Department of Defense
Fiscal Year (FY) 2022 Budget Estimates

May 2021

Army

Justification Book of

Research, Development, Test & Evaluation, Army

RDT&E − Volume III, Budget Activity 7

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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, $12,799,645,000.00 to remain available for obligation until September 30, 2023.

The FY 2022 Overseas Contingency Operations accounted for in the base budget are as follows:

Direct War cost accounted for in the Base Budget $67,710,000: Direct War costs are those combat or direct combat support costs that will not continue to be expended once combat operations end at major contingency locations.

Enduring costs accounted for in the Base budget: $41,546,000: Enduring Requirements are enduring in theater and in CONUS costs that will likely remain after combat operations cease, and have previously been funded in OCO.

FY 2021 includes Division C, Title IX and Division J, Title IV of the Consolidated Appropriations Act, 2021 (P.L. 116-260).

FY 2020 includes Division A, Title IX and X of the Consolidated Appropriations Act, 2020 (P.L. 116-93), Division F, title IV and V from the Further Consolidated Appropriations Act, 2020 (P.L. 116-94) and the Coronavirus Aid, Relief, and Economic Security Act (P.L. 116-136).

COST STATEMENT

The following Justification Books were prepared at a cost of $472,560: 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.

FY 2022 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 2021.

2. Relationship of the FY 2022 Budget Submitted to Congress to the FY 2021 Budget Submitted to Congress. This paragraph provides a list of program elements/projects that are major new starts, restructures, developmental transitions, and terminated programs. Explanations for these changes can be found in the narrative sections of the Program Element R-2A Exhibits.

New Start Programs:

Budget Activity	***OSDPE / Project***	***Project Title***
01	0601104A / CI9	Strategic University Basic Research Alliance
02	0602141A / CJ1	Lethality Enabling University Applied Research
02	0602147A / AF1	Long Range Maneuverable Fires (LRMF) Technology
02	0602181A / CM7	Collaborative Convergence Applied Research
02	0602182A / CN4	Network Enabling University Applied Research
02	0602183A / CL5	Air Platform Enabling University Applied Research
02	0602184A / CK9	Advancing Concepts and Technology Forecasting Tech
02	0602184A / CN2	Intelligent Weapons Concepts and Technologies
02	0602184A / CN9	Soldier Enabling University Applied Research
02	0602184A / CO1	Soldier Power And Energy Concepts and Technologies
02	0602184A / CO2	Soldier-Intelligent Technology Research
02	0602386A / CP6	Biotechnology Demonstration and Evaluation
03	0603025A / CK8	Advanced Technology Development and Convergence
03	0603041A / CL9	Collab Battlefield Networked Leth Sys Adv Tech
03	0603041A / CM2	Collaborative Convergence Adv Tech Development
03	0603041A / CM8	Convergence Battlefield Integration

03	0603042A / CN3	Network Enabling University Adv Development
03	0603043A / CL4	Air Platform Enabling University Adv Development
03	0603044A / CN8	Soldier Enabled University Advanced Development
03	0603119A / CJ9	Ground Enabling University Adv Development
03	0603386A / CP7	Foundational Biotechnology Design and Development
03	0603462A / BH4	Ground Vehicle Holistic Defense Adv Tech
03	0603463A / AO3	Network C3I Advanced Technology
03	0603463A / AO6	Network C3I Advanced Technology
03	0603463A / AP6	Network C3I Advanced Technology
03	0603463A / AP8	Network C3I Advanced Technology
04	0604019A / BU9	IFPC High Energy Laser
04	0604019A / CO6	IFPC High Power Microwave (HPM)
04	0604115A / CE4	Emerging Technology Initiatives Development
04	0604403A / FM3	Future Interceptor
04	0604531A / CQ5	C-SUAS JOINT NEW CAPABILITIES DEVELOPMENT
04	0604531A / CQ6	C-SUAS JOINT ENABLING CAPABILITIES DEVELOPMENT
05	0303667A / CR1	Citizen Broadband Radio System
05	0304270A / CK3	TLS Echelon Above Brigade (EAB)
05	0604601A / S70	Personnel Recovery Support System (PRSS)
05	0604802A / CE3	Precision Munition (Sniper)
05	0604804A / VR7	Combat Service Support Systems
05	0604818A / EJ6	TACTICAL ENHANCEMENT
05	0605053A / BS9	Robotic Payloads
05	0605143A / BX5	Biometrics Enabling Capability (BEC)
05	0605531A / CQ7	C-SUAS JOINT NEW CAPABILITIES
05	0605531A / CQ8	C-SUAS JOINT ENABLING CAPABILITIES
07	0307665A / BI7	Biometrics Enabled Intelligence
07	0607131A / CP2	Precision Fire Technology Improvements

Program Element/Project Restructures:

Budget Activity	***Old OSDPE / Project: Title***	***New OSDPE / Project***
01	0601102A / AA1 AA2 AA6 AA7 AA8 AB1 AB2 AB4 AC6: Multiple	0601601A / CL3
01	0602785A / 790: Manpower/Personnel/Training Technology	0603040A / CL1
02	0602787A / MM8: Infectious Diseases and Applied Rsch Technology	0603002A / CJ3
02	0602787A / MN1: Applied Sensory Systems Trauma Technology	0602787A / MK4, MM4
02	0602141A / AH9: Advanced Warheads Technology	0602141A / CJ6
02	0602141A / AI1: Advanced Terrain Shaping Technology	0602141A / CF8
02	0602143A / BC3: Soldier Decision Making & Comms Performance Tech	0602184A / CO2
02	0602143A / BD6: Soldier Sys Interfaces/Integration- Sensor Tech	0602180A / CL7
02	0602144A / CA9: Predictive Maintenance	0602180A / CN7
02	0602145A / BF6: Crew Augmentation and Optimization Tech	0602144A / CG8
02	0602145A / BF8: Artificial Intelligence & Machine Learning Tech	0602180A / CL7
02	0602145A / BF8: Artificial Intelligence & Machine Learning Tech	0602183A / CL5
02	0602145A / BF9: Sensors for Autonomous Operations and Surv Tech	0602180A / CL2
02	0602145A / BG6: Advanced Concepts for Active Defense Technology	0602144A / CG7
02	0602145A / BH5: Platform Electrification and Mobility Tech	0602144A / CG6
02	0602145A / BH9: Protection for Autonomous Systems Tech	0603041A / CM8
02	0602145A / BI2: Sensor Protection Technology	0602144A / CG5
02	0602146A / AN7: COE - Every Receiver is a Sensor Technology	0602180A / CL2
02	0602146A / AO5: Tag Track and Locate Small Satellites Technology	0602146A / CK1, CG3
02	0602146A / AP4: CEMA Camouflage Technology	0602182A / CM9, CN5
02	0602146A / AQ9: Expeditionary Data to Decisions Technology	0602146A / CI3
02	0602146A / AV6: Airborne Engineering Support Technology	0603463A / CI7
02	0602148A / AI5: Next Gen Tactical UAS TD Technology	0602148A / CH2
02	0602148A / AJ4: Digital Vehicle Management and Control Technology	0602148A / CG9
02	0602148A / AK2: Aviation Survivability Technology	0602183A / CN1
02	0602148A / AK2: Aviation Survivability Technology	0602148A / CH3
02	0602148A / AK4: Multi-Role Small Guided Missile Technology	0602148A / CI5

02	0602148A / AK9: Adv Teaming for Tactical Aviation Operations Tech	0602183A / CL8
02	0602148A / AM4: Opt Energy Stg & Therm Mgmt for FVL Survivability	0602148A / CH4
02	0602150A / AC9: High Energy Laser Tactical Vehicle Demonstrator Te	0603466A / AD1
02	0602150A / AD2: High Energy Laser (HEL) Enabling and Support Techn	0602141A / CF7
02	0602150A / AD3: Maneuver Air Defense Technology	0602141A / CJ7
02	0602213A / CY8: Cyber Security App Research and Exper Partner Tech	0603463A / CI7
02	0602213A / CY8: Cyber Security App Research and Exper Partner Tech	0602146A / CI3
02	0603002A / MO9: Vaccines to Prevent Dengue Fever Advanced Tech	0603002A / CJ3
02	0603007A / 792: Personnel Performance & Training	0603040A / CL6
03	0603116A / AI3: Terminal Weapons Effects Against Structures and Critical Targets Tech	0603116A / CH5
03	0603118A / BC4: Soldier Decision Making&Comms Performance AdvTech	0603465A / AL9
03	0603463A / AM9: Protected SATCOM Advanced Technology	0603463A / CI7
03	0603463A / AM9: Protected SATCOM Advanced Technology	0602146A / AN3
03	0603463A / AO3: Stand-In Advanced RF Effects (STARE) Adv Tech	0603463A / AO7
03	0603463A / AO6: Tag Track and Locate Small Satellites Adv Tech	0603463A / CJ8
03	0603463A / AP6: C4ISR Integrated Demonstrations Advanced Tech	0603463A / AN4, AM9, AP9
03	0603463A / AP8: Comms/Horiz Int for Army Mod Priorities Adv Tech	0603041A / CL9, CL2, CM8
03	0603463A / AQ1: Spectrum Obfuscation Advanced Technology	0603463A / CI7
03	0603463A / AQ5: Sensor CE-Integrated Sensor Architecture Adv Tech	0603463A / CI7
03	0603463A / AQ8: High Tempo Data Driven Decision Tools Adv Tech	0603463A / CI7
03	0603463A / AU6: Automated Analytics for Operational Environment AT	0603463A / CF9
03	0603463A / AV2: LEO Advanced Technology	0603463A / CJ8
03	0603463A / BZ8: Aerial Tier Networking (High Altitude)	0602146A / AN3
03	0603465A / AJ1: Future UAS Engine Advanced Technology	0603465A / AI8
03	0603465A / AJ5: Digital Vehicle Management & Control Advanced Tech	0603465A / CH6
03	0603465A / AK3: Aviation Survivability Advanced Technology	0603465A / CH8, CG1
03	0603465A / AM5: Opt Energy Stg & Therm Mgmt for FVL Surv Adv Tech	0603465A / CH7
03	0603466A / AD6: Next Generation Fires Radar Advanced Technology	0602141A / CG4
04	0603327A / FG9: Air and Missile Defense (AMD) Electronic Warfare	0604741A / 126
04	0603619A / 606: Cntrmn/Barrier Adv Dev	0603619A / CE5

04	0603639A / BQ4: 155mm Artillery Propulsion XM654	0604802A / BQ3
04	0603639A / FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	0604802A / FG1
04	0603766A / 907: Tactical Electronic Surveillance System - Adv Dev	0603766A / BX9, CC5, BY9
04	0603774A / VT7: Soldier Maneuver Sensors - Adv Dev	0603774A / BQ5
04	0603801A / F12: Future Attack Reconnaissance Aircraft	0603801A / CK7
04	0603807A / 811: Mil HIV Vac&Drug Dev	0604807A / 849
04	0604017A / FD2: Soldier Robotics Systems	0605053A / BS9
04	0604117A / FI4: Maneuver - Short Range Air Defense (M-SHORAD)	0604117A / CR9, CS1
04	0604120A / ED5: Assured Positioning, Navigation and Timing (PNT)	1206120A / FJ8
04	0604120A / EH8: DISMOUNTED	1206120A / FJ9
04	0604120A / EH9: PSEUDOLITES	1206120A / FK1
04	0604120A / EJ2: MOUNTED	1206120A / FK2
04	0604120A / EJ3: ANTI-JAM ANTENNA	1206120A / FK3
04	0604121A / FD6: Synthetic Training Environment Refine & Prototype	0604121A / CR2, CR3, CR4, CR5, CR7
04	0604121A / SV1: Soldier/Squad Virtual Trainer	0604121A / CR4, CR6
04	0604182A / HX1: Long-Range Hypersonic Weapon	0605232A / HX2
04	0604319A / DU3: IFPC2	0605052A / EY7
04	0604710A / L67: Soldier Night Vision Devices	0604710A / BQ6
04	0604807A / 812: Mil HIV Vac&Drug Dev	0604807A / 849
04	0604808A / 016: Close Combat Capabilities ENG DEV	0604808A / CS2, CS3
04	0604823A / L86: LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)	0607148A / BY8
04	0604823A / L88: Enhanced AN/TPQ 36	0607148A / BY8
05	0304270A / EW5: Electronic Warfare Development - MIP	0607313A / CE2
05	0304270A / EW6: ARAT-TSS - MIP	0304270A / CR8
05	0604798A / FG7: Emerging Technology Initiatives	0605054A / FI3
05	0605013A / 738: AcqBiz	0605013A / FL9
05	0605013A / FL9: Army Accessioning IT Development	0605233A / CP8
05	0605036A / EQ5: Combating Weapons of Mass Destruction (CWMD)	0605036A /CS6
05	0605041A / EV5: Defensive CYBER Operations	0608041A / CD1
05	0605053A / FB8: Soldier Borne Sensor (SBS)	0604827A / FK4

05	0605766A / DX9: National Integration To Tactical Systems(MIP)	0605766A / BV3
06	0604256A / 976: Army Threat Sim (ATS)	0604759A / FF1
06	0605898A / XW7: Command HQ - ARI	0605801A / M15
07	0303140A / DV4: Key Management Infrastructure (KMI)	0605144A / BY6
07	0305208A / D07: DCGS-A Common Modules (MIP)	0605148A / BY5
07	0305208A / D07: DCGS-A Common Modules (MIP)	0605224A / CK4
07	0305208A / D07: DCGS-A Common Modules (MIP)	0604037A / BY4
07	0205402A / EF2: Integrated Base Defense	0604785A / DS4
07	0607134A / ES1: Long Range Precision Fires (LRPF)	0605231A / CO3

Program Terminations (including transfers to Procurement and Sustainment):

Budget Activity	***OSDPE / Project***	***Project Title***
02	0602143A / BB7	Soldier Lethality Technology / Exoskeleton: Technology for Man-Machine Interface
02	0602145A / BF1	Next Generation Combat Vehicle Technology / Autonomous Ground Resupply Tech
02	0602146A / AM6	Network C3I Technology / Modular RF Communications Technology
02	0602146A / AP7	Network C3I Technology / Comms/Horiz Int for Army Mod Priorities Tech
02	0602146A / AQ7	Network C3I Technology / High Tempo Data Driven Decision Tools Technology
02	0602146A / AT2	Network C3I Technology / Subterranean Detection and Monitoring Technology
02	0602146A / AU3	Network C3I Technology / Geospatially Enabled Operational Design Technology
02	0602146A / AW3	Network C3I Technology / DoD PNT M&S Collaborative Initiative (CI) Technolo
02	0602146A / BZ6	Network C3I Technology / Narrowband SATCOM Technology
02	0602150A / AC9	Air and Missile Defense Technology / High Energy Laser Tactical Vehicle Demonstrator Te
02	0602150A / AE4	Air and Missile Defense Technology / Collaborative ISR Sensors Technology
03	0603118A / BB6	Soldier Lethality Advanced Technology / Physical Augmentation: Adv Tech for Field Demo
03	0603462A / BF2	Next Generation Combat Vehicle Advanced Technology / Autonomous Ground Resupply (AGR) Adv Tech
03	0603462A / BG5	Next Generation Combat Vehicle Advanced Technology / Extended Line of Sight (ELOS) Advanced Technology
03	0603462A / BH1	Next Generation Combat Vehicle Advanced Technology / Survivability Systems Controls Advanced Technology

03	0603462A / BK6	Next Generation Combat Vehicle Advanced Technology / Adv Direct InDirect Armament Sys (ADIDAS) Adv Tech
03	0603463A / AN6	Network C3I Advanced Technology / Prot SATCOM-WB Global SATCOM Inter Canc Adv Tech
03	0603463A / AW4	Network C3I Advanced Technology / DoD PNT M&S Collaborative Initiative (CI) Adv Tech
03	0603464A / AE9	Long Range Precision Fires Advanced Technology / Low-Cost Tact Ext Range Missile (LC-TERM) Adv Tech
03	0603466A / AE1	Air and Missile Defense Advanced Technology / Close Combat High Energy Laser Advanced Technology
04	0603639A / 694	Tank and Medium Caliber Ammunition / Medium Caliber Ammunition
04	0603747A / C08	Soldier Support and Survivability / Rapid Equipping Force
04	0603804A / G11	Logistics and Engineer Equipment - Adv Dev / Adv Elec Energy Con Ad
04	0603807A / VS7	Medical Systems - Adv Dev / MEDEVAC Mission Equipment Package (MEP) - Adv Dev
04	0604021A / AW7	Electronic Warfare Technology Maturation (MIP) / Electronic Warfare Technology Maturation (MIP)
04	0604115A / AX4	Technology Maturation Initiatives / Computational Prototyping Environment (CPE)
04	0604115A / AX6	Technology Maturation Initiatives / Active Protection Systems Integration
04	0604115A / AX7	Technology Maturation Initiatives / Multi-Mission High Energy Laser (MMHEL) Sys Demo
04	0604115A / AY1	Technology Maturation Initiatives / MUM-T Platform Enabler
04	0604115A / AY3	Technology Maturation Initiatives / Strategic Long Range Cannon
05	0604622A / VR5	Family of Heavy Tactical Vehicles / TWV Protection Kits
05	0604741A / 149	Air Defense Command, Con trol and Intelligence - Eng Dev / Counter-Rockets, Artillery & Mortar
05	0604768A / 688	Brilliant Anti-Armor Submunition (BAT) / ATACMS BLK II
05	0604780A / 582	Combined Arms Tactical Trainer (CATT) Core / Synthetic Envir Core
05	0604798A / DY5	Brigade Analysis, Integration and Evaluation / Production/Field Coordination for Capability Sets
05	0604802A / 613	Weapons and Munitions - Eng Dev / MORTAR SYSTEMS
05	0604802A / EU5	Weapons and Munitions - Eng Dev / .50 Caliber All-Purpose Tactical cartridge (APTC)
05	0604802A / XT2	Weapons and Munitions - Eng Dev / 40mm Door Breach
05	0604804A / FG4	Logistics and Engineer Equipment - Eng Dev / Ultra-Lightweight Camouflage Net System (ULCANS)
05	0604808A / 415	Landmine Warfare/Barrier - Eng Dev / Mine Neutral/Detection
05	0604854A / HB6	Artillery Systems - EMD / Mobile 155MM Howitzer
05	0605033A / EQ3	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E) / Grnd-Based Opnl

		Surv Sys -Exped (GBOSS-E)
05	0605053A / FB4	Ground Robotics / Common Robotic Systems
07	0203744A / EB6	Aircraft Modifications/Product Improvement Programs / MQ-1C Gray Eagle MODS
07	0305204A / 123	Tactical Unmanned Aerial V ehicles / Joint Technology Center System Integration

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 2022 President's Budget
Exhibit R-1 FY 2022 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 May 2021

Appropriation	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request
Research, Development, Test & Eval, Army	12,842,958	14,144,856	12,799,645
Total Research, Development, Test & Evaluation	12,842,958	14,144,856	12,799,645
Other RDT&E Budget Activities Not Included in the Research, Development, Test and Evaluation Title			
Chem Agents & Munitions Destruction	890,830	942,493	1,001,231
Total Not in Research, Development, Test & Evaluation Title	890,830	942,493	1,001,231

R-122BAS: FY 2022 President's Budget (Total Base Published Version), as of May 5, 2021 at 15:01:27

Department of Defense
FY 2022 President's Budget
Exhibit R-1 FY 2022 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 May 2021

Summary Recap of Budget Activities	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request
Basic Research	557,265	552,521	473,475
Applied Research	1,227,661	1,518,770	914,288
Advanced Technology Development	1,520,145	1,940,015	1,297,437
Advanced Component Development & Prototypes	2,895,592	3,577,387	3,806,330
System Development & Demonstration	3,072,662	2,948,445	3,392,358
Management Support	1,759,840	1,834,218	1,416,698
Operational Systems Development	1,809,793	1,716,794	1,380,248
Software and Digital Technology Pilot Programs		56,706	118,811
Total Research, Development, Test & Evaluation	12,842,958	14,144,856	12,799,645

Summary Recap of FYDP Programs			
General Purpose Forces	733,243	589,525	542,571
Intelligence and Communications	287,081	362,184	280,473
Research and Development	11,434,683	13,058,379	11,911,888
Central Supply and Maintenance	105,885	130,785	61,720
Administration and Associated Activities	61		
Space	274,732		
Classified Programs	7,273	3,983	2,993
Total Research, Development, Test & Evaluation	12,842,958	14,144,856	12,799,645

R-122BAS: FY 2022 President's Budget (Total Base Published Version), as of May 5, 2021 at 15:01:27

Department of Defense
FY 2022 President's Budget
Exhibit R-1 FY 2022 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 May 2021

	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request
Summary Recap of Non-RDT&E Title FYDP Programs			
Central Supply and Maintenance	890,830	942,493	1,001,231
Total Research, Development, Test & Evaluation	890,830	942,493	1,001,231

R-122BAS: FY 2022 President's Budget (Total Base Published Version), as of May 5, 2021 at 15:01:27

Department of the Army
FY 2022 President's Budget
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Department of the Army
FY 2022 President's Budget
Exhibit R-1 FY 2022 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 May 2021

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

Line No	Program Element Number	Item	Act	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request	Sec
1	0601102A	Defense Research Sciences	01	343,481	344,031	297,241	U
2	0601103A	University Research Initiatives	01	85,148	84,697	66,981	U
3	0601104A	University and Industry Research Centers	01	123,654	118,716	94,003	U
4	0601121A	Cyber Collaborative Research Alliance	01	4,982	5,077	5,067	U
5	0601601A	Artificial Intelligence and Machine Learning Basic Research	01			10,183	U
		Basic Research		557,265	552,521	473,475	
6	0602115A	Biomedical Technology	02		11,403	11,925	U
7	0602134A	Counter Improvised-Threat Advanced Studies	02		1,927	1,976	U
8	0602141A	Lethality Technology	02	68,852	117,484	64,126	U
9	0602142A	Army Applied Research	02	30,733	30,757	28,654	U
10	0602143A	Soldier Lethality Technology	02	141,154	201,750	105,168	U
11	0602144A	Ground Technology	02	143,172	158,158	56,400	U
12	0602145A	Next Generation Combat Vehicle Technology	02	255,041	258,351	172,166	U
13	0602146A	Network C3I Technology	02	133,804	202,257	84,606	U
14	0602147A	Long Range Precision Fires Technology	02	117,395	119,007	64,285	U
15	0602148A	Future Verticle Lift Technology	02	94,888	169,536	91,411	U
16	0602150A	Air and Missile Defense Technology	02	93,937	107,584	19,316	U
17	0602180A	Artificial Intelligence and Machine Learning Technologies	02			15,034	U
18	0602181A	All Domain Convergence Applied Research	02			25,967	U
19	0602182A	C3I Applied Research	02			12,406	U
20	0602183A	Air Platform Applied Research	02			6,597	U

R-122BAS: FY 2022 President's Budget (Total Base Published Version), as of May 5, 2021 at 15:01:27

Department of the Army
FY 2022 President's Budget
Exhibit R-1 FY 2022 President's Budget
Total Obligational Authority
(Dollars in Thousands)

05 May 2021

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

Line No	Program Element Number	Item	Act	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request	Sec
21	0602184A	Soldier Applied Research	02			11,064	U
22	0602213A	C3I Applied Cyber	02	17,351	18,816	12,123	U
23	0602386A	Biotechnology for Materials - Applied Research	02			20,643	U
24	0602785A	Manpower/Personnel/Training Technology	02	20,406	20,399	18,701	U
25	0602787A	Medical Technology	02	110,928	101,341	91,720	U
		Applied Research		1,227,661	1,518,770	914,288	
26	0603002A	Medical Advanced Technology	03	82,256	94,669	43,804	U
27	0603007A	Manpower, Personnel and Training Advanced Technology	03	10,225	11,344	14,273	U
28	0603025A	Army Agile Innovation and Demonstration	03			22,231	U
29	0603040A	Artificial Intelligence and Machine Learning Advanced Technologies	03			909	U
30	0603041A	All Domain Convergence Advanced Technology	03			17,743	U
31	0603042A	C3I Advanced Technology	03			3,151	U
32	0603043A	Air Platform Advanced Technology	03			754	U
33	0603044A	Soldier Advanced Technology	03			890	U
34	0603115A	Medical Development	03		26,711	26,521	U
35	0603116A	Lethality Advanced Technology	03			8,066	U
36	0603117A	Army Advanced Technology Development	03	66,424	62,663	76,815	U
37	0603118A	Soldier Lethality Advanced Technology	03	131,119	151,370	107,966	U
38	0603119A	Ground Advanced Technology	03	136,544	196,055	23,403	U
39	0603134A	Counter Improvised-Threat Simulation	03		24,087	24,747	U
40	0603386A	Biotechnology for Materials - Advanced Research	03			53,736	U

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41	0603457A	C3I Cyber Advanced Development	03	25,492	43,357	31,426	U
42	0603461A	High Performance Computing Modernization Program	03	217,389	221,161	189,123	U
43	0603462A	Next Generation Combat Vehicle Advanced Technology	03	255,386	302,209	164,951	U
44	0603463A	Network C3I Advanced Technology	03	138,937	216,520	155,867	U
45	0603464A	Long Range Precision Fires Advanced Technology	03	196,393	177,142	93,909	U
46	0603465A	Future Vertical Lift Advanced Technology	03	180,163	220,334	179,677	U
47	0603466A	Air and Missile Defense Advanced Technology	03	79,817	175,703	48,826	U
48	0603920A	Humanitarian Demining	03		16,690	8,649	U
		Advanced Technology Development		1,520,145	1,940,015	1,297,437	
49	0603305A	Army Missle Defense Systems Integration	04	59,318	140,195	11,702	U
50	0603308A	Army Space Systems Integration	04		25,584	18,755	U
51	0603327A	Air and Missile Defense Systems Engineering	04	52,672	47,098		U
52	0603619A	Landmine Warfare and Barrier - Adv Dev	04	79,504	56,067	50,314	U
53	0603639A	Tank and Medium Caliber Ammunition	04	72,456	100,367	79,873	U
54	0603645A	Armored System Modernization - Adv Dev	04	138,300	138,685	170,590	U
55	0603747A	Soldier Support and Survivability	04	9,246	5,712	2,897	U
56	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	37,490	182,400	113,365	U
57	0603774A	Night Vision Systems Advanced Development	04	192,530	15,429	18,000	U
58	0603779A	Environmental Quality Technology - Dem/Val	04	19,089	20,906	11,921	U
59	0603790A	NATO Research and Development	04	5,184	4,589	3,777	U
60	0603801A	Aviation - Adv Dev	04	488,397	694,296	1,125,641	U

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61	0603804A	Logistics and Engineer Equipment - Adv Dev	04	7,081	8,587	7,055	U
62	0603807A	Medical Systems - Adv Dev	04	36,307	33,085	22,071	U
63	0603827A	Soldier Systems - Advanced Development	04	25,204	23,184	17,459	U
64	0604017A	Robotics Development	04	80,909	95,367	87,198	U
65	0604019A	Expanded Mission Area Missile (EMAM)	04			50,674	U
66	0604021A	Electronic Warfare Technology Maturation (MIP)	04	23,043	15,034		U
67	0604035A	Low Earth Orbit (LEO) Satellite Capability	04		21,850	19,638	U
68	0604036A	Multi-Domain Sensing System (MDSS) Adv Dev	04			50,548	U
69	0604037A	Tactical Intel Targeting Access Node (TITAN) Adv Dev	04			28,347	U
70	0604100A	Analysis Of Alternatives	04	9,811	9,714	10,091	U
71	0604101A	Small Unmanned Aerial Vehicle (SUAV) (6.4)	04		1,328	926	U
72	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	40,745	57,083	69,697	U
73	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	364,154	308,805	327,690	U
74	0604115A	Technology Maturation Initiatives	04	171,058	141,109	270,124	U
75	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	41,690	4,813	39,376	U
76	0604119A	Army Advanced Component Development & Prototyping	04	117,335	172,990	189,483	U
77	0604120A	Assured Positioning, Navigation and Timing (PNT)	04		115,688	96,679	U
78	0604121A	Synthetic Training Environment Refinement & Prototyping	04	99,357	112,093	194,195	U
79	0604134A	Counter Improvised-Threat Demonstration, Prototype Development, and Testing	04		13,326	13,379	U
80	0604182A	Hypersonics	04	394,619	832,166	300,928	U
81	0604403A	Future Interceptor	04	1,918		7,895	U

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82	0604531A	Counter - Small Unmanned Aircraft Systems Advanced Development	04			19,148	U
83	0604541A	Unified Network Transport	04	28,478	39,192	35,409	U
84	0604644A	Mobile Medium Range Missile	04	4,794	88,100	286,457	U
85	0604785A	Integrated Base Defense (Budget Activity 4)	04	2,000	2,020	2,040	U
86	0305251A	Cyberspace Operations Forces and Force Support	04	58,611	50,525	52,988	U
87	1206120A	Assured Positioning, Navigation and Timing (PNT)	04	133,307			U
88	1206308A	Army Space Systems Integration	04	100,985			U
		Advanced Component Development & Prototypes		2,895,592	3,577,387	3,806,330	
89	0604201A	Aircraft Avionics	05	8,069	7,011	6,654	U
90	0604270A	Electronic Warfare Development	05	57,090	56,624	30,840	U
91	0604601A	Infantry Support Weapons	05	86,154	88,552	67,873	U
92	0604604A	Medium Tactical Vehicles	05		8,213	11,374	U
93	0604611A	JAVELIN	05	14,377	5,983	7,094	U
94	0604622A	Family of Heavy Tactical Vehicles	05	12,085	22,254	31,602	U
95	0604633A	Air Traffic Control	05	5,543	3,383	4,405	U
96	0604642A	Light Tactical Wheeled Vehicles	05	2,843	4,193	2,055	U
97	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	273,433	123,992	137,256	U
98	0604710A	Night Vision Systems - Eng Dev	05	135,283	54,234	62,690	U
99	0604713A	Combat Feeding, Clothing, and Equipment	05	7,295	2,734	1,658	U
100	0604715A	Non-System Training Devices - Eng Dev	05	29,785	27,013	26,540	U
101	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	70,279	62,058	59,518	U

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102	0604742A	Constructive Simulation Systems Development	05	11,158	9,779	22,331	U
103	0604746A	Automatic Test Equipment Development	05	10,466	5,375	8,807	U
104	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	7,480	7,605	7,453	U
105	0604768A	Brilliant Anti-Armor Submunition (BAT)	05	19,177	24,064		U
106	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	8,861	3,438		U
107	0604798A	Brigade Analysis, Integration and Evaluation	05	29,852	18,737	21,534	U
108	0604802A	Weapons and Munitions - Eng Dev	05	182,119	268,858	309,778	U
109	0604804A	Logistics and Engineer Equipment - Eng Dev	05	105,668	53,676	59,261	U
110	0604805A	Command, Control, Communications Systems - Eng Dev	05	12,077	10,674	20,121	U
111	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	70,489	51,285	44,424	U
112	0604808A	Landmine Warfare/Barrier - Eng Dev	05	33,881	9,239	14,137	U
113	0604818A	Army Tactical Command & Control Hardware & Software	05	124,749	128,676	162,704	U
114	0604820A	Radar Development	05	91,782	105,271	127,919	U
115	0604822A	General Fund Enterprise Business System (GFEBS)	05	41,119	15,428	17,623	U
116	0604823A	Firefinder	05	16,583	18,278		U
117	0604827A	Soldier Systems - Warrior Dem/Val	05	4,606	6,296	6,454	U
118	0604852A	Suite of Survivability Enhancement Systems - EMD	05	81,899	62,012	106,354	U
119	0604854A	Artillery Systems - EMD	05	20,290	36,187		U
120	0605013A	Information Technology Development	05	89,541	126,498	122,168	U
121	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	97,873	111,078	76,936	U
122	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	80,381	76,140	35,560	U

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123	0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05	6,423			U
124	0605030A	Joint Tactical Network Center (JTNC)	05	15,228	15,671	16,364	U
125	0605031A	Joint Tactical Network (JTN)	05	39,130	30,540	28,954	U
126	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	3,689	5,758		U
127	0605034A	Tactical Security System (TSS)	05	7,343			U
128	0605035A	Common Infrared Countermeasures (CIRCM)	05	22,226	29,770	16,630	U
129	0605036A	Combating Weapons of Mass Destruction (CWMD)	05	9,589			U
130	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	5,805	4,669	7,618	U
131	0605041A	Defensive CYBER Tool Development	05	50,662	28,544	18,892	U
132	0605042A	Tactical Network Radio Systems (Low-Tier)	05	27,236	20,511	28,849	U
133	0605047A	Contract Writing System	05	16,379	22,025	22,960	U
134	0605049A	Missile Warning System Modernization (MWSM)	05	1,475			U
135	0605051A	Aircraft Survivability Development	05	130,211	99,208	65,603	U
136	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	186,369	153,362	233,512	U
137	0605053A	Ground Robotics	05	24,747	12,010	18,241	U
138	0605054A	Emerging Technology Initiatives	05	36,146	294,366	254,945	U
139	0605143A	Biometrics Enabling Capability (BEC)	05			4,326	U
140	0605144A	Next Generation Load Device - Medium	05			15,616	U
141	0605145A	Medical Products and Support Systems Development	05		919	962	U
142	0605148A	Tactical Intel Targeting Access Node (TITAN) EMD	05			54,972	U

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143	0605203A	Army System Development & Demonstration	05	184,410	150,201	122,175	U
144	0605205A	Small Unmanned Aerial Vehicle (SUAV) (6.5)	05		5,780	2,275	U
145	0605224A	Multi-Domain Intelligence	05			9,313	U
146	0605225A	SIO Capability Development	05			22,713	U
147	0605231A	Precision Strike Missile (PrSM)	05			188,452	U
148	0605232A	Hypersonics EMD	05			111,473	U
149	0605233A	Accessions Information Environment (AIE)	05			18,790	U
150	0605450A	Joint Air-to-Ground Missile (JAGM)	05	6,314	7,566	2,134	U
151	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	211,634	206,850	157,873	U
152	0605531A	Counter - Small Unmanned Aircraft Systems Sys Dev & Demonstration	05			33,386	U
153	0605625A	Manned Ground Vehicle	05	197,304	171,890	225,106	U
154	0605766A	National Capabilities Integration (MIP)	05	7,835	7,670	14,454	U
155	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	7,119	1,678	2,564	U
156	0605830A	Aviation Ground Support Equipment	05	1,596	1,413	1,201	U
157	0303032A	TROJAN - RH12	05	3,936	3,451	3,362	U
158	0303267A	Auctioned Spectrum Relocation Fund	05	7,650			U
159	0303467A	SENSR Spectrum Pipeline SRF	05	251			U
160	0303567A	Non-SENSR Spectrum Pipeline SRF	05	1,236			U
161	0304270A	Electronic Warfare Development	05	18,432	59,755	75,520	U
		System Development & Demonstration		3,072,662	2,948,445	3,392,358	
162	0604256A	Threat Simulator Development	06	41,566	41,486	18,439	U

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163	0604258A	Target Systems Development	06	27,984	35,279	17,404	U
164	0604759A	Major T&E Investment	06	140,946	119,231	68,139	U
165	0605103A	Rand Arroyo Center	06	12,573	12,989	33,126	U
166	0605301A	Army Kwajalein Atoll	06	230,051	221,965	240,877	U
167	0605326A	Concepts Experimentation Program	06	35,403	50,394	79,710	U
168	0605502A	Small Business Innovative Research	06	392,999	369,715		U
169	0605601A	Army Test Ranges and Facilities	06	356,231	390,351	354,227	U
170	0605602A	Army Technical Test Instrumentation and Targets	06	60,170	81,829	49,253	U
171	0605604A	Survivability/Lethality Analysis	06	33,632	36,001	36,389	U
172	0605606A	Aircraft Certification	06	3,319	2,736	2,489	U
173	0605702A	Meteorological Support to RDT&E Activities	06	6,094	6,360	6,689	U
174	0605706A	Materiel Systems Analysis	06	21,233	21,830	21,558	U
175	0605709A	Exploitation of Foreign Items	06	11,168	8,936	13,631	U
176	0605712A	Support of Operational Testing	06	52,280	54,116	55,122	U
177	0605716A	Army Evaluation Center	06	60,474	56,827	65,854	U
178	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	2,423	2,478	2,633	U
179	0605801A	Programwide Activities	06	56,800	84,510	96,589	U
180	0605803A	Technical Information Activities	06	30,434	25,487	26,808	U
181	0605805A	Munitions Standardization, Effectiveness and Safety	06	52,401	55,648	43,042	U
182	0605857A	Environmental Quality Technology Mgmt Support	06	4,489	1,715	1,789	U
183	0605898A	Army Direct Report Headquarters - R&D - MHA	06	53,320	54,564	52,108	U

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184	0606001A	Military Ground-Based CREW Technology	06	2,053			U
185	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	64,311	68,911	80,952	U
186	0606003A	CounterIntel and Human Intel Modernization	06	2,925	5,200	5,363	U
187	0606105A	Medical Program-Wide Activities	06		19,164	39,041	U
188	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	4,500	6,496	5,466	U
189	0909999A	Financing for Cancelled Account Adjustments	06	61			U
		Management Support		1,759,840	1,834,218	1,416,698	
190	0603778A	MLRS Product Improvement Program	07	14,014	9,786	12,314	U
191	0605024A	Anti-Tamper Technology Support	07	8,141	8,436	8,868	U
192	0607131A	Weapons and Munitions Product Improvement Programs	07	14,222	19,666	22,828	U
193	0607134A	Long Range Precision Fires (LRPF)	07	149,455	100,146		U
194	0607136A	Blackhawk Product Improvement Program	07	22,502	8,300	4,773	U
195	0607137A	Chinook Product Improvement Program	07	164,820	49,409	52,372	U
196	0607139A	Improved Turbine Engine Program	07	197,941	232,159	275,024	U
197	0607142A	Aviation Rocket System Product Improvement and Development	07	1,847	13,421	12,417	U
198	0607143A	Unmanned Aircraft System Universal Products	07	17,386	19,460	4,594	U
199	0607145A	Apache Future Development	07	5,224	52,502	10,067	U
200	0607148A	AN/TPQ-53 Counterfire Target Acquisition Radar System	07			56,681	U
201	0607150A	Intel Cyber Development	07		14,652	3,611	U
202	0607312A	Army Operational Systems Development	07	45,026	35,851	28,029	U
203	0607313A	Electronic Warfare Development	07			5,673	U

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204	0607665A	Family of Biometrics	07	1,576	1,276	1,178	U
205	0607865A	Patriot Product Improvement	07	83,833	178,984	125,932	U
206	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	07	45,447	43,060	25,547	U
207	0203735A	Combat Vehicle Improvement Programs	07	266,197	213,728	211,523	U
208	0203743A	155mm Self-Propelled Howitzer Improvements	07	191,076	217,959	213,281	U
209	0203744A	Aircraft Modifications/Product Improvement Programs	07	8,896	11,261		U
210	0203752A	Aircraft Engine Component Improvement Program	07	138	80	132	U
211	0203758A	Digitization	07	4,043	4,351	3,936	U
212	0203801A	Missile/Air Defense Product Improvement Program	07	1,235	1,241	127	U
213	0203802A	Other Missile Product Improvement Programs	07		15,268	10,265	U
214	0205412A	Environmental Quality Technology - Operational System Dev	07	10,000	250	262	U
215	0205456A	Lower Tier Air and Missile Defense (AMD) System	07	93,743		182	U
216	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	112,468	72,817	63,937	U
217	0208053A	Joint Tactical Ground System	07		9,510	13,379	U
219	0303028A	Security and Intelligence Activities	07	26,674	23,367	24,531	U
220	0303140A	Information Systems Security Program	07	25,710	28,270	15,720	U
221	0303141A	Global Combat Support System	07	57,604	70,652	52,739	U
222	0303142A	SATCOM Ground Environment (SPACE)	07		18,002	15,247	U
223	0303150A	WWMCCS/Global Command and Control System	07	1,988			U
226	0305179A	Integrated Broadcast Service (IBS)	07	459	382	5,430	U
227	0305204A	Tactical Unmanned Aerial Vehicles	07	22,147	38,151	8,410	U

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228	0305206A	Airborne Reconnaissance Systems	07	13,177	28,858	24,460	U
229	0305208A	Distributed Common Ground/Surface Systems	07	28,821	40,771		U
230	0305219A	MQ-1C Gray Eagle UAS	07	5,000			U
231	0305232A	RQ-11 UAV	07	3,218			U
232	0305233A	RQ-7 UAV	07	7,817			U
233	0307665A	Biometrics Enabled Intelligence	07	4,350		2,066	U
234	0708045A	End Item Industrial Preparedness Activities	07	105,885	130,785	61,720	U
235	1203142A	SATCOM Ground Environment (SPACE)	07	32,764			U
236	1208053A	Joint Tactical Ground System	07	7,676			U
9999	9999999999	Classified Programs		7,273	3,983	2,993	U
		Operational Systems Development		1,809,793	1,716,794	1,380,248	
237	0608041A	Defensive CYBER - Software Prototype Development	08		56,706	118,811	U
		Software and Digital Technology Pilot Programs			56,706	118,811	
		Total Research, Development, Test & Eval, Army		12,842,958	14,144,856	12,799,645	

R-122BAS: FY 2022 President's Budget (Total Base Published Version), as of May 5, 2021 at 15:01:27

Department of the Army
FY 2022 President's Budget
Exhibit R-1 FY 2022 President's Budget
Non RDT&E Title
(Dollars in Thousands)

05 May 2021

Summary Recap of Budget Activities	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request
Research, Development, Test, And Evaluation	890,830	942,493	1,001,231
Total Research, Development, Test & Evaluation	890,830	942,493	1,001,231

Summary Recap of Non-RDT&E Title FYDP Programs			
Central Supply and Maintenance	890,830	942,493	1,001,231
Total Research, Development, Test & Evaluation	890,830	942,493	1,001,231

Department of the Army
FY 2022 President's Budget
Exhibit R-1 FY 2022 President's Budget
Non RDT&E Title
(Dollars in Thousands)

05 May 2021

Appropriation: 0390D Chem Agents & Munitions Destruction

Line No	Program Element Number	Item	Act	FY 2020 Actual*	FY 2021 Enacted**	FY 2022 Request	Sec
1	0708081D	Chemical Materials Agency	02	6,500	6,494	6,220	U
2	0708083D	Assembled Chemical Weapons Alternatives	02	884,330	935,999	995,011	U
		Research, Development, Test, And Evaluation		890,830	942,493	1,001,231	
Total Chem Agents & Munitions Destruction				890,830	942,493	1,001,231	

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
190	07	0603778A	MLRS Product Improvement Program	1
191	07	0605024A	Anti-Tamper Technology Support	19
192	07	0607131A	Weapons and Munitions Product Improvement Programs	26
193	07	0607134A	Long Range Precision Fires (LRPF)	64
194	07	0607136A	Blackhawk Product Improvement Program	75
195	07	0607137A	Chinook Product Improvement Program	86
196	07	0607139A	Improved Turbine Engine Program	97
197	07	0607142A	Aviation Rocket System Product Improvement and Development	106
198	07	0607143A	Unmanned Aircraft System Universal Products	114
199	07	0607145A	Apache Future Development	123
200	07	0607148A	AN/TPQ-53 Counterfire Target Acquisition Radar System	131
201	07	0607150A	Intel Cyber Development	139
202	07	0607312A	Army Operational Systems Development	145
203	07	0607313A	Electronic Warfare Development	146
204	07	0607665A	Family of Biometrics	154
205	07	0607865A	Patriot Product Improvement	165

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

Line #	Budget Activity	Program Element Number	Program Element Title	Page
206	07	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	177
207	07	0203735A	Combat Vehicle Improvement Programs	195
208	07	0203743A	155mm Self-Propelled Howitzer Improvements	230
209	07	0203744A	Aircraft Modifications/Product Improvement Programs	237
210	07	0203752A	Aircraft Engine Component Improvement Program	245
211	07	0203758A	Digitization	253
212	07	0203801A	Missile/Air Defense Product Improvement Program	262
213	07	0203802A	Other Missile Product Improvement Programs	270
214	07	0205412A	Environmental Quality Technology - Operational System Dev	283
215	07	0205456A	Lower Tier Air and Missile Defense (AMD) System	289
216	07	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	296
217	07	0208053A	Joint Tactical Ground System	312
219	07	0303028A	Security and Intelligence Activities	322
220	07	0303140A	Information Systems Security Program	334
221	07	0303141A	Global Combat Support System	361
222	07	0303142A	SATCOM Ground Environment (SPACE)	377
223	07	0303150A	WWMCCS/Global Command and Control System	394
226	07	0305179A	Integrated Broadcast Service (IBS)	401

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

Line #	Budget Activity	Program Element Number	Program Element Title	Page
227	07	0305204A	Tactical Unmanned Aerial Vehicles	407
228	07	0305206A	Airborne Reconnaissance Systems	421
229	07	0305208A	Distributed Common Ground/Surface Systems	448
230	07	0305219A	MQ-1 Gray Eagle UAV	459
231	07	0305232A	RQ-11 UAV	464
232	07	0305233A	RQ-7 UAV	472
233	07	0307665A	Biometrics Enabled Intelligence	479
234	07	0708045A	End Item Industrial Preparedness Activities	493
235	07	1203142A	SATCOM Ground Environment (SPACE)	508
236	07	1208053A	Joint Tactical Ground System	526

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

Program Element Title	Program Element Number	Line #	BA	Page
155mm Self-Propelled Howitzer Improvements	0203743A	208	07	230
AN/TPQ-53 Counterfire Target Acquisition Radar System	0607148A	200	07	131
Airborne Reconnaissance Systems	0305206A	228	07	421
Aircraft Engine Component Improvement Program	0203752A	210	07	245
Aircraft Modifications/Product Improvement Programs	0203744A	209	07	237
Anti-Tamper Technology Support	0605024A	191	07	19
Apache Future Development	0607145A	199	07	123
Army Operational Systems Development	0607312A	202	07	145
Aviation Rocket System Product Improvement and Development	0607142A	197	07	106
Biometrics Enabled Intelligence	0307665A	233	07	479
Blackhawk Product Improvement Program	0607136A	194	07	75
Chinook Product Improvement Program	0607137A	195	07	86
Combat Vehicle Improvement Programs	0203735A	207	07	195
Digitization	0203758A	211	07	253
Distributed Common Ground/Surface Systems	0305208A	229	07	448
Electronic Warfare Development	0607313A	203	07	146
End Item Industrial Preparedness Activities	0708045A	234	07	493

Program Element Title	Program Element Number	Line #	BA	Page
Environmental Quality Technology - Operational System Dev	0205412A	214	07	283
Family of Biometrics	0607665A	204	07	154
Global Combat Support System	0303141A	221	07	361
Guided Multiple-Launch Rocket System (GMLRS)	0205778A	216	07	296
Improved Turbine Engine Program	0607139A	196	07	97
Information Systems Security Program	0303140A	220	07	334
Integrated Broadcast Service (IBS)	0305179A	226	07	401
Intel Cyber Development	0607150A	201	07	139
Joint Automated Deep Operation Coordination System (JADOCS)	0203728A	206	07	177
Joint Tactical Ground System	0208053A	217	07	312
Joint Tactical Ground System	1208053A	236	07	526
Long Range Precision Fires (LRPF)	0607134A	193	07	64
Lower Tier Air and Missile Defense (AMD) System	0205456A	215	07	289
MLRS Product Improvement Program	0603778A	190	07	1
MQ-1 Gray Eagle UAV	0305219A	230	07	459
Missile/Air Defense Product Improvement Program	0203801A	212	07	262
Other Missile Product Improvement Programs	0203802A	213	07	270
Patriot Product Improvement	0607865A	205	07	165
RQ-11 UAV	0305232A	231	07	464

Program Element Title	Program Element Number	Line #	BA	Page
RQ-7 UAV	0305233A	232	07	472
SATCOM Ground Environment (SPACE)	0303142A	222	07	377
SATCOM Ground Environment (SPACE)	1203142A	235	07	508
Security and Intelligence Activities	0303028A	219	07	322
Tactical Unmanned Aerial Vehicles	0305204A	227	07	407
Unmanned Aircraft System Universal Products	0607143A	198	07	114
WWMCCS/Global Command and Control System	0303150A	223	07	394
Weapons and Munitions Product Improvement Programs	0607131A	192	07	26

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0603778A / *MLRS Product Improvement Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	14.014	9.786	12.314	-	12.314	-	-	-	-	-	-
093: *Multi-Launch Rocket System (MLRS)*	-	6.293	4.852	4.973	-	4.973	-	-	-	-	-	-
DX8: *HIMARS Product Improvement Program*	-	7.721	4.934	7.341	-	7.341	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

Project 093. The M270A1 Multiple Launch Rocket System (MLRS) launcher is a full-spectrum, combat-proven, all-weather, 24/7 lethal and responsive, precision strike weapon system. MLRS provides critical missile precision strike, operational shaping fires, counterfire, and close support destructive and suppressive fires. MLRS is a tracked, indirect fire, rocket/missile launcher capable of firing two pods of precision rockets/missiles from the current Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM) to include the Guided Multiple Launch Rocket System-Unitary (GMLRS-U), GMLRS-Alternative Warhead, the Army Tactical Missile System (ATACMS) and future MFOM to include the Extended Range (ER) GMLRS, and the Precision Strike Missile (PrSM). Funds software development, training updates, Assured Positioning, Navigation and Timing (APNT) technology implementation, integration of satellite communications, and nonrecurring engineering for the MLRS launcher. Funds development related to maintaining capability associated with the current and evolving threat. Funding in FY 2023-2026 also funds non-recurring engineering for system hardware and software modernization to the MLRS chassis, Launcher Loader Module, and Fire Control System. Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as Assured Positioning, Navigation and Timing (APNT) integration and rocket launcher software development effort by Combat Capabilities Development Command Aviation and Missile Center (CCDC AvMC). The goal is to develop common solutions applicable to both MLRS and HIMARS launchers.

Project DX8. The M142 High Mobility Artillery Rocket System (HIMARS) launcher is a full-spectrum, combat-proven, all-weather, 24/7 lethal and responsive, precision strike weapon system. HIMARS provides critical missile precision strike, operational shaping fires, counterfire, and close support destructive and suppressive fires. HIMARS is a C-130 or C-17 transportable, wheeled, indirect fire, rocket/missile launcher capable of firing one pod of precision rockets/missiles from the current and emerging Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM), to include the Guided Multiple Launch Rocket System-Unitary (GMLRS-U), GMLRS-Alternative Warhead, the Army Tactical Missile System (ATACMS) and future MFOM to include the Extended Range (ER) GMLRS, and the Precision Strike Missile (PrSM). Funds software development, training updates, Assured Positioning, Navigation and Timing (APNT) technology implementation, integration of satellite

communications, and nonrecurring engineering for the HIMARS launcher. Funds development related to maintaining capability associated with the current and evolving threat. Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as Assured Positioning, Navigation and Timing (APNT) integration and rocket launcher software development effort by Combat Capabilities Development Command Aviation and Missile Center (CCDC AvMC). The goal is to develop common solutions applicable to both MLRS and HIMARS launchers.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	14.615	10.157	12.467	-	12.467
Current President's Budget	14.014	9.786	12.314	-	12.314
Total Adjustments	-0.601	-0.371	-0.153	-	-0.153
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.601	-0.371			
• Adjustments to Budget Years	-	-	-0.153	-	-0.153

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0603778A / *MLRS Product Improvement Program*				Project (Number/Name) 093 / *Multi-Launch Rocket System (MLRS)*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
093: *Multi-Launch Rocket System (MLRS)*	-	6.293	4.852	4.973	-	4.973	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 093. The M270A1 Multiple Launch Rocket System (MLRS) launcher is a full-spectrum, combat-proven, all-weather, 24/7 lethal and responsive, precision strike weapon system. MLRS provides critical missile precision strike, operational shaping fires, counterfire, and close support destructive and suppressive fires. MLRS is a tracked, indirect fire, rocket/missile launcher capable of firing two pods of precision rockets/missiles from the current Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM) to include the Guided Multiple Launch Rocket System-Unitary (GMLRS-U), GMLRS-Alternative Warhead, the Army Tactical Missile System (ATACMS) and future MFOM to include the Extended Range (ER) GMLRS, and the Precision Strike Missile (PrSM). Funds software development, training updates, Assured Positioning, Navigation and Timing (APNT) technology implementation, integration of satellite communications, and nonrecurring engineering for the MLRS launcher. Funds development related to maintaining capability associated with the current and evolving threat. Funding in FY 2023-2026 also funds non-recurring engineering for system hardware and software modernization to the MLRS chassis, Launcher Loader Module, and Fire Control System. Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as Assured Positioning, Navigation and Timing (APNT) integration and rocket launcher software development effort by Combat Capabilities Development Command Aviation and Missile Center (CCDC AvMC). The goal is to develop common solutions applicable to both MLRS and HIMARS launchers. The M270A1 MLRS launcher program will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.

Justification:
FY 2022 Base funding in the amount of $4.973 million for Project 093 continues tactical launcher software development, qualification, and materiel release to support the Fire Control System (FCS) electronic obsolescence mitigation hardware upgrade required to operate a MLRS launcher. The tactical software is a critical developmental item required to field additional launchers, maintain backward compatibility for current fleet sustainment, and is the first release of government developed software common to both the MLRS and HIMARS launcher. Also funds additional integration of Assured Positioning, Navigation and Timing (APNT) capabilities, and integration of satellite communications, allowing MLRS to continue to effectively operate in near-peer and peer-threat environments.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022**
Title: MLRS Product Improvement Program	6.293	4.852	4.973
Description: The M270A1 MLRS Product Improvement Program provides the preservation of platform viability and readiness to accept technology insertion as capability enhancements are developed and to mitigate electronic obsolescence. Support efforts include: obsolescence mitigation and enhancements for the M993A1 carrier, Fire Control System, Launcher Loader Module and Enhanced Command and Control; development and updating the Fire Control System software to keep pace with changes to the munitions; and performing Command, Control, Communications, Computers and Intelligence (C4I)/interoperability and			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** 093 / *Multi-Launch Rocket System (MLRS)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Information. Assurance compliance certification and network interoperability testing. Perform technical assessments and concept studies for the following: electronic obsolescence mitigation, Assured Positioning, Navigation and Timing (APNT), crew protection, automotive and hardware/software enhancements, improving operational timelines and risk reduction. ***FY 2021 Plans:*** Will continue updates to currently fielded tactical launcher software. Continue tactical launcher software development to incorporate updates post Functional Qualification and Post System Integration Qualification to support the FCS electronic obsolescence mitigation hardware upgrade required to operate a MLRS launcher. Conduct a demonstration for APNT capabilities. ***FY 2022 Plans:*** Continue updates to currently fielded tactical launcher software. Continue tactical launcher software development to incorporate updates post Functional Qualification and Post System Integration Qualification to support the Fire Control System (FCS) obsolescence mitigation hardware upgrade required to operate a MLRS launcher. Integrate and test the improved Assured Positioning, Navigation and Timing (APNT) capabilities and satellite communications. Development, integration, and testing of Multiple Launch Rocket System solutions, including test planning to support an annual PEO MS-led Multi-Domain Operations test/ demonstration event beginning in FY2023, to include biennial Survivability Resiliency/Cyber-Electromagnetic Activities exercises with an event planned in FY2022. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increased funding of $0.121 million supports tactical launcher software development.			
Accomplishments/Planned Programs Subtotals	6.293	4.852	4.973

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C67500: *MLRS Mods*	372.550	330.419	273.856	-	273.856	-	-	-	-	-	-

Remarks

C67500 is Budget Line Item Number (BLIN) 23 funded in the Missiles Procurement Army appropriation.

D. Acquisition Strategy

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

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** 093 / *Multi-Launch Rocket System (MLRS)*

communications and munitions to maintain compatibility and operational viability against near-peer adversaries. The Multiple Launch Rocket System will participate yearly in an integration event at the PEO Missiles and Space level to integrate with current C2, Air and Missile Defense, and Fires systems.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0603778A / *MLRS Product Improvement Program*	Project (Number/Name) 093 / *Multi-Launch Rocket System (MLRS)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Various	STORM Project Office : Redstone Arsenal, AL	8.955	-		-		-		-		-	0.000	8.955	-
		Subtotal	8.955	-		-		-		-		-	0.000	8.955	N/A

Remarks

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

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Other Government Agencies OGA	MIPR	FT SILL OK, CECOM-NJ AMRDEC-RSA AL, : various	17.108	-		-		-		-		-	0.000	17.108	-
MLRS IAC	C/CPFF	LMMFC : Grand Prairie, TX	30.498	-		-		-		-		-	0.000	30.498	-
MLRS FCS Development	SS/CR	LMMFC : Grand Prairie, TX	70.200	-		-		-		-		-	0.000	70.200	-
Organic Software Development	MIPR	CCDC AvMC : Redstone Arsenal, AL	9.544	4.943	Dec 2019	4.852	Dec 2020	2.449	Dec 2021	-		2.449	Continuing	Continuing	Continuing
Risk Reduction Effort: Common Fire Control System	SS/CR	LMMFC : Grand Prairie, TX	21.900	-		-		-		-		-	0.000	21.900	-
Risk Reduction Effort: Hulls	MIPR	Red River Army Depot : Red River Army Depot, TX	3.200	-		-		-		-		-	0.000	3.200	-
Assured Positioning, Navigation and Timing (APNT) Demonstration	MIPR	CCDC AvMC : Redstone Arsenal, AL	-	0.176		-		-		-		-	0.000	0.176	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** 093 / *Multi-Launch Rocket System (MLRS)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Assured Positioning, Navigation and Timing (APNT) Integration	WR	LMMFC : Grand Prairie, TX	-	-		-		1.907	Nov 2021	-		1.907	0.000	1.907	-
		Subtotal	152.450	5.119		4.852		4.356		-		4.356	Continuing	Continuing	N/A

Remarks

Organic (government developed, maintained, and owned) software development includes additional research and development related to Fire Control System obsolescence.

Assured Positioning, Navigation and Timing (APNT) includes activities such as Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Contract	Various	Multiple : Multiple	4.834	-		-		-		-		-	0.000	4.834	-
		Subtotal	4.834	-		-		-		-		-	0.000	4.834	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support, Joint Interoperability Test Certificate	MIPR	CTSF, Ft. Hood : Texas	10.712	-		-		-		-		-	0.000	10.712	-
Test Support	MIPR	Ft Hood, TX, ATEC, APG, MD, WSMR, RTC, : RSA: Various	-	1.174	Nov 2019	-		0.617	Nov 2021	-		0.617	Continuing	Continuing	Continuing
		Subtotal	10.712	1.174		-		0.617		-		0.617	Continuing	Continuing	N/A

Remarks

Test support includes software qualification for the Fire Control System as well as the qualification and testing of the Assured Positioning, Navigation and Timing (APNT) solution.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0603778A / *MLRS Product Improvement Program*	Project (Number/Name) 093 / *Multi-Launch Rocket System (MLRS)*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	176.951	6.293		4.852		4.973		-		4.973	Continuing	Continuing	N/A

Remarks

Acronyms:
AvMC: Aviation and Missile Center;
CCDC: Combat Capabilities Development Command;
AMRDEC - Aviation and Missile Research Development and Engineering Center;
STORM - Strategic and Operational Rocket and Missile Systems;
CTSF - Central Technical Support Facility;
ATEC - US Army Test and Evaluation Command;
APG MD - Aberdeen Proving Ground, Maryland;
WSMR - White Sands Missile Range;
RTC RSA - Redstone Test Center, Redstone Arsenal, Alabama
LMMFC - Lockheed Martin Missiles & Fire Control

PFRMS Project Office renamed to STORM Project Office in 2019.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** 093 / *Multi-Launch Rocket System (MLRS)*

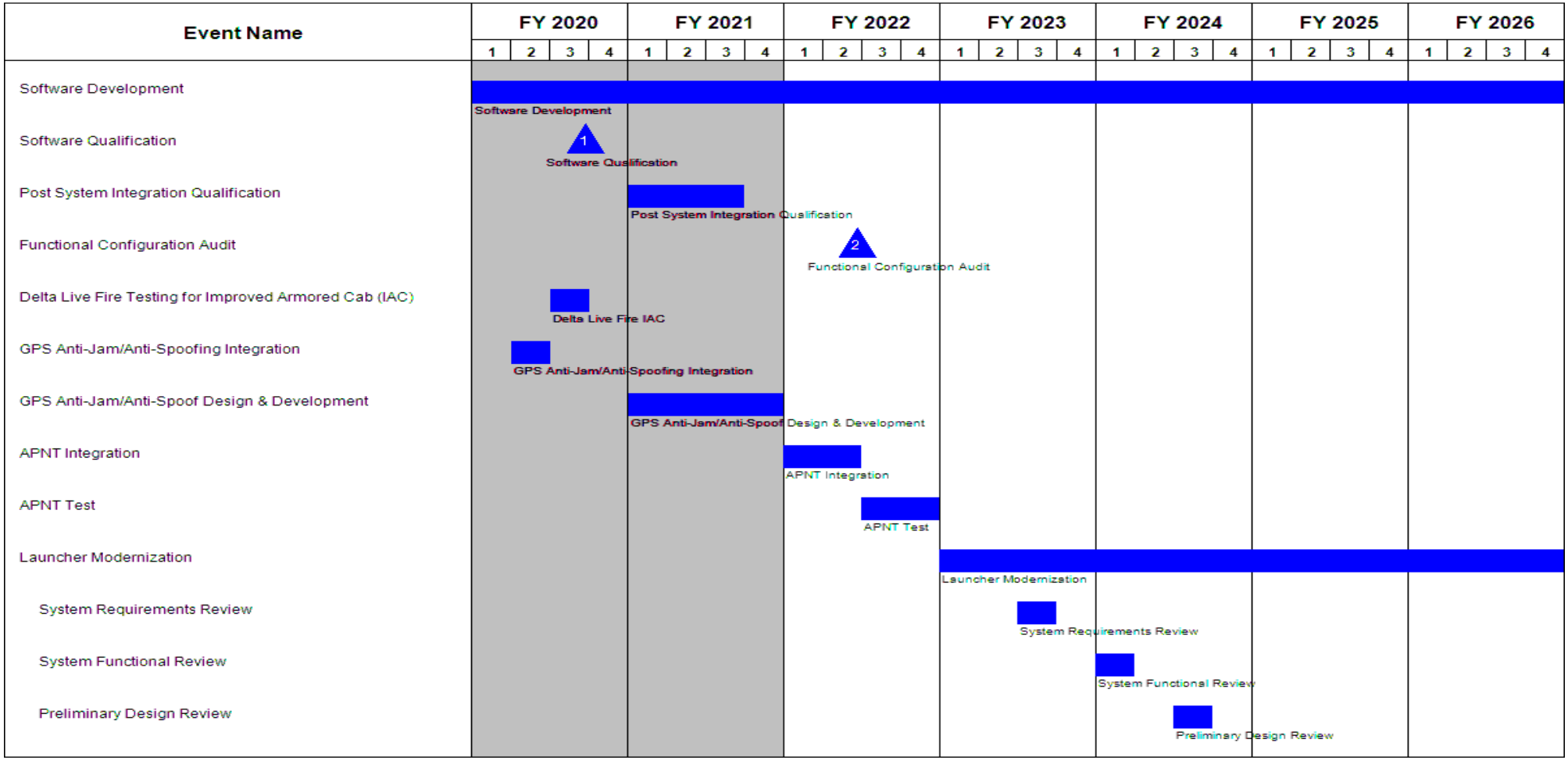

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** 093 / *Multi-Launch Rocket System (MLRS)*

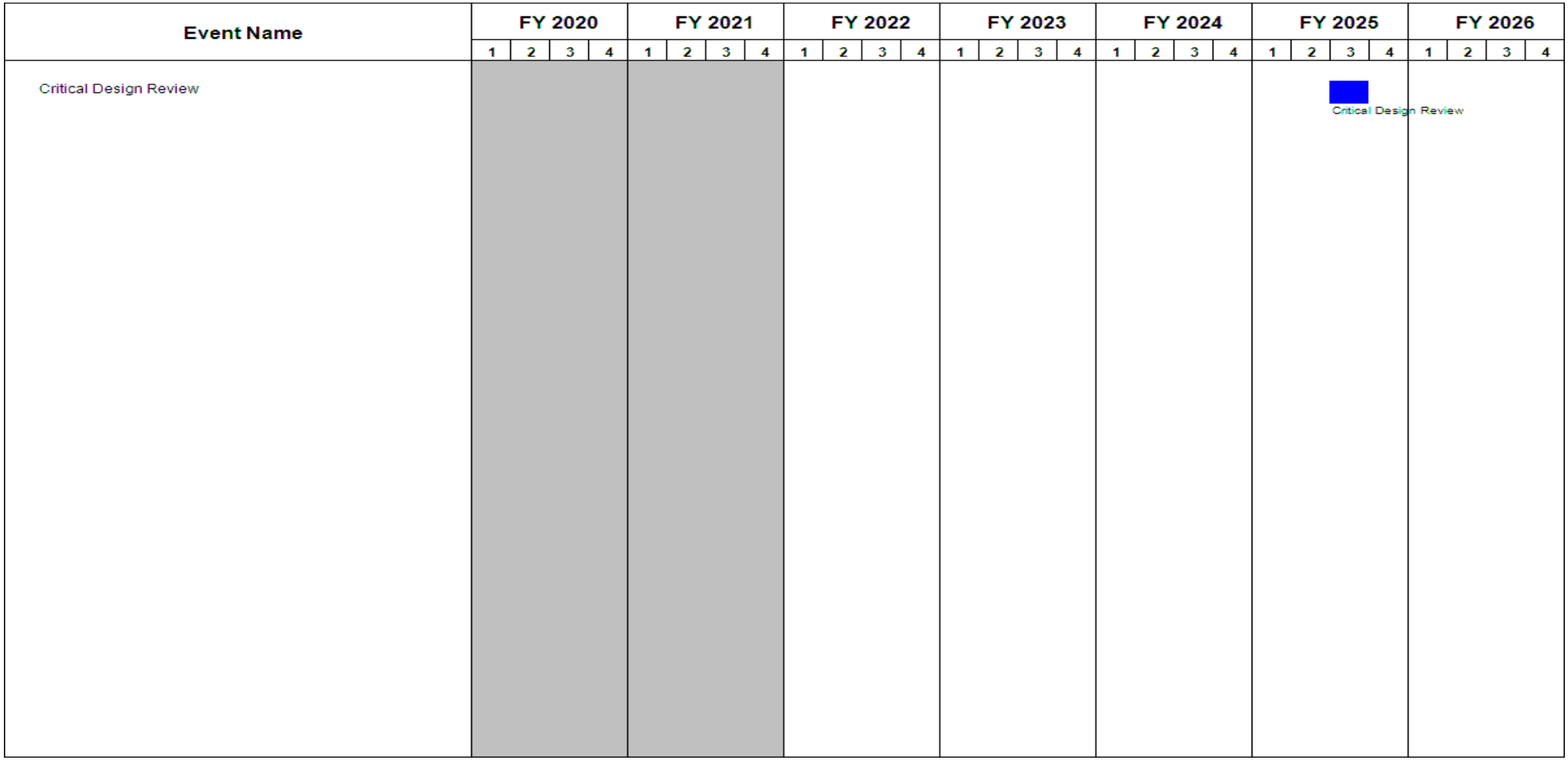

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** 093 / *Multi-Launch Rocket System (MLRS)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Software Development	1	2018	4	2026
Software Qualification	3	2020	3	2020
Post System Integration Qualification	1	2021	3	2021
Functional Configuration Audit	2	2022	2	2022
Delta Live Fire Testing for Improved Armored Cab (IAC)	3	2020	3	2020
GPS Anti-Jam/Anti-Spoofing Integration	2	2020	2	2020
GPS Anti-Jam/Anti-Spoof Design & Development	1	2021	4	2021
APNT Integration	1	2022	2	2022
APNT Test	3	2022	4	2022
Launcher Modernization	1	2023	4	2026
System Requirements Review	3	2023	3	2023
System Functional Review	1	2024	1	2024
Preliminary Design Review	3	2024	3	2024
Critical Design Review	3	2025	3	2025

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0603778A / *MLRS Product Improvement Program*	Project (Number/Name) DX8 / *HIMARS Product Improvement Program*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
DX8: *HIMARS Product Improvement Program*	-	7.721	4.934	7.341	-	7.341	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project DX8. The M142 High Mobility Artillery Rocket System (HIMARS) launcher is a full-spectrum, combat-proven, all-weather, 24/7 lethal and responsive, precision strike weapon system. HIMARS provides critical missile precision strike, operational shaping fires, counterfire, and close support destructive and suppressive fires. HIMARS is a C-130 or C-17 transportable, wheeled, indirect fire, rocket/missile launcher capable of firing one pod of precision rockets/missiles from the current and emerging Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM), to include the Guided Multiple Launch Rocket System-Unitary (GMLRS-U), GMLRS-Alternative Warhead, the Army Tactical Missile System (ATACMS) and future MFOM to include the Extended Range (ER) GMLRS, and the Precision Strike Missile (PrSM). Funds software development, training updates, Assured Positioning, Navigation and Timing (APNT) technology implementation, integration of satellite communications, and nonrecurring engineering for the HIMARS launcher. Funds development related to maintaining capability associated with the current and evolving threat. Funding from both Projects 093 and DX8 contributes to common efforts between both launcher platforms such as Assured Positioning, Navigation and Timing (APNT) integration and rocket launcher software development effort by Combat Capabilities Development Command Aviation and Missile Center (CCDC AvMC). The goal is to develop common solutions applicable to both MLRS and HIMARS launchers. The M142 HIMARS launcher program will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.

Justification:
FY 2022 Base funding in the amount of $7.341 million for Project DX8 supports tactical launcher software development and qualification to support the Fire Control System (FCS) electronic obsolescence mitigation hardware upgrade required to operate a HIMARS launcher. The tactical software is a critical developmental item required to field additional launchers, maintain backward compatibility for current fleet sustainment, and is the first release of government developed software common to both the MLRS and HIMARS launcher. Also funds integration of Assured Positioning, Navigation and Timing (APNT) capabilities and satellite communications that allows HIMARS to continue to effectively operate in near-peer and peer-threat environments.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: MLRS Production Improvement Program (PIP)-HIMARS PIP	7.721	4.934	7.341
Description: The HIMARS Product Improvement Program provides the preservation of platform viability and readiness to accept technology insertion. As capability enhancements are developed, technology is inserted in order to mitigate obsolescence. Support efforts include: obsolescence mitigation and enhancements for the truck, Fire Control System, Launcher Loader Module and Enhanced Command and Control; development and updating the Fire Control System software to keep pace with changes to the munitions; and performing Command, Control, Communications, Computers and Intelligence (C4I)/interoperability and Information Assurance compliance certification and network interoperability testing. Perform technical assessments and			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** DX8 / *HIMARS Product Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
concept studies for the following: electronic obsolescence mitigation and redesign to keep pace with the evolving threat, Assured Positioning Navigation and Timing (APNT), crew protection, automotive and hardware/software enhancements, improving operational timelines, leader-follower technology and risk reduction. ***FY 2021 Plans:*** Continue tactical launcher software development, risk reduction, and qualification to support the FCS electronic obsolescence mitigation hardware upgrade required to operate a HIMARS launcher. Integrate APNT capabilities, and integrate satellite communications. ***FY 2022 Plans:*** Continue tactical launcher software development, risk reduction, and qualification to support the Fire Control System (FCS) electronic obsolescence mitigation hardware upgrade required to operate a HIMARS launcher. Integrate and test the improved Assured Positioning, Navigation and Timing (APNT) capabilities and satellite communications. Development, integration, and testing of High Mobility Artillery Rocket System solutions, including test planning to support an annual PEO MS-led Multi-Domain Operations test/demonstration event beginning in FY2023, to include biennial Survivability Resiliency/Cyber-Electromagnetic Activities exercises with an event planned in FY2022. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increased funding of $2.407 million facilitates integration and testing of Assured Positioning, Navigation and Timing (APNT) capabilities and satellite communications. This integration allows the HIMARS Launcher to continue effective operations in near-peer threat environments.			
Accomplishments/Planned Programs Subtotals	7.721	4.934	7.341

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C67501: *HIMARS Modifications*	12.483	6.081	7.192	-	7.192	-	-	-	-	-	-
• C02901: *High Mobility Artillery Rocket System (HIMARS)*	-	46.276	128.438	-	128.438	-	-	-	-	-	-

Remarks

C67501 (Budget Line Item Number 24) and C02091 (Budget Line Item Number 14) are funded in the Missiles Procurement Army appropriation.

D. Acquisition Strategy

The M142 HIMARS Product Improvement Program performs development efforts required to address emerging requirements. Emerging requirements include, but are not limited to, updates to address emerging threats of the launcher organic version 8.x software, reacting to system changes driven by policy and emerging

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** DX8 / *HIMARS Product Improvement Program*

requirements, and maintaining architectural compatibility with other Army ground based systems reducing sustainability costs. Update software and hardware for communications and munitions to maintain compatibility and operational viability against near-peer adversaries. The High Mobility Artillery Rocket System will participate yearly in an integration event at the PEO Missiles and Space level to integrate with current C2, Air and Missile Defense, and Fires systems.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0603778A / *MLRS Product Improvement Program*	Project (Number/Name) DX8 / *HIMARS Product Improvement Program*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Various	STORM Project Office : Redstone Arsenal, AL	0.817	-		0.100		-		-		-	0.000	0.917	-
		Subtotal	0.817	-		0.100		-		-		-	0.000	0.917	N/A

Remarks

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

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Other Government Agencies (OGA)	MIPR	AMCOM, GSA, RSA : Various	3.318	-		-		-		-		-	0.000	3.318	-
Organic Software Development	MIPR	CCDC AvMC : Redstone Arsenal, AL	14.079	6.466	Apr 2020	4.834	Apr 2021	4.817	Apr 2022	-		4.817	Continuing	Continuing	Continuing
APNT Demonstration	MIPR	CCDC AvMC : Redstone Arsenal, AL	-	0.128	Apr 2020	-		-		-		-	0.000	0.128	-
APNT Integration	WR	LMMFC : Grand Prairie, TX	-	-		-		1.907	Nov 2021	-		1.907	0.000	1.907	-
		Subtotal	17.397	6.594		4.834		6.724		-		6.724	Continuing	Continuing	N/A

Remarks

Organic (government developed, maintained, and owned) software development includes additional research and development related to Fire Control System electronic obsolescence.

Assured Positioning, Navigation and Timing (APNT) includes activities such as Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0603778A / *MLRS Product Improvement Program*	Project (Number/Name) DX8 / *HIMARS Product Improvement Program*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support	MIPR	Ft Hood, TX, ATEC, APG, MD, WSMR, RTC, RSA : Various	3.559	1.127	Jun 2020	-		0.617	Nov 2021	-		0.617	Continuing	Continuing	Continuing
		Subtotal	3.559	1.127		-		0.617		-		0.617	Continuing	Continuing	N/A

Remarks

Test support includes software qualification for the Fire Control System as well as the qualification and testing of the Assured Positioning, Navigation and Timing (APNT) solution.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	21.773	7.721		4.934		7.341		-		7.341	Continuing	Continuing	N/A

Remarks

AvMC: Aviation and Missile Center;
CCDC: Combat Capabilities Development Command;
AMRDEC - Aviation and Missile Research Development and Engineering Center;
PFRMS - Precision Fires Rocket and Missile Systems (former name for PM STORM);
STORM - Strategic and Operational Rocket and Missile Systems;
CTSF - Central Technical Support Facility;
ATEC - US Army Test and Evaluation Command;
APG MD - Aberdeen Proving Ground, Maryland;
WSMR - White Sands Missile Range;
RTC RSA - Redstone Test Center, Redstone Arsenal, Alabama

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** DX8 / *HIMARS Product Improvement Program*

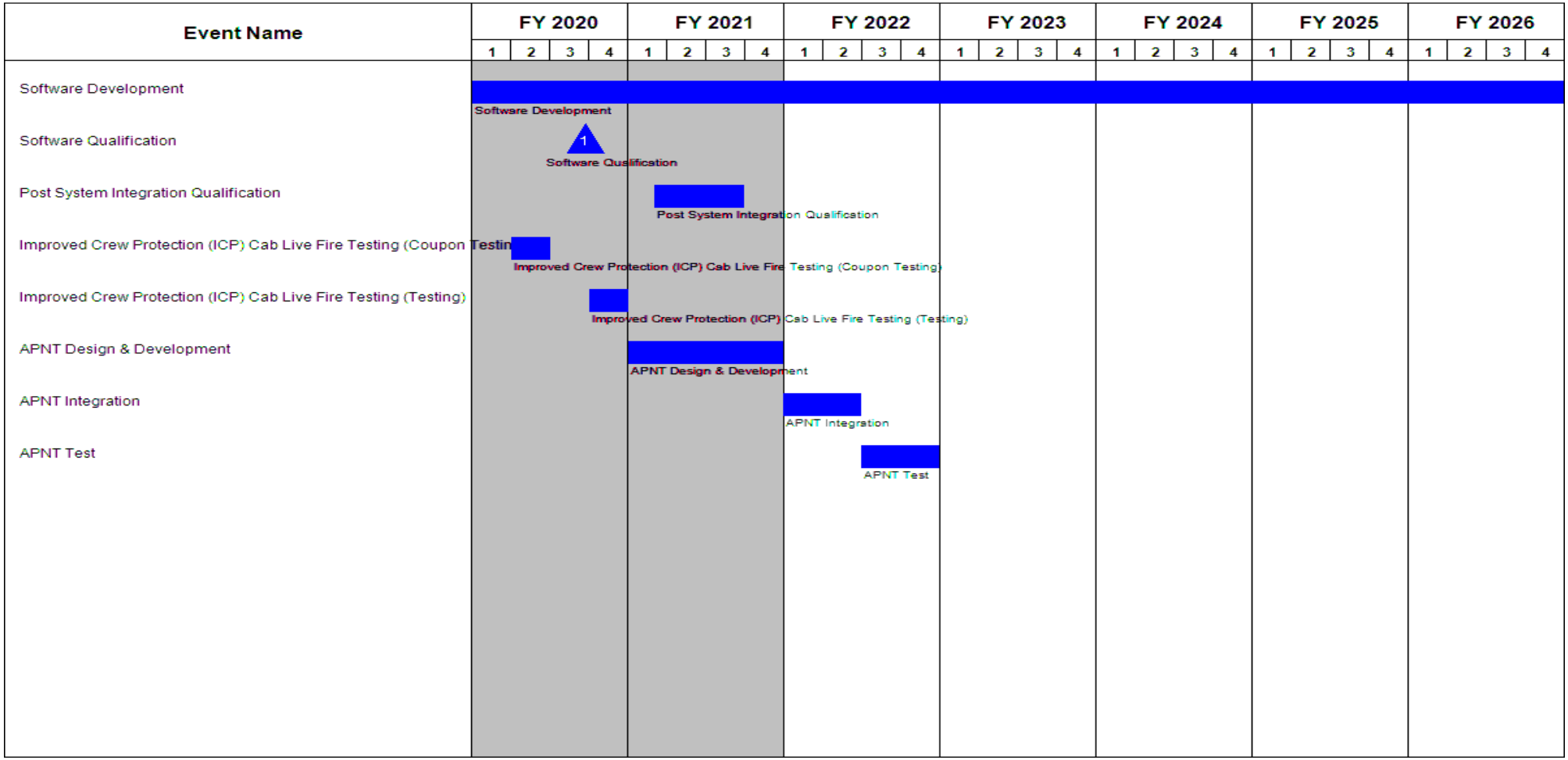

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0603778A / *MLRS Product Improvement Program*	**Project (Number/Name)** DX8 / *HIMARS Product Improvement Program*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Software Development	1	2019	4	2026
Software Qualification	3	2020	3	2020
Post System Integration Qualification	1	2021	3	2021
Improved Crew Protection (ICP) Cab Live Fire Testing (Coupon Testing)	2	2020	2	2020
Improved Crew Protection (ICP) Cab Live Fire Testing (Testing)	4	2020	4	2020
APNT Design & Development	1	2021	4	2021
APNT Integration	1	2022	2	2022
APNT Test	3	2022	4	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0605024A / *Anti-Tamper Technology Support*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	8.141	8.436	8.868	-	8.868	-	-	-	-	-	-
FB1: *Anti-Tamper Technology Support*	-	8.141	8.436	8.868	-	8.868	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	8.491	8.682	8.977	-	8.977
Current President's Budget	8.141	8.436	8.868	-	8.868
Total Adjustments	-0.350	-0.246	-0.109	-	-0.109
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.350	-0.246			
• Adjustments to Budget Years	-	-	-0.109	-	-0.109

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0605024A / *Anti-Tamper Technology Support*	Project (Number/Name) FB1 / *Anti-Tamper Technology Support*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FB1: *Anti-Tamper Technology Support*	-	8.141	8.436	8.868	-	8.868	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Anti-Tamper (AT) Technology Support	8.141	8.436	8.868
Description: AT is a DoD program that encompasses the systems engineering activities intended to prevent and/or delay exploitation of critical technologies in U.S. weapon systems. These activities involve the entire life-cycle of systems acquisition, including research, development, implementation, and testing of AT measures. ***FY 2021 Plans:*** Continue to build and maintain the Protective Technologies (PT) core team of SMEs available for this ongoing mission to support the development of Army programs and evaluating their AT architectures. In support of that primary mission, PT must and will continue to build and maintain state-of-the-art RE capabilities to facilitate technical assessments to evaluate the vulnerabilities of micro-electronic components used in the electronic designs of Army weapons systems with CPI that requires protection. ***FY 2022 Plans:*** Will continue to build and maintain the PT core team of SMEs available for this ongoing Army-level mission to support the development of new and upgraded Army programs and evaluating their AT architectures. In support of that primary mission, PT must and will continue to build and maintain state-of-the-art RE capabilities to facilitate technical assessments to evaluate the vulnerabilities of micro-electronic components used in the electronic designs of Army weapons systems with CPI that requires protection. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase supports planned systems engineering activities needed for growing list of Army programs with AT evaluation requirements.			
Accomplishments/Planned Programs Subtotals	8.141	8.436	8.868

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0605024A / *Anti-Tamper Technology Support*	**Project (Number/Name)** FB1 / *Anti-Tamper Technology Support*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0605024A / *Anti-Tamper Technology Support*	**Project (Number/Name)** FB1 / *Anti-Tamper Technology Support*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AT CA - Accelerate new Novel Tech Solutions	TBD	AMRDEC : , Redstone Arsenal AL	3.000	-		-		-		-		-	0.000	3.000	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	N/A : N/A	0.001	-		-		-		-		-	0.000	0.001	-
		Subtotal	3.001	-		-		-		-		-	0.000	3.001	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AT V&V Activities	Various	Redstone Arsenal & Prime Contract locations : Redstone Arsenal	1.944	2.819	Oct 2019	3.245	Oct 2020	3.356	Oct 2021	-		3.356	0.000	11.364	-
		Subtotal	1.944	2.819		3.245		3.356		-		3.356	0.000	11.364	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AT/RE Lab Facilities & Equipment	Various	Redstone Arsenal, AL : Redstone Arsenal, AL	1.352	3.603	Oct 2019	3.231	Oct 2020	3.486	Oct 2021	-		3.486	0.000	11.672	-
		Subtotal	1.352	3.603		3.231		3.486		-		3.486	0.000	11.672	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0605024A / *Anti-Tamper Technology Support*	Project (Number/Name) FB1 / *Anti-Tamper Technology Support*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AT/RE Laboratory Assessments	Various	Redstone Arsenal, AL : Redstone Arsenal, AL	0.862	1.719	Oct 2019	1.960	Oct 2020	2.026	Oct 2021	-		2.026	0.000	6.567	-
		Subtotal	0.862	1.719		1.960		2.026		-		2.026	0.000	6.567	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	7.159	8.141		8.436		8.868		-		8.868	0.000	32.604	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0605024A / *Anti-Tamper Technology Support*	**Project (Number/Name)** FB1 / *Anti-Tamper Technology Support*

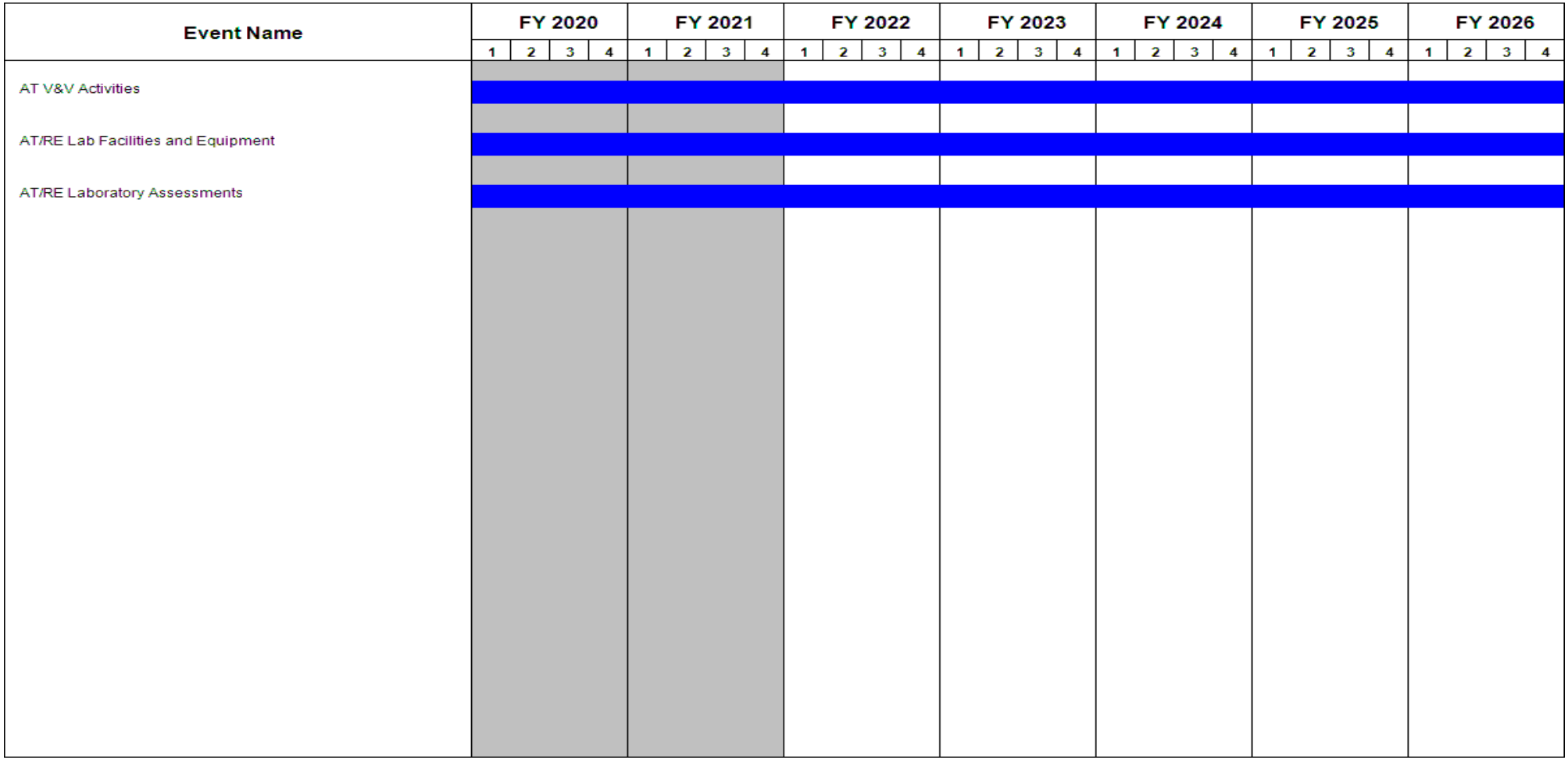

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0605024A / *Anti-Tamper Technology S upport*	**Project (Number/Name)** FB1 / *Anti-Tamper Technology Support*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
AT V&V Activities	1	2017	4	2026
AT/RE Lab Facilities and Equipment	1	2017	4	2026
AT/RE Laboratory Assessments	1	2017	4	2026
AT Congressional Add - New Novel Tech Solutions	2	2019	4	2019

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607131A / *Weapons and Munitions Product Improvement Programs*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	14.222	19.666	22.828	-	22.828	-	-	-	-	-	-
CP2: *Precision Fire Technology Improvements*	-	-	-	8.210	-	8.210	-	-	-	-	-	-
ER2: *Close Combat Technology*	-	1.972	6.518	3.468	-	3.468	-	-	-	-	-	-
ER5: *Indirect Fire and Fuze Technology*	-	4.076	4.712	4.463	-	4.463	-	-	-	-	-	-
ER6: *Direct Fire Technology*	-	8.174	8.436	6.687	-	6.687	-	-	-	-	-	-

Note

In Fiscal Year (FY) 2022, Project CP2, Precision Fire Technology Improvements is a New Start.

A. Mission Description and Budget Item Justification

Project CP2 Precision Fire Technology Improvements supports required Precision Munitions and Fuze assessment and improvement initiatives to support increased rates of fire for items that have been fielded or in full rate production, such as the M1155 Enhanced Portable Inductive Artillery Fuze Setter (EPIAFS), Excalibur and Precision Guidance Kit (PGK). Efforts will identify, characterize, study, analyze, test and develop Precision Munition and Fuze technologies to increase range, lethality, effectiveness, survivability and accuracy. Fiscal Year (FY) 2022 funding will support preliminary fuze setter trade studies and improvement activities on setter technologies to inform requirements and the setter modernization roadmap. FY 2022 funding will also support the Excalibur high pressure setback testing and safety margin improvement initiatives that will ensure survivability and reliability with the Extended Range Cannon Artillery (ERCA) system in support of the Army's modernization priorities.

Project ER2 Close Combat Technology project includes development efforts to upgrade Close Combat technologies, energetics, and munitions, such as counter explosives, grenades, demolitions, shoulder launched munitions, pyrotechnic simulators, countermeasure flares, non-lethal ammunition/systems, networked munitions and mines, that have been fielded or have received approval for full rate production. This program will identify, characterize, study, analyze, test and develop technologies to resolve close combat munition reliability, safety, environmental, storage, standardization, obsolescence and manufacturing/producibility issues. Fiscal Year (FY) 2022 funds will resource improvements to the following grenade efforts: M67 (G881) Insensitive Munition (IM) Replacement, and M98/M99 Non-Lethal 66mm Grenades, and Volcano Countermeasure Testing

Project ER5 Indirect Fire and Fuze Technology Project includes product improvement development efforts to upgrade indirect fire weapon systems and munitions that have already been fielded and/or are in production. Efforts include improved target engagement, increased reliability, availability, maintainability, and safety, standardization and interoperability with weapons and munitions of Allied Nations, defense exportability features, reduction of failure mechanisms, and supply chain risk by introducing new and alternative technology and materiel solutions, improvement of manufacturing methods and their associated production processes, new capabilities in response to the evolving and emerging threats and countermeasures, and reduction/elimination of potential environmental and health risks associated with

these products. Fiscal Year (FY) 2022 funding will complete a long range precision fires artillery fuze compatibility study to determine compatibility with production fuzes; conduct analysis on mortar training fuzes for ballistic flight performance improvements; conduct analysis on production fuze TDPs to preclude potential single point and critical suppliers issues; investigate improved proximity fuze radar transceivers for proximity mortar fuzes to increase performance and survivability; integrate extended range precision artillery fuzing power sources prototypes to support extended flight durations; and implement hand grenade safety improvements integrating electronic and energetic technologies that will also improve insensitive munition capability. FY 2022 funding will also support the continued studies and analysis (Key Parameter Development and Management (KPDM) and Model Based Systems Engineering (MBSE)) efforts supporting indirect fire artillery ammunition and mortar ammunition developmental product improvement initiatives to increase range, lethality, effectiveness, survivability and accuracy .

Project ER6 Direct Fire Technology funding will be used to support direct fire ammunition from small caliber ammunition, 40 millimeter (mm) grenade, medium caliber cannon ammunition and large caliber ammunition enhancements to lethality, effectiveness, survivability, accuracy and general product improvements. Fiscal Year (FY) 2022 funds support lethality and safety improvements to 40mm ammunition, making a number of improvements to training ammunition, performing improvements to small caliber primers to make the primers more environmentally friendly, optimize handgun ammunition, explore precision sniper improvements and continuing the effort to reduce Soldier load by developing lightweight small caliber ammunition. FY 2022 also includes examination and implementation of improvements to 105mm and 120mm tank ammunition.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	15.645	20.409	14.799	-	14.799
Current President's Budget	14.222	19.666	22.828	-	22.828
Total Adjustments	-1.423	-0.743	8.029	-	8.029
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.780	-			
• SBIR/STTR Transfer	-0.643	-0.743			
• Adjustments to Budget Years	-	-	8.029	-	8.029

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
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COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CP2: *Precision Fire Technology Improvements*	-	-	-	8.210	-	8.210	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2022.

In Fiscal Year (FY) 2022, Project CP2, Precision Fire Technology Improvements is a New Start.

A. Mission Description and Budget Item Justification

This Project supports required Precision Munitions and Fuze assessment and improvement initiatives to support increased rates of fire for items that have been fielded or in full rate production, such as the M1155 Enhanced Portable Inductive Artillery Fuze Setter (EPIAFS), Excalibur and Precision Guidance Kit (PGK). Efforts will identify, characterize, study, analyze, test and develop Precision Munition and Fuze technologies to increase range, lethality, effectiveness, survivability and accuracy. FY 2022 funding will support preliminary fuze setter trade studies and improvement activities on setter technologies to inform requirements and the setter modernization roadmap. FY 2022 funding will also support the Excalibur high pressure setback testing and safety margin improvement initiatives that will ensure survivability and reliability with the Extended Range Cannon Artillery (ERCA) system in support of the Army's modernization priorities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Enhanced Portable Inductive Artillery Fuze Setter (EPIAFS) Modernization	-	-	3.270
Description: The effort supports fuze setting system requirements based on legacy and developmental platforms and munitions for 155mm Artillery systems. Efforts support development of comprehensive technology plan for Increased Range and Increased Rate of Fire improvements related to the ERCA weapon system as well as other Artillery Modernization efforts. ***FY 2022 Plans:*** FY 2022 funding will support preliminary fuze setter trade studies and improvement activities on setter technologies to inform requirements and the setter modernization roadmap. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in FY 2022 due to initiation of EPIAFS Modernization effort.			
Title: Excalibur Ib Modernization	-	-	4.940
Description: This effort will complete a series of Excalibur Ib safety and reliability test activities to ensure survivability at higher pressures in the ERCA system.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 Plans: FY 2022 funding will support the Excalibur high pressure setback testing and safety margin improvement initiatives that will ensure survivability and reliability with the ERCA system in support of the Army's modernization priorities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in FY 2022 due to initiation of Excalibur Ib Modernization effort.			
Accomplishments/Planned Programs Subtotals	-	-	8.210

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The EPIAFS Modernization effort will utilize US Government labor and development capabilities to accomplish trade studies and Other Transaction Agreement (OTA) contracts for development of promising fuze setting concepts. Upon completion, efforts will transition to production as Engineering Change Proposals (ECPs) to be integrated into existing production contracts as they become available.

The Excalibur Ib Modernization effort will utilize existing Engineering Services contract with Raytheon Missiles and Defense as well as various Federal Acquisition Regulation (FAR) contracts to support modernization activities. Upon successful completion, improvements will be integrated via Engineering Change Proposal (ECP) in the Excalibur Ib production contract.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Excalibur Ib Modernization Component Hardware	Various	To Be Determined : TBD	-	-		-		0.286	Jan 2022	-		0.286	0.000	0.286	-
Excalibur Ib Modernization Hardware	SS/CPFF	Raytheon Missiles and Defense (RMD) : Tuscon, AZ	-	-		-		1.329	Apr 2022	-		1.329	0.000	1.329	-
EPIAFS Modernization Development and Hardware	Various	To Be Determined : TBD	-	-		-		1.000	Jun 2022	-		1.000	0.000	1.000	-
		Subtotal	-	-		-		2.615		-		2.615	0.000	2.615	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Excalibur Ib Modernization Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ	-	-		-		0.600	Nov 2021	-		0.600	0.000	0.600	-
EPIAFS Modernization Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ	-	-		-		1.870	Nov 2021	-		1.870	0.000	1.870	-
EPIAFS Modernization Platform/Fire Control Integration Support	MIPR	Combat Capabilities Development Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ	-	-		-		0.100	Nov 2021	-		0.100	0.000	0.100	-
EPIAFS Modernization Cybersecurity Support	MIPR	Combat Capabilities Development	-	-		-		0.100	Nov 2021	-		0.100	0.000	0.100	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ													
		Subtotal	-	-		-		2.670		-		2.670	0.000	2.670	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Excalibur Ib High Pressure Setback Testing	MIPR	Army Test and Evaluation Command (ATEC), Yuma Proving Grounds : Yuma, AZ	-	-		-		0.525	May 2022	-		0.525	0.000	0.525	-
Excalibur Ib Safety Margin and Reliability Testing	MIPR	Army Test and Evaluation Command (ATEC), Yuma Proving Grounds : Yuma, AZ	-	-		-		2.200	Jun 2022	-		2.200	0.000	2.200	-
EPIAFS Modernization Environmental Testing	MIPR	Combat Capabilities Development Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ	-	-		-		0.100	Aug 2022	-		0.100	0.000	0.100	-
EPIAFS Modernization Firing Testing	MIPR	Combat Capabilities Development Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ	-	-		-		0.100	Aug 2022	-		0.100	0.000	0.100	-
		Subtotal	-	-		-		2.925		-		2.925	0.000	2.925	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		8.210		-		8.210	0.000	8.210	N/A

Remarks

EPIAFS = Enhanced Portable Inductive Artillery Fuze Setter

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** CP2 / *Precision Fire Technology Improvements*

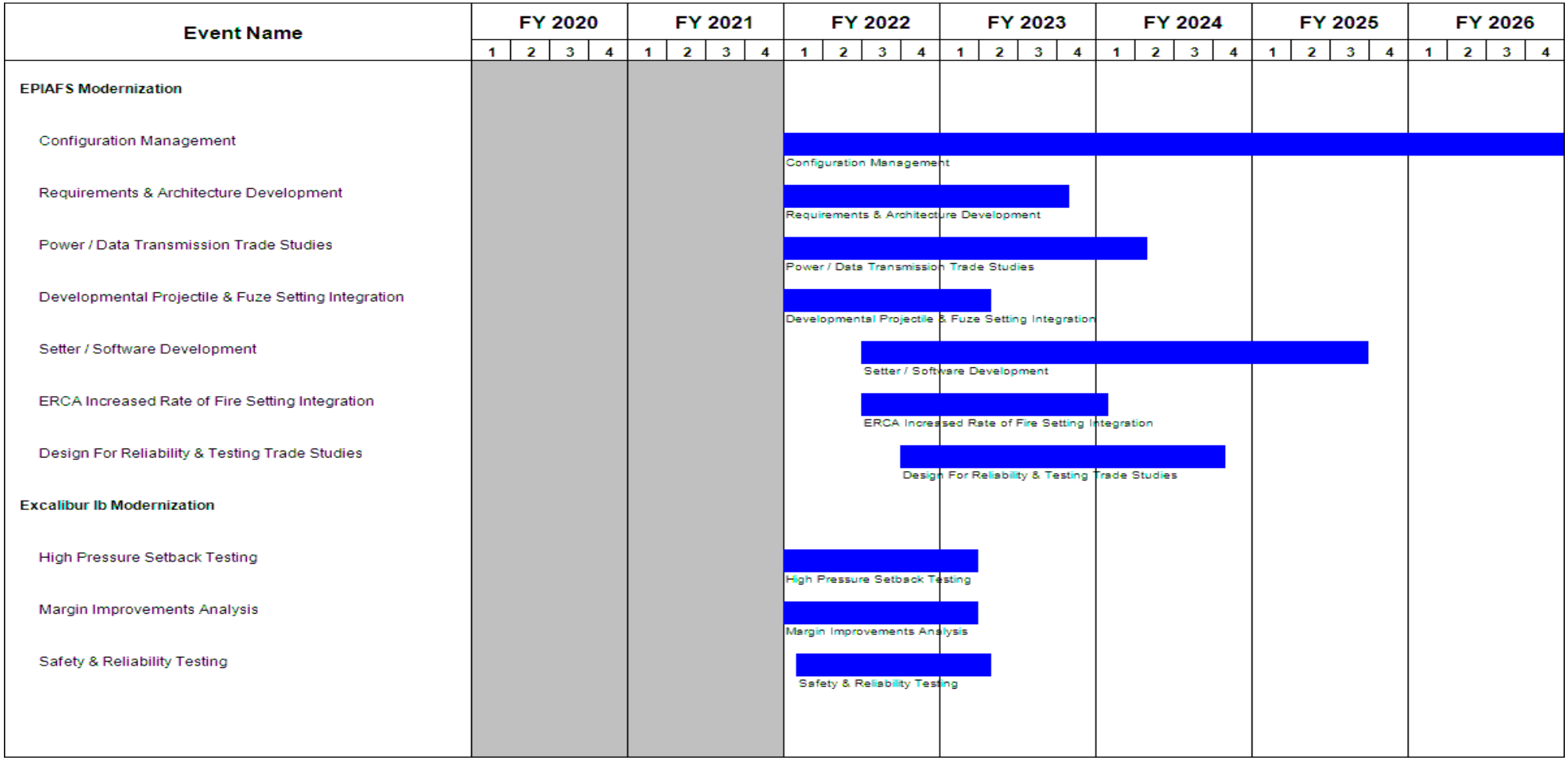

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** CP2 / *Precision Fire Technology Improvements*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
EPIAFS Modernization	1	2022	4	2026
Configuration Management	1	2022	4	2026
Requirements & Architecture Development	1	2022	4	2023
Power / Data Transmission Trade Studies	1	2022	2	2024
Developmental Projectile & Fuze Setting Integration	1	2022	2	2023
Setter / Software Development	3	2022	3	2025
ERCA Increased Rate of Fire Setting Integration	3	2022	1	2024
Design For Reliability & Testing Trade Studies	4	2022	4	2024
Excalibur Ib Modernization	1	2022	4	2022
High Pressure Setback Testing	1	2022	1	2023
Margin Improvements Analysis	1	2022	1	2023
Safety & Reliability Testing	1	2022	2	2023

Note

EPIAFS = Enhanced Portable Inductive Artillery Fuze Setter
ERCA = Extended Range Cannon Artillery

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / *Weapons and Munitions Product Improvement Programs*	Project (Number/Name) ER2 / *Close Combat Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
ER2: *Close Combat Technology*	-	1.972	6.518	3.468	-	3.468	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project ER2 Close Combat Technology includes development efforts to upgrade Close Combat technologies, energetics, and munitions, such as counter explosives, grenades, demolitions, shoulder launched munitions, pyrotechnic simulators, countermeasure flares, non-lethal ammunition/systems, and networked munitions and mines, that have been fielded or have received approval for full rate production. FY 2022 funding will allow the project to identify, characterize, study, analyze, test and develop technologies to resolve close combat munition reliability, safety, environmental, storage, standardization, obsolescence and manufacturing/producibility issues.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: M67 (G881) Fragmentation Hand Grenade	0.096	3.184	1.334
Description: The M67 Hand Grenade uses the M213 fuze which does not meet Insensitive Munitions (IM) requirements. This effort will evaluate potential foreign fuze candidates as a replacement to the current M213 fuze. This new fuze will be qualified for incorporation into the M67 design and the TDP will be updated.			
FY 2021 Plans: FY 2021 supports the hardware build and initial integration testing efforts for the replacement fuze into the M67 Grenade.			
FY 2022 Plans: FY 2022 will finalize development of the replacement fuze to be integrated into the M67 fragmentation hand grenade and will fund the hardware build to support qualification testing planned for FY 2023.			
FY 2021 to FY 2022 Increase/Decrease Statement: FY 2022 will continue with development and integration testing.			
Title: M330 Obscuration Grenade	0.800	0.950	1.115
Description: This effort supports the Design/Type Classification/Production Prove Out of an improved obscurant grenade that provides the warfighter with screening performance approaching that of the legacy AN-M8 smoke grenade, using a different smoke formulation than the legacy's grenade's Hexachloroethane (HC). The use of HC has been restricted inside and outside the Continental United States (CONUS/OCONUS) due to its toxic effects. The legacy AN-M8 grenade is limited to use in contingency operations only. The M83 training smoke grenade is currently used in lieu of the AN-M8 in both training and tactical operations, but does not give screening performance comparable to the legacy AN-M83. Soldiers must use two or three M8 grenades to produce obscuration effects comparable to a single AN-M8 grenade.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: FY 2021 finalizes technical requirements. Redesign internal components and retest final configuration. Complete DVT test plan. Award PBA facilitization production line contract ***FY 2022 Plans:*** FY 2022 will complete grenade specification. Complete Draft Technical Data Package (TDP) and Initial Engineering Change Proposal (ECP). Procure Design Verification Testing (DVT) components. Complete Qualification Plan for product release ECP. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2021 funding primarily used to support testing. FY 2022 request will primarily support program documentation and procuring hardware for DVT.			
Title: MICLIC Trainer Product Improvement ***Description:*** This effort will develop a replacement for the current M68 Mine Clearing Line Charge (MICLIC) training round which has proven to be expensive and difficult to utilize. The M68 trainer is designed to be fired 3 times but repacking the inert line charge into its ?tub? after a firing event is a manpower intensive and time consuming endeavor, which leads to an ineffective training experience for soldiers. This effort will explore concepts and qualify a solution that provides a realistic training experience for the soldier, reduces the scope of or eliminates the repacking task, and is more cost effective than the current system. ***FY 2022 Plans:*** FY2022 funding supports the analysis of requirements, initial concept development, modeling and simulation and convergence on an initial design to be followed by the development of a prototype design for later procurement and testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 funding required to initiate the MICLIC Trainer Product Improvement effort.	-	-	0.550
Title: Volcano Countermeasure Testing ***Description:*** The Family of Scatterable Mines (FASCAM)/Volcano use electronic sensors to detect vehicles and engage them. New foreign and domestic electronic counter-measure systems have been developed which may breach a field at a much higher speed than legacy mechanical breachers. This testing will assess the speed and range of electronic breaching Volcano. The program will also characterize newer electronic munition sensors for their ability to resist these new defeat systems. ***FY 2021 Plans:*** FY 2021 will begin the characterization of newer electronic munition sensors. ***FY 2022 Plans:***	-	0.250	0.269

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 will conduct speed and range testing and characterization of newer electronic munition sensors. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Volcano Countermeasure testing is a new start for FY 2022 and will support testing and characterization efforts.			
Title: M18 Smoke Grenade Dye ***Description:*** Smoke Grenade Dyes are a key component of the M18 Color Smoke Hand Grenades (Green, Yellow, Red, Violet) and are among items at risk for future production. The anthraquinone-based intermediates necessary for dye production are foreign-sourced (non-NTIB). No alternative dye formulation has successfully been identified to date. This represents a single point failure for the Army. This effort seeks to prove out a pilot-scale process to synthesize the necessary intermediates that could lead to a producer within the NTIB. ***FY 2021 Plans:*** FY 2021 supports a Feasibility Demonstration for the red and violet dyes. This will be followed by Government testing of the dyes and a decision about whether to proceed with the remainder of the effort. ***FY 2022 Plans:*** FY 2022 will support the completion of government testing ahead of a planned production system. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 funding is required to complete testing efforts.	-	0.250	0.200
Title: M111 Offensive Hand Grenade - Alternative Explosive Fill ***Description:*** This effort will qualify an alternative explosive fill for the M111 Offensive Hand Grenade, which replaces the MK3A2 Offensive Hand Grenade. The alternate fill will mitigate availability risk of the current M111 fill, PAX-3, which is a single point failure within the production of the M111 Offensive Hand Grenade. ***FY 2021 Plans:*** Conduct qualification testing of prototypes to determine safety, viability, and effectiveness of an alternative explosive fill, which can be incorporated into the M111 design. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** No budget request in FY 2022. The M111 alternate fill qualification effort will conclude in FY 2021, and can be incorporated into follow on production.	0.760	1.339	-
Title: M82 Simulant Smoke Practice Grenade	0.316	0.545	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: This effort is to address performance issues with the current M82 design. This modification includes design improvements, which will be validated through testing. Technical Data Package (TDP) will be updated to implement changes. ***FY 2021 Plans:*** FY 2021 supports prototype grenades testing, data analysis, and final Technical Data Package (TDP) updates to be incorporated into M82 production. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** No budget request in FY 2022. The M82 development effort will conclude in FY 2021 and will be incorporated into follow on production.			
Accomplishments/Planned Programs Subtotals	1.972	6.518	3.468

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• E33010: *GRENADE, HAND OFFENSIVE, M111*	-	5.694	11.218	-	11.218	-	-	-	-	-	-
• E32000: *GRENADE, Hand, Frag, Delay, M67*	5.058	3.536	3.358	-	3.358	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The strategy for the legacy M67 Fragmentation Hand Grenade is to acquire and test an Insensitive Munitions (IM) complaint M213 fuze replacement to be incorporated into the M67 offensive hand grenade. The new design will be qualified in order to mitigate the insensitive munition hazards associated with the explosive fill and the fuze technology. Follow-on procurement efforts will be competitive pending market research.

The strategy for the M330 is to qualify an alternative fill due to obsolescence and manufacturability driven changes required to provide smoke for use by Soldiers to meet existing validated requirements. Once the smoke fill is qualified, the plan is to conduct qualification testing, implement final design into technical data package, and prepare for production.

The strategy for the M68 MICLIC Trainer Improvement effort is to identify or design a trainer concept, leverage modeling and simulation, and build prototypes to be used for qualification testing ahead of a production decision.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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The strategy for Volcano characterization is to test the speed and range of current Volcano electronic sensors using government testing facilities to inform future countermeasure development.

The strategy for the M18 Smoke Grenade is to utilize an Other Transaction Authority (OTA) contract to demonstrate a novel method of colored smoke dye production.

The strategy for the M111 is to qualify an alternate explosive fill for the M111 Offensive Hand Grenade, which replaces the MK3A2 Offensive Hand Grenade. The alternate fill solution mitigates availability risk of PAX-3, which is a single point failure within the production of the M111 Offensive Hand Grenade. The alternate fill, once qualified, will be implemented into the Grenade Consolidation Contract via an Engineering Change Proposal (ECP).

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M67 (G881) Fragmentation Hand Grenade	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	-		0.959	May 2021	0.596	Oct 2021	-		0.596	Continuing	Continuing	-
M330 Enhanced Obscuration Grenade Hardware	MIPR	Pine Bluff Arsenal : White Hall, AR	-	0.190	Jan 2021	-		0.040	Jan 2022	-		0.040	0.000	0.230	-
M18 Smoke Grenade	C/FFP	TBD : TBD	-	-		0.170	Apr 2021	-		-		-	0.000	0.170	-
M111, Offensive Hand Grenade	C/FFP	Battelle Memorial Institute : Columbus, OH	0.873	0.262	Mar 2020	-		-		-		-	0.000	1.135	-
M67 Fragmentation Grenade	C/FFP	Battelle Memorial Institute : Columbus, OH	0.251	0.096	Jul 2020	-		-		-		-	0.000	0.347	-
M82 Simulant Smoke Practice Grenade	MIPR	Pine Bluff Arsenal : White Hall, AR	-	0.316	Jul 2020	-		-		-		-	0.000	0.316	-
M330 Enhanced Obscuration Grenade	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	0.265	-		-		-		-		-	0.000	0.265	-
		Subtotal	1.389	0.864		1.129		0.636		-		0.636	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M67 (G881) Fragmentation Hand Grenade	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	-		0.725	Feb 2021	0.738	Oct 2021	-		0.738	Continuing	Continuing	-
M330 Enhanced Obscuration Grenade	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	0.265	0.129	Nov 2020	0.598	Nov 2020	0.736	Nov 2021	-		0.736	Continuing	Continuing	-
M330 Enhanced Obscuration Grenade	MIPR	DEVCOM Chemical Biological Center : Edgewood, MD	0.890	0.481	Nov 2020	-		0.339	Jan 2022	-		0.339	0.850	2.560	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M68 MICLIC Trainer	TBD	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	-		-		0.300	Oct 2021	-		0.300	0.000	0.300	-
M111, Offensive Hand Grenade	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	3.220	0.418	Jan 2020	0.389	Mar 2021	-		-		-	0.182	4.209	-
M111, Offensive Hand Grenade	MIPR	Letterkenny Army Depot : Chambersburg, PA	0.038	0.001	Mar 2020	-		-		-		-	0.000	0.039	-
M111, Offensive Hand Grenade Demil	MIPR	Tooele Army Depot : Tooele, UT	-	0.070	Mar 2020	-		-		-		-	0.000	0.070	-
M111, Offensive Hand Grenade Shipping	Allot	Shipping : Picatinny Arsenal, NJ	-	0.009	Jan 2020	-		-		-		-	0.000	0.009	-
M82 Simulant Smoke Practice Grenade	MIPR	DEVCOM Armaments Center : Picatinny Arsenal. NJ	0.265	-		-		-		-		-	0.000	0.265	-
M82 Simulant Smoke Practice Grenade	MIPR	DEVCOM Chemical Biological Center : Edgewood, MD	0.095	-		-		-		-		-	0.000	0.095	-
		Subtotal	4.773	1.108		1.712		2.113		-		2.113	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Volcano Countermeasure Testing	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	-		0.250	Dec 2020	0.269	Jan 2022	-		0.269	0.000	0.519	-
M18 Prototype Testing	MIPR	Pine Bluff Arsenal : White Hall, AR	-	-		0.075	Aug 2021	0.200	Oct 2021	-		0.200	0.000	0.275	-
M68 MICLIC Modeling and Simulation	MIPR	Various : Various	-	-		-		0.250	Mar 2022	-		0.250	0.000	0.250	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / *Weapons and Munitions Product Improvement Programs*	Project (Number/Name) ER2 / *Close Combat Technology*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M67 Testing	MIPR	DEVCOM Armaments Center : Picatinny Arsenal, NJ	-	-		1.500	Aug 2021	-		-		-	0.000	1.500	-
M111, Offensive Hand Grenade	MIPR	Redstone Test Center : Redstone Arsenal, AL	0.037	-		0.334	May 2021	-		-		-	0.000	0.371	-
M111, Offensive Hand Grenade	MIPR	Yuma Test Center : Yuma Proving Grounds, AZ	-	-		0.373	May 2021	-		-		-	0.000	0.373	-
M111, Offensive Hand Grenade	MIPR	Aberdeen Test Center : Aberdeen Proving Grounds, NJ	0.351	-		0.600	May 2021	-		-		-	0.000	0.951	-
M82 Simulant Smoke Practice Grenade	MIPR	Pine Bluff Arsenal : Pine Bluff Arsenal, Arkansas	0.495	-		0.545	Nov 2020	-		-		-	0.000	1.040	-
		Subtotal	0.883	-		3.677		0.719		-		0.719	0.000	5.279	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	7.045	1.972		6.518		3.468		-		3.468	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER2 / *Close Combat Technology*

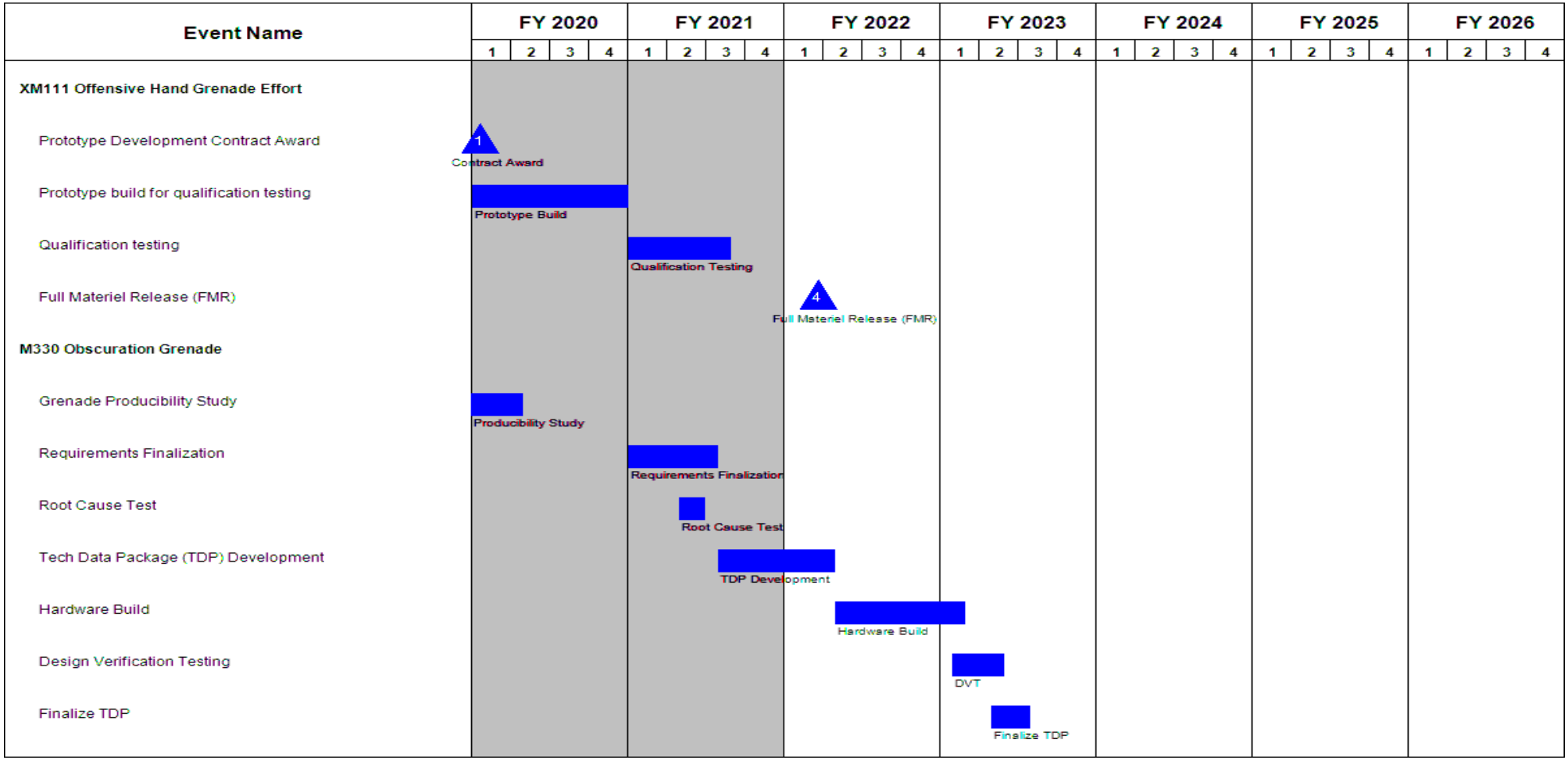

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER2 / *Close Combat Technology*

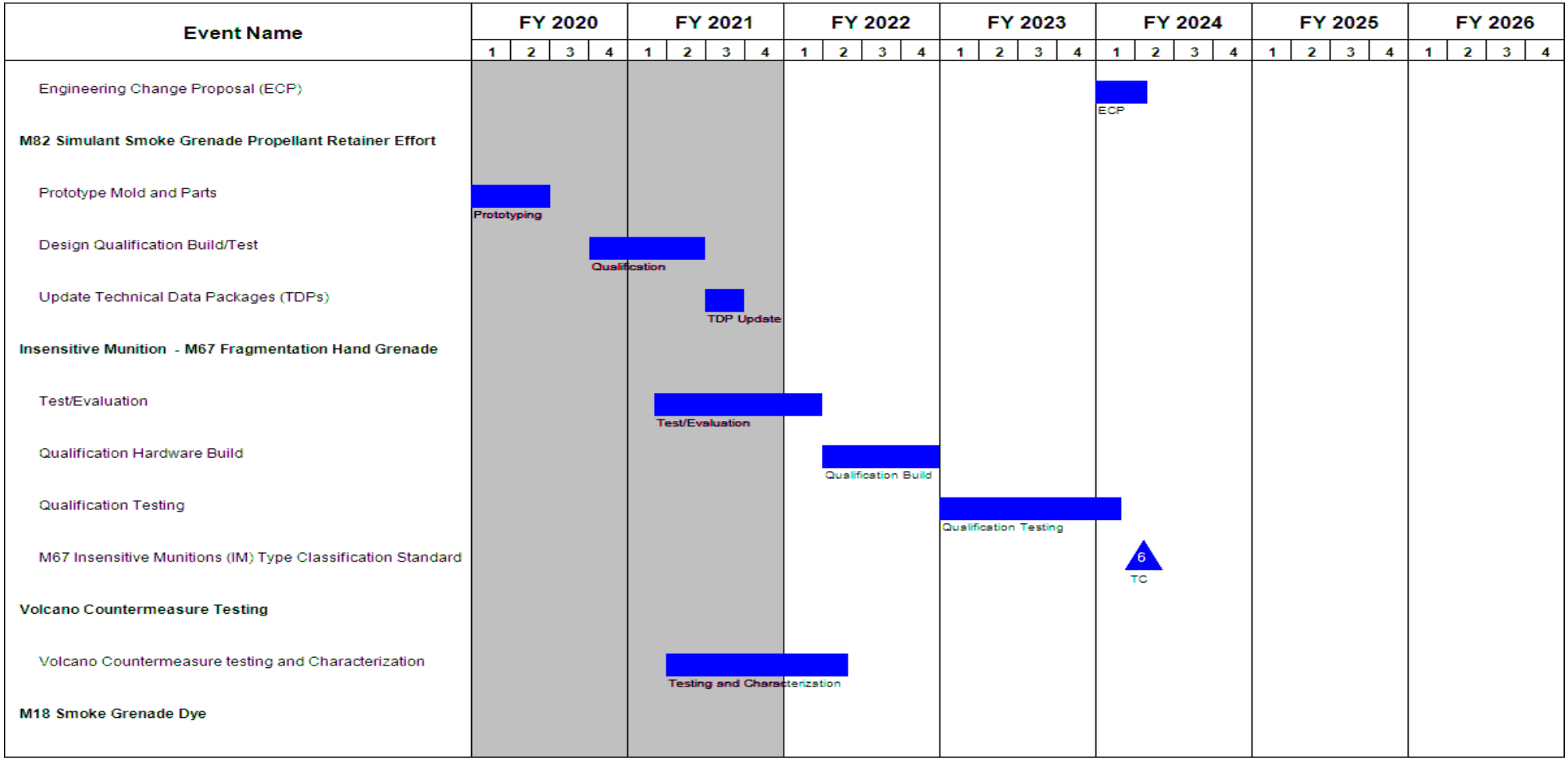

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER2 / *Close Combat Technology*

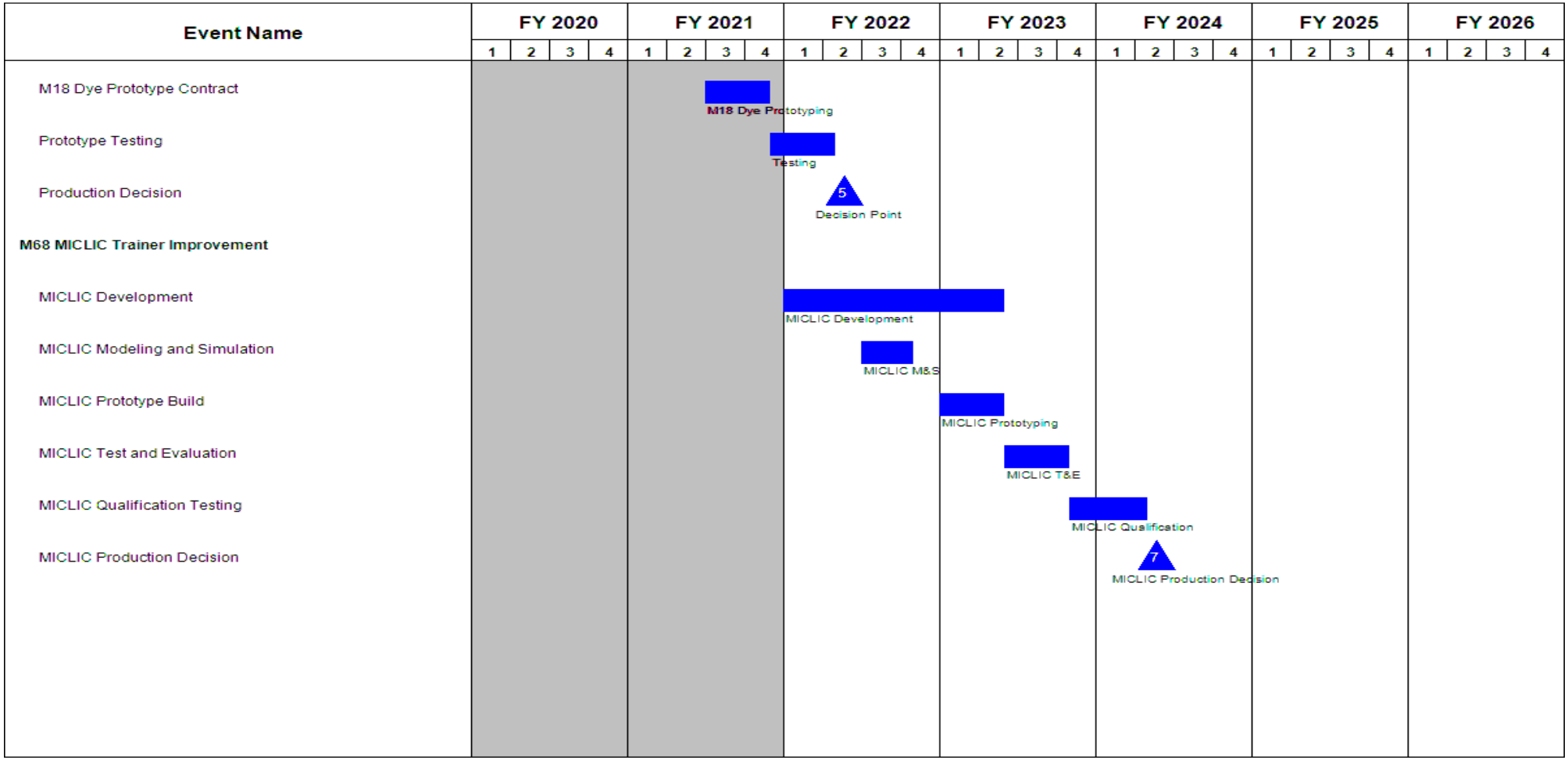

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER2 / *Close Combat Technology*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
XM111 Offensive Hand Grenade Effort	1	2017	4	2020
Testing Insensitive Munitions (IM), E3	3	2018	1	2019
Limited User Assessment (LUA)	4	2018	1	2019
Type Classification (TC) Documentation	2	2018	3	2019
Type Classification	4	2019	4	2019
Prototype Development Contract Award	1	2020	1	2020
Prototype build for qualification testing	1	2020	4	2020
Qualification testing	1	2021	3	2021
Full Materiel Release (FMR)	1	2022	1	2022
M330 Obscuration Grenade	1	2017	4	2020
Hexachloroethane Titanium Oxide (HX) Toxicity Study	1	2017	1	2019
AN-M8A1 Ecological Study	4	2018	1	2019
Starter Cup Development	2	2018	3	2019
Technical Data Package (TDP) Scrub	1	2019	1	2019
Fuze Assessment	2	2019	3	2019
Trade Analysis & Requirements. Validation	2	2019	4	2019
Grenade Producibility Study	2	2019	1	2020
Requirements Finalization	1	2021	3	2021
Root Cause Test	2	2021	2	2021
Tech Data Package (TDP) Development	3	2021	2	2022
Hardware Build	2	2022	1	2023
Design Verification Testing	1	2023	2	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
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	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Finalize TDP	2	2023	3	2023
Engineering Change Proposal (ECP)	1	2024	2	2024
M82 Simulant Smoke Grenade Propellant Retainer Effort	1	2017	4	2020
Propellant Retainer Development	1	2019	2	2019
Prototype Mold and Parts	2	2019	2	2020
Design Qualification Build/Test	4	2020	2	2021
Update Technical Data Packages (TDPs)	3	2021	3	2021
Insensitive Munition - M67 Fragmentation Hand Grenade	1	2021	4	2027
Test/Evaluation	1	2021	1	2022
Qualification Hardware Build	2	2022	4	2022
Qualification Testing	1	2023	1	2024
M67 Insensitive Munitions (IM) Type Classification Standard	2	2024	2	2024
Volcano Countermeasure Testing	1	2022	1	2022
Volcano Countermeasure testing and Characterization	2	2021	2	2022
M18 Smoke Grenade Dye	1	2021	1	2023
M18 Dye Prototype Contract	3	2021	4	2021
Prototype Testing	4	2021	2	2022
Production Decision	2	2022	2	2022
M68 MICLIC Trainer Improvement	1	2022	1	2022
MICLIC Development	1	2022	2	2023
MICLIC Modeling and Simulation	3	2022	4	2022
MICLIC Prototype Build	1	2023	2	2023
MICLIC Test and Evaluation	2	2023	4	2023
MICLIC Qualification Testing	4	2023	2	2024
MICLIC Production Decision	2	2024	2	2024

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / *Weapons and Munitions Product Improvement Programs*	Project (Number/Name) ER5 / *Indirect Fire and Fuze Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
ER5: *Indirect Fire and Fuze Technology*	-	4.076	4.712	4.463	-	4.463	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project supports the identification, study, analysis, and integration of in production and fielded fuzing technologies and safe arm devices. The Project implements new technologies into fuzing systems to preclude obsolescence, maximize standardization, enhance performance, and improve the safety and exportability of existing munitions. The Project addresses two major areas: (1) analysis and (2) block upgrades. Analysis efforts will identify second sources for fuzing systems that may reduce costs as a result of competition, and maintain production when sources or parts are no longer available. It will also allow for the performance enhancement of current ammunition items by conducting studies of major fuze components to detect, identify, and, if possible, correct latent defects. Block upgrades will identify and support studies on fuze improvements, implement fuze technology enhancements, and increase commonality of fuze components and requirements. Upgrades will enable the introduction of the latest technologies into fuzing, keep the fuze design current to avoid obsolescence issues, and add capabilities. Fiscal Year (FY) 2022 funding will support the transition and incorporation of Engineering Change Proposals (ECPs) to production fuze's Technical Data Packages (TDPs) for the next generation mortar proximity fuze microcontroller implementing portable software; an improved hand grenade fuze body to increase producibility and safety; and an enhanced M739A1 impact delay module upgrade to increase safety and performance. The FY2022 funding will complete a long range precision fires artillery fuze compatibility study to determine compatibility with production fuzes. The FY 2022 funding will conduct analysis on mortar training fuzes for ballistic flight performance improvements; conduct analysis on production fuze TDPs to preclude potential single point and critical suppliers issues; investigate improved proximity fuze radar transceivers for proximity mortar fuzes to increase performance and survivability; integrate extended range precision artillery fuzing power sources prototypes to support extended flight durations; and implement hand grenade safety improvements integrating electronic and energetic technologies that will also improve insensitive munition capability.

This Project also supports indirect fire artillery ammunition and mortar ammunition developmental product improvement initiatives to increase range, lethality, effectiveness, survivability and accuracy that will be incorporated into production via ECP. FY 2022 funding will support the continued studies and analysis (Key Parameter Development and Management (KPDM) and Model Based Systems Engineering (MBSE)).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Fuze Technology Integration (FTI)	2.612	2.263	2.321
Description: This project implements new and mature technologies into fuzing systems to preclude obsolescence, maximize standardization, enhance performance, and improve the safety and exportability of existing munitions. The FTI project addresses two major areas: (1) analysis/risk mitigation and (2) block upgrades. Analysis efforts will identify second sources for fuzing systems that may reduce costs by providing competition and maintain production when sources or parts are no longer available. It will also allow for the performance enhancement of current ammunition items by conducting studies of major fuze components to detect, identify, and correct latent defects. The second major area is block upgrades, which will identify and perform studies on			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER5 / *Indirect Fire and Fuze Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
improvements to fuzes, increase commonality of fuze components and requirements. Block upgrades will enable the introduction of the latest technologies into fuzing, keep the fuzing design current to avoid obsolescence issues and add capabilities. ***FY 2021 Plans:*** Analysis / Risk Mitigation: Will conduct engineering tests on the next generation micro-controller to modernize and replace a one-time programmable component for mortar proximity fuzes, will transition prototype replacement electronic transceivers into indirect fire fuzes and generate Engineering Change Proposals (ECPs) to incorporate into the Technical Data Packages (TDPs). Will also conduct analysis on alternative suppliers for critical fuzing components. Block Upgrades: Will conduct engineering tests of enhanced fuze delay mode designs on the M739A1 Point Detonation (PD) fuze for increased safety and improved performance, will conduct laboratory evaluations on the hand grenade fuzes to reduce the number of critical defects that will improve producibility and increase safety, will conduct studies of airburst fuzing technologies for medium and large caliber munitions, and will conduct analysis and laboratory evaluations on mortar training fuzes for increased safety and improved performance. ***FY 2022 Plans:*** Analysis/Risk Mitigation: Will conduct engineering tests on the next generation micro-controller to modernize and replace a one-time programmable component for mortar proximity fuzes; will conduct analysis and laboratory evaluations on mortar training fuzes for increased safety and improved performance; will conduct analysis on conventional artillery fuzes for compatibility with Long Range Precision Fires (LRPF) munitions and requirements; will conduct analysis on alternative suppliers for critical fuzing components. Block Upgrades: Will conduct engineering tests of enhanced fuze delay mode designs on the M739A1 Point Detonation (PD) fuze for increased safety and improved performance; will conduct laboratory evaluations on the hand grenade fuzes to reduce the number of critical defects that will improve producibility and increase safety; investigate proximity fuze alternative transceivers for proximity mortar fuzes to increase capability, performance, and survivability; hand grenade safety improvements integrating electronic and energetic technologies that will also improve insensitive munition capability; integrate extended range precision artillery fuzing power sources prototypes to support extended flight durations. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in funding in FY 2022 due to additional Fuze Technology Integration projects that have been identified for execution.			
Title: Ammunition Range and Reliability Improvements ***Description:*** This Project explores possibilities of increasing range, enhancing reliability, and increasing performance of Artillery and Mortar ammunition. This effort supports analysis efforts to identify improvement areas to key parameters.	0.300	2.373	2.142

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER5 / *Indirect Fire and Fuze Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: FY 2021 funding supports the studies and analysis (Key Parameter Development and Management (KPDM) and Model Based Systems Engineering (MBSE)). ***FY 2022 Plans:*** FY 2022 funding will support the continued studies and analysis (Key Parameter Development and Management (KPDM) and Model Based Systems Engineering (MBSE)). ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in funding in FY 2022 required for enhancement studies and analysis on Artillery and Mortar ammunition. Studies and analysis conducted will aim to increase performance.			
Title: Mortar Smoke Development ***Description:*** This Project supports the incorporation of the new Hexachloroethane Zinc Oxide (HC) smoke fill formulation while utilizing the existing illumination shell body configuration to support mortar smoke training for US Army Europe (USAREUR). The HC smoke fill formulation is less toxic and less incendiary than the current Mortar Red Phosphorus (RP) or White Phosphorous (WP) Smoke rounds and will reduce risk of unintended collateral damage or environmentally hazardous waste. USAREUR has yearly requirements for procurement of smoke mortar cartridges across all calibers to be used for training, but is prohibited from training with the current WP or RP smoke munitions in Europe due to environmental restrictions. This effort does not have an FY 2022 budget request. ***FY 2021 Plans:*** FY 2021 funding supports the completion of 120mm mortar ammunition HC smoke fill formulation development activities. Engineering efforts are focused on development of a smoke canister design that will promote effective smoke production and screening while being adapted to existing mortar cartridge carrier designs. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease in funding in FY 2022 due to the completion of 120mm smoke mortar development activities.	1.164	0.076	-
Accomplishments/Planned Programs Subtotals	4.076	4.712	4.463

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER5 / *Indirect Fire and Fuze Technology*

D. Acquisition Strategy

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

The Ammunition Range and Reliability Improvements effort is utilizing incrementally funded product improvement development contracts. Upon completion, efforts will transition to production as Engineering Change Proposals (ECPs) to be integrated into existing production contracts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / *Weapons and Munitions Product Improvement Programs*	Project (Number/Name) ER5 / *Indirect Fire and Fuze Technology*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Fuze Technology Integration Development	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	3.459	1.768	Oct 2019	1.350	Oct 2020	1.350	Nov 2021	-		1.350	0.000	7.927	-
Ammunition Range and Lethality Improvements	MIPR	TBD : TBD	-	-		1.871	Mar 2021	1.720	Dec 2021	-		1.720	0.000	3.591	-
Mortar Smoke Development	MIPR	Government Owned Government Operated (GOGO) Facilities : Various	0.357	0.347	Mar 2020	-		-		-		-	0.000	0.704	-
		Subtotal	3.816	2.115		3.221		3.070		-		3.070	0.000	12.222	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Fuze Technology Integration Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ	3.283	0.844	Oct 2019	0.913	Oct 2020	0.921	Nov 2021	-		0.921	0.000	5.961	-
Ammunition Range and Lethality Improvements	MIPR	Combat Capabilities Development Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ	-	0.300	Mar 2020	0.502	Mar 2021	0.422	Dec 2021	-		0.422	0.000	1.224	-
Mortar Smoke Development Engineering Support	MIPR	Combat Capabilities Development Command Armaments Center (DEVCOM AC) : Picatinny Arsenal, NJ	0.553	0.566	Feb 2020	0.076	Nov 2020	-		-		-	0.000	1.195	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / *Weapons and Munitions Product Improvement Programs*	Project (Number/Name) ER5 / *Indirect Fire and Fuze Technology*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mortar Smoke Development Engineering Support	MIPR	Combat Capabilities Development Command Chemical Biological Center (DEVCOM CBC) : Army Research Laboratory, MD	0.212	0.170	Feb 2020	-		-		-		-	0.000	0.382	-
		Subtotal	4.048	1.880		1.491		1.343		-		1.343	0.000	8.762	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Fuze Technology Integration Ballistic Testing	MIPR	Army Test and Evaluation Command (ATEC) : Yuma Proving Ground, AZ	0.100	-		-		0.050	Mar 2022	-		0.050	0.000	0.150	-
Mortar Smoke Testing	MIPR	Army Test and Evaluation Command (ATEC) : Yuma Proving Ground, AZ	0.199	0.081	Sep 2020	-		-		-		-	0.000	0.280	-
		Subtotal	0.299	0.081		-		0.050		-		0.050	0.000	0.430	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	8.163	4.076		4.712		4.463		-		4.463	0.000	21.414	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER5 / *Indirect Fire and Fuze Technology*

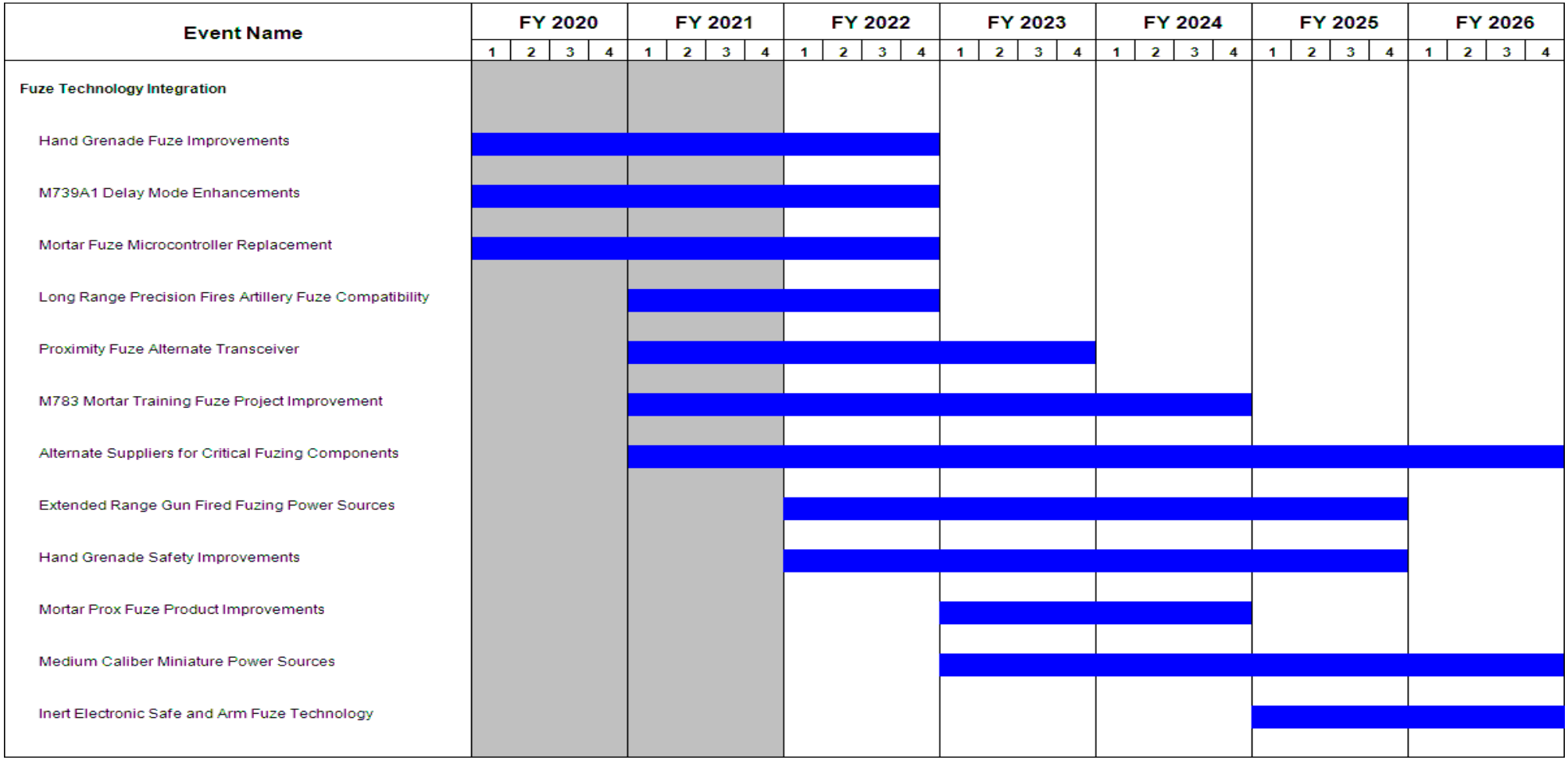

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER5 / *Indirect Fire and Fuze Technology*

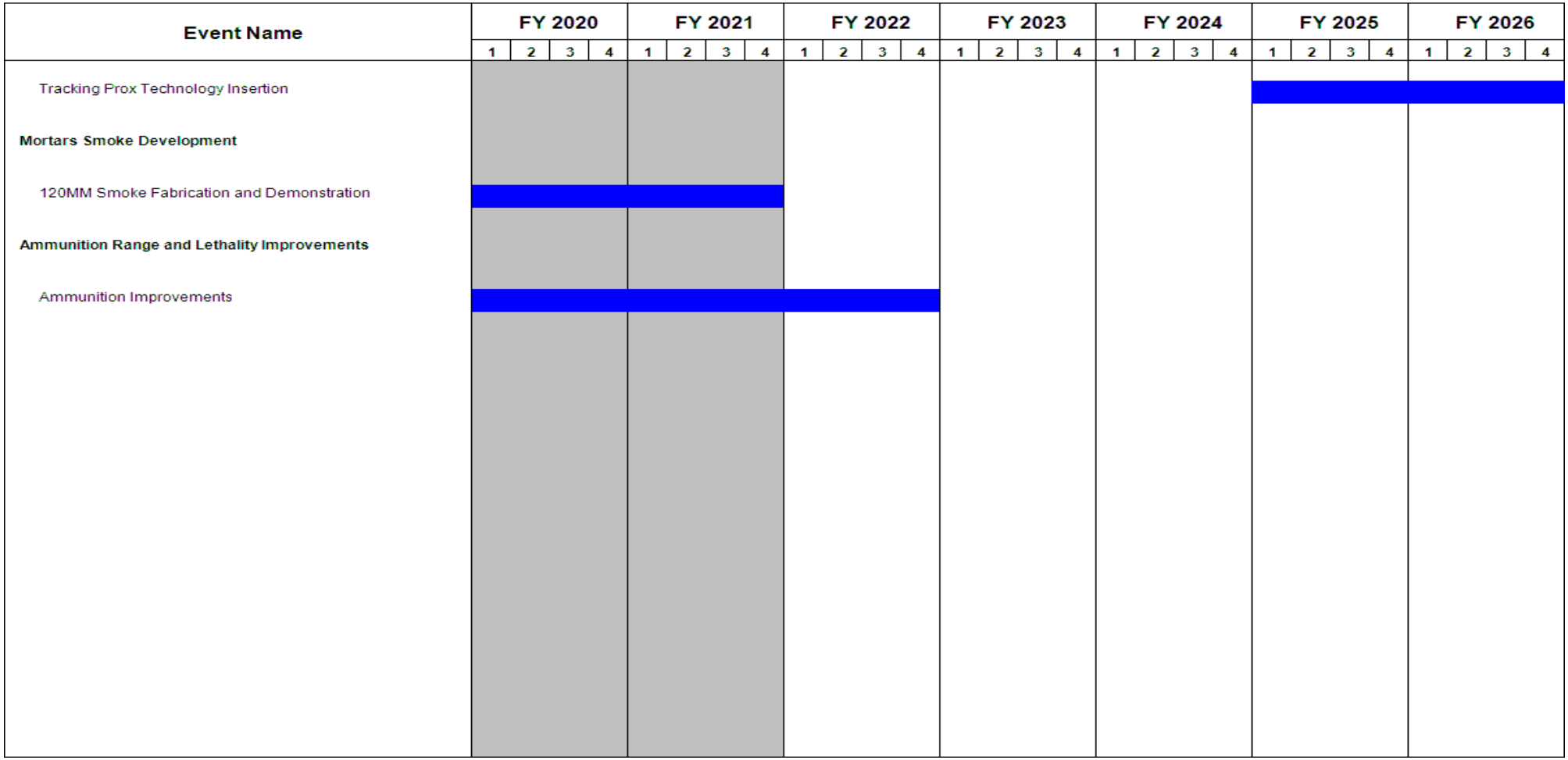

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER5 / *Indirect Fire and Fuze Technology*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Fuze Technology Integration	1	2016	4	2027
Hand Grenade Fuze Improvements	1	2016	4	2022
M739A1 Delay Mode Enhancements	1	2019	4	2022
Mortar Fuze Microcontroller Replacement	1	2020	4	2022
Long Range Precision Fires Artillery Fuze Compatibility	1	2021	4	2022
Proximity Fuze Alternate Transceiver	1	2021	4	2023
M783 Mortar Training Fuze Project Improvement	1	2021	4	2024
Alternate Suppliers for Critical Fuzing Components	1	2021	4	2026
Extended Range Gun Fired Fuzing Power Sources	1	2022	4	2025
Hand Grenade Safety Improvements	1	2022	4	2025
Mortar Prox Fuze Product Improvements	1	2023	4	2024
Medium Caliber Miniature Power Sources	1	2023	4	2026
Inert Electronic Safe and Arm Fuze Technology	1	2025	4	2027
Tracking Prox Technology Insertion	1	2025	4	2027
Mortars Smoke Development	1	2020	4	2021
120MM Smoke Fabrication and Demonstration	1	2019	4	2021
Ammunition Range and Lethality Improvements	1	2020	4	2022
Ammunition Improvements	1	2020	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / *Weapons and Munitions Product Improvement Programs*	Project (Number/Name) ER6 / *Direct Fire Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
ER6: *Direct Fire Technology*	-	8.174	8.436	6.687	-	6.687	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Direct Fire Technology funding will be used to support direct fire ammunition from small caliber ammunition, medium caliber ammunition and large caliber ammunition enhancements to lethality, effectiveness, survivability, accuracy and general product improvements. Fiscal Year (FY) 2022 funds support a number of small caliber ammunition projects including improvements to training ammunition; improvements to make small caliber primers more environmentally friendly; optimization of handgun ammunition; exploring precision sniper improvements and continuing the effort to reduce Soldier load by developing lightweight ammunition. Improvements to medium caliber ammunition include lethality and safety enhancements on 40mm ammunition. Improvements to 105mm and 120mm tank ammunition include examination and implementation of performance enhancement and improvements to tracer, combustible cartridge case and 105mm Advanced Multipurpose (AMP).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Small Caliber Ammunition Product Improvements	5.612	5.558	4.451
Description: Develop, demonstrate, and qualify improvements for 5.56mm, 7.62mm, .50 cal, Next Generation Squad Weapon ammunition, Precision Sniper ammunition and Handgun ammunition to achieve an increase in overall lethality and effectiveness.			
FY 2021 Plans: FY 2021 funding supports Phase III development contract to build lightweight 7.62mm ammunition (that will provide an ammunition weight savings of ten to fifty percent to the M240 gunner, assistant gunner, and ammo bearer), performing Validation Testing, conducting and Limited User Evaluation (LUE), and accomplishing the Engineering Change Proposal (ECP) in preparation for Low-Rate Initial Production (LRIP). FY 2021 also supports Phase I development efforts for the lightweight .50 Caliber ammunition (that will provide an ammunition weight savings of ten to fifty percent to the M2 gunner, assistant gunner, and ammo bearer) variant, performing Validation Testing, conducting a Limited User Evaluation, and conducting a Critical Design Review (CDR). FY 2021 funding supports the prove out of the prototype manufacturing to automate line (to reduce human exposure and reduce environmental waste) and integrate environmentally friendly lead free primers (new composition to address lead health concerns) for multiple small caliber ammunition variants and performing Pre Production Qualification Testing (PPQT) activities for the 5.56mm/7.62mm ammunition. Commercial primer testing will also be done to determine extreme temperature sensitivity and overall reliability. FY 2021 supports M118LRA1 development, refinement, and improvement of performance manufacturability, and test and evaluation though the employment of advanced simulations and experiments techniques (aerodynamic, propulsion, terminal, and structural) across the entire ballistic range.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER6 / *Direct Fire Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 will support Phase II development efforts for the lightweight case .50 Caliber ammunition variant, award Phase II down-select contract, prepare fielding documents, conduct a Critical Design Review (CDR). FY 2022 will support Phase III down-select to one concept for lightweight case 7.62mm ammunition variant and also conducting aging studies, obtaining safety release confirmation, conducting limited user evaluation, verification testing and preparing documents for engineering change proposal (ECP) in FY 2023. FY 2022 will support purchasing prototype equipment for the green primer pilot-line and pre-production qualification testing (PPQT) for 7.62mm green primer. FY 2022 will support improved dispersion and lethality for precision sniper ammunition particularly M1158. FY 2022 will support optimization and qualification testing to field handgun improvements such as Enhanced Ball Round (EBR) and Breeching capability. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** All Small Caliber Ammunition improvements are now incorporated into this funding line.			
Title: Medium Caliber Ammunition Product Improvements ***Description:*** Develop, demonstrate, and qualify improvements for 20mm, 25mm, 30mm, and 40mm ammunition. 40mm M433E1 will improve lethality (fragmentation) of the M433 grenade. The 40mm M550 fuze replacement will replace the single stage fuze with a dual spinlock fuze to improve safety and performance reliability. Improve safety, performance and reliability issues on the 20mm M940 ammunition. ***FY 2021 Plans:*** FY 2021 the Government will complete the M433E1 Pre Production Qualification Test (PPQT) to assess safety and performance increases and support the Type Classification documentation. FY 2021 the Government will investigate 20mm ammunition safety, performance and reliability issues to achieve an increase in overall lethality and effectiveness including analysis of the self-destruct feature. Testing on the 20mm M940 conversion from metal to plastic rotating band technology to reduce barrel wear on the M61 gun. ***FY 2022 Plans:*** FY 2022 supports finalizing type classification, full materiel release, and the technical data package for M433E1 and M550 fuze improvement. FY 2022 the Government will investigate 20mm ammunition safety, performance and reliability issues to achieve an increase in overall lethality and effectiveness including analysis of the self-destruct feature. Testing on the 20mm M940 conversion from metal to plastic rotating band technology to reduce barrel wear on the M61 gun. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** All Medium Caliber Ammunition product improvements are now incorporated into this funding line.	0.681	1.495	1.033
Title: Tank Ammunition Product Improvements ***Description:*** Develop and test potential improvements to 105mm and 120mm gun system ammunition.	1.881	1.383	1.203

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER6 / *Direct Fire Technology*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: FY 2021 funding will support continuing various 105mm and 120mm tank ammunition improvement efforts, including tracer improvements, combustible cartridge case design and fabrication improvements, and continuing efforts to assess the 105mm Advanced Multipurpose (AMP) cartridge/solution. Evaluate 105mm candidate cartridges, perform warhead lethality studies, modeling and simulation, conduct fuze assessment studies, perform propulsion system evaluation, assess fabrication improvements, and perform integration and testing of tank cartridges. ***FY 2022 Plans:*** FY 2022 funding supports continuing various 105mm and 120mm tank ammunition improvement efforts, including tracer improvements, combustible cartridge case design and fabrication improvements, and continuing efforts to assess the 105mm Advanced Multipurpose (AMP) cartridge/solution. Evaluate 105mm candidate cartridges, perform warhead lethality studies, modeling and simulation, conduct fuze assessment studies, perform propulsion system evaluation, assess fabrication improvements, and perform integration and testing of tank cartridges. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** All Tank Ammunition improvements are now incorporated into this funding line.			
Accomplishments/Planned Programs Subtotals	8.174	8.436	6.687

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / *Weapons and Munitions Product Improvement Programs*	Project (Number/Name) ER6 / *Direct Fire Technology*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
M433 Warhead Improvement - Contract 1	Option/ FFP	AMTEC Corporation : Janesville, WI	-	0.232	Jun 2020	-		-		-		-	0.000	0.232	-
Lightweight Case Ammunition - Contract 1	C/FFP	To Be Determined : To Be Determined	-	-		1.500	Aug 2021	1.540	Mar 2022	-		1.540	Continuing	Continuing	Continuing
Lightweight Case Ammunition - Contract 2	Option/ FFP	Olin Winchester : Independence, Missouri	-	-		0.600	Jun 2021	-		-		-	Continuing	Continuing	Continuing
Green Primer - Contract 1	C/FFP	Innovative Materials & Processes (IMP), LLC : Rapid City, South Dakota	-	0.117	May 2020	0.075	May 2021	-		-		-	0.000	0.192	-
Green Primer - Contract 2	C/FFP	Northrop Grumman Innovation Systems : Independence, Missouri	-	0.129	Mar 2020	-		0.700	Mar 2022	-		0.700	Continuing	Continuing	Continuing
Green Primer - Contract 3	C/FFP	Franklin Engineering : Franklin, Tennessee	-	0.278	Aug 2020	-		-		-		-	0.000	0.278	-
M118LRA1 - Contract 1	C/FFP	Vista : Anoka, Minnesota	-	0.548	Aug 2020	0.210	Feb 2021	-		-		-	0.000	0.758	-
Tank Ammunition Foam Celluloid Contract	C/FFP	Polymer Processing Institute : Newark, New Jersey	-	0.391	Mar 2020	0.600	Mar 2021	0.200	Jan 2022	-		0.200	Continuing	Continuing	Continuing
Tank Improvements 105mm HE - Contract 1	C/FFP	Northrop Grumman Innovation Systems : Plymouth, Minnesota	-	0.506	Sep 2020	-		-		-		-	0.000	0.506	-
Tank Improvements 105mm HE - Contract 2	C/FFP	General Dynamics : St. Petersburg, Florida	-	0.489	Sep 2020	-		-		-		-	0.000	0.489	-
Tank Ammunition 105mm HE - Contract 3	Option/ FFP	IMI Systems, LTD : Ramat Hasharon, Israel	-	-		0.275	Apr 2021	-		-		-	0.000	0.275	-
		Subtotal	-	2.690		3.260		2.440		-		2.440	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER6 / *Direct Fire Technology*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CCDC Armaments Center Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, New Jersey	4.202	3.304	Nov 2019	2.536	Nov 2020	2.947	Nov 2021	-		2.947	Continuing	Continuing	Continuing
Ammunition Demilitarization	MIPR	Toole Army Depot : Toole, Utah	0.200	0.200	Dec 2020	-		-		-		-	0.000	0.400	-
		Subtotal	4.402	3.504		2.536		2.947		-		2.947	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Research Lab (ARL)	MIPR	CCDC Army Research Lab (ARL) : Aberdeen, Maryland	0.585	1.820	Jan 2020	0.900	Dec 2020	0.800	Jan 2022	-		0.800	Continuing	Continuing	Continuing
Aberdeen Test Center (ATC)	MIPR	Aberdeen Test Center (ATC) : Aberdeen, Maryland	1.965	0.035	Jan 2020	1.320	Jan 2021	0.500	Jan 2022	-		0.500	Continuing	Continuing	Continuing
Ballistic Support Office (BSO at LCAAP)	MIPR	Joint Munitions Command (JMC) : Independence, Missouri	-	0.125	Jun 2020	0.220	Jan 2021	-		-		-	0.000	0.345	-
Yuma Proving Ground	MIPR	Yuma Proving Ground : Yuma, Arizona	-	-		0.200	Mar 2021	-		-		-	0.000	0.200	-
		Subtotal	2.550	1.980		2.640		1.300		-		1.300	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.952	8.174		8.436		6.687		-		6.687	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER6 / *Direct Fire Technology*

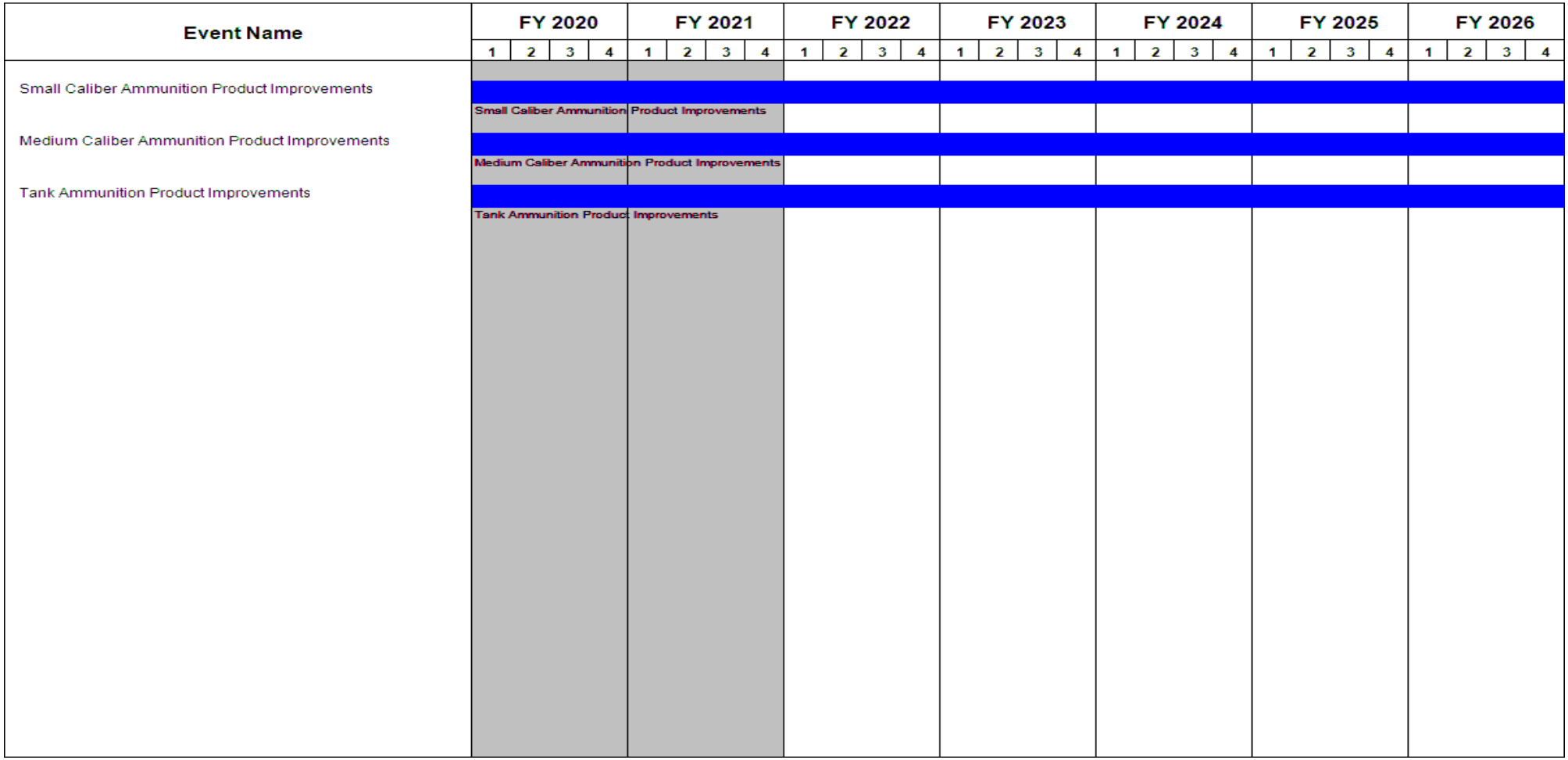

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607131A / *Weapons and Munitions Product Improvement Programs*	**Project (Number/Name)** ER6 / *Direct Fire Technology*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Small Caliber Ammunition Product Improvements	1	2018	4	2033
Medium Caliber Ammunition Product Improvements	1	2018	4	2033
Tank Ammunition Product Improvements	1	2018	4	2033

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607134A *I Long Range Precision Fires (LRPF)*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	149.455	100.146	-	-	-	-	-	-	-	-	-
ES1: *Long Range Precision Fires (LRPF)*	-	149.455	100.146	-	-	-	-	-	-	-	-	-
Program MDAP/MAIS Code: 494												

Note

Starting in Fiscal Year (FY) 2022 all funds for this program were restructured from PE 0607134A to PE 0605231A.. PE 0605231A is a continuation of the existing PrSM program.

A. Mission Description and Budget Item Justification

Precision Strike Missile (PrSM) is the Army's next generation surface-to-surface missile that replaces and improves upon Army Tactical Missile System (ATACMS) capabilities. The mission of the PrSM System is to attack/ neutralize/suppress/destroy targets using missile delivered indirect precision fires. PrSM will provide Joint Force Commanders with a 24/7, all-weather capability to attack critical and time sensitive area and point targets including threat air defense, missile launchers, command and control centers, assembly/staging areas and high payoff targets at all depths of the multi-domain battlefield. PrSM will counter the enemy's ability to conduct combat maneuver and air defense operations.

PrSM requirements include: max range of greater than 400 kilometers (km), specified lethality against the designated target set, a Launch Pod Missile Container (LPMC) that holds two missiles, survivability in a threat environment, and compatibility with the existing launcher platforms (M270A2 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS)). PrSM will meet cluster and insensitive munition requirements and is being designed with an open system architecture that provides the capability for future growth to counter new and emerging threats. Increment 2 of PrSM will include the ability to attack mobile or relocatable ground and maritime targets. Future PrSM increments will provide increased lethality against hardened targets and extend range capability to 650km. There is no funding for FY 2022.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0607134A *I Long Range Precision Fires (LRPF)*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	156.682	122.733	145.681	-	145.681
Current President's Budget	149.455	100.146	0.000	-	0.000
Total Adjustments	-7.227	-22.587	-145.681	-	-145.681
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-18.108			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.781	-			
• SBIR/STTR Transfer	-6.446	-4.479			
• Adjustments to Budget Years	-	-	-145.681	-	-145.681

Change Summary Explanation

Starting in Fiscal Year (FY) 2022 all funds for this program were restructured from PE 0607134A to PE 0605231A.. PE 0605231A is a continuation of the existing PrSM program.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607134A / *Long Range Precision Fires (LRPF)*	Project (Number/Name) ES1 / *Long Range Precision Fires (LRPF)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
ES1: *Long Range Precision Fires (LRPF)*	-	149.455	100.146	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Starting in Fiscal Year (FY) 2022 all funds for this program were restructured from PE 0607134A to PE 0605231A.. PE 0605231A is a continuation of the existing PrSM program.

A. Mission Description and Budget Item Justification

Precision Strike Missile (PrSM) is the Army's next generation surface-to-surface missile that replaces and improves upon Army Tactical Missile System (ATACMS) capabilities. The mission of the PrSM System is to attack/ neutralize/suppress/destroy targets using missile delivered indirect precision fires. PrSM will provide Joint Force Commanders with a 24/7, all-weather capability to attack critical and time sensitive area and point targets including threat air defense, missile launchers, command and control centers, assembly/staging areas and high payoff targets at all depths of the multi-domain battlefield. PrSM will counter the enemy's ability to conduct combat maneuver and air defense operations.

PrSM requirements include: max range of greater than 400 kilometers (km), specified lethality against the designated target set, a Launch Pod Missile Container (LPMC) that holds two missiles, survivability in a threat environment, and compatibility with the existing launcher platforms (M270A2 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS)). PrSM will meet cluster and insensitive munition requirements and is being designed with an open system architecture that provides the capability for future growth to counter new and emerging threats. Increment 2 of PrSM will include the ability to attack mobile or relocatable ground and maritime targets. Future PrSM increments will provide increased lethality against hardened targets and extend range capability to 650km. There is no funding for FY 2022.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Enhanced Technology Maturation and Risk Reduction (E-TMRR)	149.455	32.276	-
Description: E-TMRR activities to develop the Army's next generation missile capability that doubles volume of fire, meets range requirements by exceeding 400km, provides required lethality for both point and area targets, ensures survivability, meets cluster munition policy requirements, and provides an open system architecture. PrSM provides field artillery units with a deep-strike capability while supporting Brigade, Division, Corps, Army, Theater, Joint and Coalition forces in full, limited or expeditionary operations.			
FY 2021 Plans: Complete execution of E-TMRR activities to include four (4) PrSM EDT missile flights. One of the flight tests will be a maximum range demonstration. Continue subsystem qualifications, HWIL, SWIL, 6 Degrees of Freedom (6DoF) analysis, and conduct			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607134A / *Long Range Precision Fires (LRPF)*	**Project (Number/Name)** ES1 / *Long Range Precision Fires (LRPF)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
critical missile survivability assessments. Government will continue activities to support PrSM missile software integration with the HIMARS fire control system to include required interface with Advanced Field Artillery Tactical Data System (AFATDS). After the completion of Milestone B, the Product Office will award an EMD contract. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** E-TMRR activities will be complete in FY21.			
Title: Engineering and Manufacturing Development (EMD) ***Description:*** EMD activities to develop the Army's next generation missile capability that doubles volume of fire, meets range requirements by exceeding 400km, provides required lethality for both point and area targets, ensures survivability, meets cluster munition policy requirements, and provides an open system architecture. PrSM provides field artillery units with a deep-strike capability while supporting Brigade, Division, Corps, Army, Theater, Joint and Coalition forces in full, limited or expeditionary operations. ***FY 2021 Plans:*** After the completion of Milestone B, the Army will award an EMD. The contractor will identify and implement required design changes informed by E-TMRR testing, begin any additional sub-assembly system qualification, finalize production planning in support of Manufacturing Readiness Assessments for UMR, and order long lead items for system safety testing and assembly of (12) Production Qualification Test (PQT) flight test articles. The Government will continue to assess the contractor's missile performance through modeling, simulation, and performance testing. The Army will continue tactical software integration on the HIMARS launcher, prioritize required qualification, safety and transportation hazard classification approvals necessary to meet UMR requirements. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Change reflects decrease from funding being moved from PE 0607134A to PE 0605231A.	-	49.870	-
Title: Increment 2 ***Description:*** Activities to procure long lead Increment 1 test hardware for PrSM Increment 2 for prototype development. ***FY 2021 Plans:*** Procure long lead Increment 1 test hardware for PrSM Increment 2 for prototype development. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Change reflects decrease from funding being moved from PE 0607134A to PE 0605231A.	-	18.000	-
Accomplishments/Planned Programs Subtotals	149.455	100.146	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607134A / *Long Range Precision Fires (LRPF)*	**Project (Number/Name)** ES1 / *Long Range Precision Fires (LRPF)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• 0605231A: *Precision Strike Missile (PrSM)*	-	-	188.452	-	188.452	-	-	-	-	-	-
• C29600: *PRECISION STRIKE MISSILE (PRSM)*	-	49.941	166.130	-	166.130	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

PrSM follows the Major Capability Acquisition pathway. A 6 NOV 2013 Materiel Development Decision Acquisition Decision Memorandum designated PrSM as a Pre-Major Defense Acquisition Program. An AoA supporting the MS A decision was completed by U.S. Army Training and Doctrine Command (TRADOC) Analysis Center-White Sands Missile Range (TRAC-WSMR), with an Office of the Secretary of Defense (OSD) letter of sufficiency issued in September 2015. In 4Q FY 2016, the Army awarded 9 month risk reduction, trade study and initial design development agreements to two contractors. The effort resulted in development of initial baseline designs presented during final technical reviews that resulted in a seamless transition into the TMRR phase. Subsequent to MS A, on 31 March 2017, the Army awarded competitive Other Transaction Agreements to two contractors with planned down-select following the conclusion of system level prototype flight testing in FY 2020.

In FY 2018, the Army in response to immediate near-peer threats and the requirement to engage targets with a precision guided missile at ranges beyond 400km the Army directed acceleration of PrSM Early Operational Capability (EOC) with planned fielding in FY 2023. The PrSM acquisition approach was updated to include follow-on competitive TMRR effort, Enhanced TMRR (E-TMRR). A successful system level prototype flight test was the entry criteria for award of the E-TMRR agreement.

In FY 2019 both contractors completed a Preliminary Design Review (PDR), conducted component level Design Verification Testing (DVT) on PrSM sub-assemblies prior to system level prototype flight tests. During DVT, one PrSM contractor experienced a catastrophic rocket motor failure.

In FY 2020 The Army decided not to fund the contractor's additional cost growth and the contractor chose not to fund internally. The period of performance expired on this effort in March 20, 2020 leaving only one contractor to continue development activities. The remaining contractor conducted prototype flights in 1-3QFY2020 and was solely awarded E-TMRR in 12 JUN 2020.

During E-TMRR the contractor will finalize tactical designs, build additional missiles for system level EDT flight tests, begin subsystem qualification, and establish a production capability for EOC missiles. These risk reduction activities inform Milestone B decision and transition to EMD. EMD Phase begins 4Q FY 2021 following the MS B approval. The EMD phase will include assembly of PQT flight test articles in parallel with completion of ground and system qualification, tactical software integration on the HIMARS and M270A2 launchers and production planning efforts. Also, the program will refine critical missile survivability assessments to ensure the selected EMD design will successfully meet PrSM's kinetic, electro-magnetic spectrum, cyber, environmental, nuclear requirements. On 3 FEB 2021 Army Futures Command, Commanding General signed a Directed Requirement for initial quantities of PrSM EOC. FY21-24 MIPA funds will initially support an EOC and then transition to Full Rate Production and achieve Initial Operational Capability in FY 2025. EOC production begins in FY 2021 with fielding occurring in FY 2023. PrSM acquisition

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607134A / *Long Range Precision Fires (LRPF)*	**Project (Number/Name)** ES1 / *Long Range Precision Fires (LRPF)*

approach is incremental. The modular systems Improvements will occur via technology insertions that increase the capabilities of the base missile. During FY 2021 the program will procure Increment 1 long lead test hardware to support Increment 2 prototype development for integration with Science & Technology (S&T) developed hardware that will transition to the Program Office in FY 2022.

Development, integration, and testing of PrSM systems solutions, including test planning to support an annual PEO MS-led Multi-Domain Operations test/demonstration event beginning in FY23, to include biennial Survivability Resiliency/Cyber-Electromagnetic Activities exercises with an event planned in FY22.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607134A / *Long Range Precision Fires (LRPF)*	**Project (Number/Name)** ES1 / *Long Range Precision Fires (LRPF)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	MIPR	Various : RSA, AL	8.339	2.569	Nov 2019	5.169	Feb 2021	-		-		-	Continuing	Continuing	Continuing
		Subtotal	8.339	2.569		5.169		-		-		-	Continuing	Continuing	N/A

Remarks

RSA - Redstone Arsenal, Alabama

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PrSM Increment 1 TMRR - 2 Vendors* (Raytheon and Lockheed Martin)	C/Various	LMMFCS / RMS : Grand Prairie, TX / Tucson, AZ	233.459	-		-		-		-		-	0.000	233.459	-
PrSM Increment 1 E-TMRR - 1 Vendor (Lockheed Martin)	C/CS	LMMFCS : Grand Prairie, TX	-	96.036	Nov 2019	12.210	Mar 2021	-		-		-	0.000	108.246	-
PrSM Increment 1 EMD - 1 Vendor (Lockheed Martin)	SS/FPIS	LMMFCS : Grand Prairie, TX	-	-		46.262	May 2021	-		-		-	Continuing	Continuing	Continuing
PrSM Increment 2 - 1 Vendor (Lockheed Martin)	TBD	LMMFCS : Grand Prairie, TX	-	-		18.000	Aug 2021	-		-		-	Continuing	Continuing	Continuing
Development Engineering Support	MIPR	AMCOM/CCDC AvMC/S3I : RSA, AL	14.731	2.008	Nov 2019	1.554	Jan 2021	-		-		-	Continuing	Continuing	Continuing
A-PNT	MIPR	CCDC AvMC : RSA, AL	-	7.000		-		-		-		-	0.000	7.000	-
Software Development	MIPR	S3I : RSA, AL	-	2.876	Nov 2019	2.805	Feb 2021	-		-		-	Continuing	Continuing	Continuing
FY20 Rescission	TBD	N/A : N/A	-	30.000	Jan 2021	-		-		-		-	0.000	30.000	-
		Subtotal	248.190	137.920		80.831		-		-		-	Continuing	Continuing	N/A

Remarks

*Lockheed Martin awarded E-TMRR in 1QFY2020 after successful flight test.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607134A / *Long Range Precision Fires (LRPF)*	Project (Number/Name) ES1 / *Long Range Precision Fires (LRPF)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AMCOM - Aviation and Missile Command; A-PNT - Assured-Position, Navigation and Timing; CCDC AvMC - Combat Capabilities Development Center Aviation & Missile Command; DOTC - DoD Ordnance Technology Consortium; LMMFCS - Lockheed Martin Missiles and Fire Control System; OTA - Other Transaction Agreements; RMS - Raytheon Missile Systems; RSA - Redstone Arsenal, Alabama; S3I - Systems Simulation, Software and Integration; TX - Texas															

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Quality, Safety, SETA Support, and Analysis	SS/T&M	Various; S3 / Pending Competitor in Aug 2021 : RSA, AL	4.320	3.549	Nov 2019	4.028	Feb 2021	-		-		-	Continuing	Continuing	Continuing
		Subtotal	4.320	3.549		4.028		-		-		-	Continuing	Continuing	N/A

Remarks

RSA - Redstone Arsenal, AL; S3 Inc - System Studies & Simulation Inc.; SETA - Systems Engineering and Technical Support

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support	MIPR	WSMR; RTC : WSMR,NM; RSA, AL	8.736	5.417	Nov 2019	10.118	Feb 2021	-		-		-	Continuing	Continuing	Continuing
		Subtotal	8.736	5.417		10.118		-		-		-	Continuing	Continuing	N/A

Remarks

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

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	269.585	149.455		100.146		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607134A / *Long Range Precision Fires (LRPF)*	Project (Number/Name) ES1 / *Long Range Precision Fires (LRPF)*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607134A / *Long Range Precision Fires (LRPF)*	**Project (Number/Name)** ES1 / *Long Range Precision Fires (LRPF)*

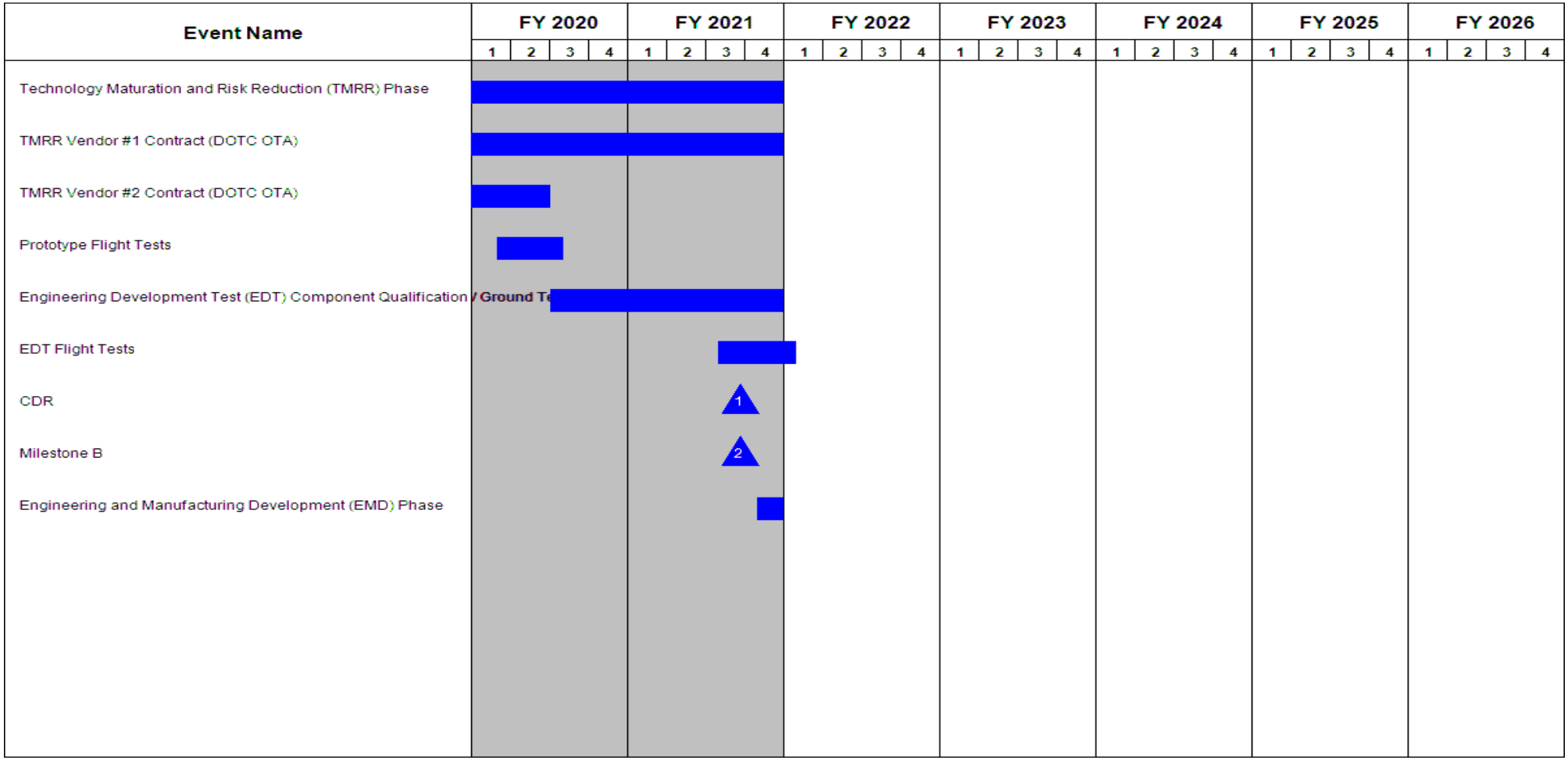

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607134A / *Long Range Precision Fires (LRPF)*	**Project (Number/Name)** ES1 / *Long Range Precision Fires (LRPF)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
AoA	2	2015	3	2015
Materiel Solution Analysis (MSA)	1	2014	3	2017
MSA Vendor #1 Contract (DOTC OTA)	3	2016	3	2017
MSA Vendor #2 Contract (DOTC OTA)	3	2016	3	2017
Milestone A	2	2017	2	2017
Technology Maturation and Risk Reduction (TMRR) Phase	2	2017	4	2021
TMRR Vendor #1 Contract (DOTC OTA)	3	2017	4	2021
TMRR Vendor #2 Contract (DOTC OTA)	3	2017	2	2020
System Requirements Review (SRR)	4	2017	4	2017
System Functional Review (SFR)	1	2018	1	2018
Preliminary Design Review (PDR)	1	2019	1	2019
Prototype Flight Tests	1	2020	3	2020
Engineering Development Test (EDT) Component Qualification / Ground Testing	3	2020	4	2021
EDT Flight Tests	3	2021	1	2022
CDR	3	2021	3	2021
Milestone B	3	2021	3	2021
Engineering and Manufacturing Development (EMD) Phase	4	2021	4	2021

Note

Funding for FY22 and out moved from PE 0607134A to PE 0605231A

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607136A / *Blackhawk Product Improvement Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	22.502	8.300	4.773	-	4.773	-	-	-	-	-	-
ES3: *Blackhawk Product Improvement Program*	-	22.502	8.300	4.773	-	4.773	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

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

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

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607136A / *Blackhawk Product Improvement Program*

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	23.039	11.236	5.227	-	5.227
Current President's Budget	22.502	8.300	4.773	-	4.773
Total Adjustments	-0.537	-2.936	-0.454	-	-0.454
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.525			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.537	-0.411			
• Adjustments to Budget Years	-	-	-0.454	-	-0.454

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607136A / *Blackhawk Product Improvement Program*				Project (Number/Name) ES3 / *Blackhawk Product Improvement Program*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
ES3: *Blackhawk Product Improvement Program*	-	22.502	8.300	4.773	-	4.773	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

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

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607136A / *Blackhawk Product Improvement Program*	**Project (Number/Name)** ES3 / *Blackhawk Product Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: UH-60V Product Development ***Description:*** The UH-60V program provides an integrated digital map, integrated performance planning, common functionality and commonality of training with UH-60M. Product Development includes all activities related to Hardware and Software development, Prototype Manufacturing (3 units), Training Equipment, Data, and Production Engineering and Planning for the UH60V program. Examples of specific activities include drawing development, work instruction development, prototype builds, Preliminary Design Review (PDR)/Critical Design Review (CDR), Software Engineering Directorate (SED) Simulation Integration Laboratory (SIL) design, Software Development (aircraft and off aircraft), trainers, and training material development.	1.179	-	-
Title: UH-60V Support ***Description:*** Support Costs include Systems Engineering/Program Management (SEPM) type activities performed at various test agencies. ***FY 2021 Plans:*** Support of UH-60V Publication and Verification post Initial Operational Test and Evaluation (IOT&E). ***FY 2021 to FY 2022 Increase/Decrease Statement:*** 60V development is anticipated to end in FY21.	1.349	0.350	-
Title: UH-60V Management Services ***Description:*** Management Services includes all activities related to Government/Contractor SEPM to include the cost of Government and Contractor personnel supporting the UH-60V program.	1.273	-	-
Title: UH-60V Test & Evaluation ***Description:*** The Utility Helicopters Project Office (UHPO) is responsible for day-to-day test management activities to include execution of all developmental tests and support of operational tests for the UH-60V Program. The focal point for test management is the UH-60V Test Lead Engineer who is the chair for the UH-60V Test and Evaluation (T&E) Working-level Integrated Product Team. The UH-60 T&E team ensures integration and coordination of test and data requirements among all agencies involved in the test and acquisition of the UH-60V effort. T&E activities include: AFTD Baseline Flight Testing, IOTE, Cybersecurity and Interoperability tests. ***FY 2021 Plans:*** UH-60V Publication and Verification post IOT&E. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	1.066	5.081	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607136A / *Blackhawk Product Improvement Program*	**Project (Number/Name)** ES3 / *Blackhawk Product Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
60V development is anticipated to end in FY21.			
Title: MEDEVAC MEP Integration Product Development ***Description:*** MEDEVAC MEP Integration Product Development. ***FY 2021 Plans:*** Continue executing contract with PIF Contractor to perform HW design and SW Design activities for H-60V MEDEVAC MEP Integration effort. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 funding decrease is due to end of design phase and contract close out.	5.383	0.462	-
Title: MEDEVAC MEP Integration Support ***Description:*** Support the HW and SW Design Activities with Airworthiness and Technical data division support. ***FY 2021 Plans:*** Support the hardware and software Design Activities with Airworthiness and Technical data division support. ***FY 2022 Plans:*** Support the hardware and software Design Activities with Airworthiness and Technical data division support. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 funding increase is due to effort needed to review all final design documentation and test data/reports to support a Fielding Airworthiness Release.	0.518	0.840	1.139
Title: MEDEVAC MEP Management Services ***Description:*** Management Services includes all activities related to Government/Contractor SEPM to include the cost of Government and Contractor personnel supporting the H-60V MEDEVAC MEP Integration Program. ***FY 2021 Plans:*** Provide Management Services with Government / Contractor SEPM to include the cost of the Government and contractor personnel supporting the H-60V MEDEVAC MEP Integration Program. ***FY 2022 Plans:*** Provide Management Services with Government / Contractor SEPM to include the cost of the Government and contractor personnel supporting the H-60V MEDEVAC MEP Integration Program. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	1.808	0.555	0.486

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607136A / *Blackhawk Product Improvement Program*	**Project (Number/Name)** ES3 / *Blackhawk Product Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY22 funding decrease is due to transition from design to final AWR documentation reviews and closeout.			
Title: MEDEVAC Test & Evaluation ***Description:*** The UHPO is responsible for day-to-day test management activities to include the execution of all developmental tests for the UH-60V MEDEVAC program. As part of this responsibility, UHPO manages the Test and Evaluation Working Group with a UH-60V MEDEVAC Test lead. He/she ensures the test agencies are coordinated, test plans are created, instrumentation is developed and installed, and airworthiness approvals are obtained. He/she tracks status of the testing throughout the program, assists in resolving issues, and coordinates approval of the test data and test reports. For this effort, the UHPO will manage system-level testing necessary to receive a fielding AWR, including Electromagnetic Compatibility (EMC), Noise Floor, Electromagnetic Vulnerability (EMV), and ground system checkouts and flight testing of the FLIR, Hoist, and IMMSS. ***FY 2021 Plans:*** MEDEVAC plans to implement funding at the Redstone Test Center (RTC) to perform planning for and execution of system-level ground and flight testing and instrumentation. The flight testing will focus on proper operation of the FLIR and the new Pilot Vehicle Interface (PVI) for the FLIR geopoint and geolocate functionality. It will also focus on safe operation of the hoist with payload. This effort will be managed by UHPO PD MEDEVAC. ***FY 2022 Plans:*** MEDEVAC plans to implement funding at RTC to continue execution of continued system-level testing and a delta operational test. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 funding increase is due to the system-level test activities and the operational testing to be performed in FY22.	-	1.012	3.148
Title: SATCOM ***Description:*** SATCOM: Development and Integration of an airworthiness satellite communications for better coordination, information sharing and situational awareness/situational understanding on UH/HH-60 aircraft	9.926	-	-
Accomplishments/Planned Programs Subtotals	22.502	8.300	4.773

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A05009: *UH-60 Black Hawk L and V Models*	169.290	165.197	166.205	-	166.205	-	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607136A / *Blackhawk Product Improvement Program*	**Project (Number/Name)** ES3 / *Blackhawk Product Improvement Program*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• Q13015: *MEDICAL EVACUATION*	-	-	12.314	-	12.314	-	-	-	-	-	-

Remarks

Q13015000 MEDICAL EVACUATION provides procurement funding for MEDEVAC MEP capability on UH-60 helicopters. Per requirements, starting in FY 2022, Q13015000 will resource procurement of MEDEVAC MEP kits and installations at a rate of 15 aircraft per year through FY 2034, which is the estimated year the AAO of 200 UH-60V MEDEVAC is reached. Figures shown above reflect the full FL8D/Q13015000/OPA/MEDICAL EVACUATION funding line, which includes the production kits and MEP installation costs at CCAD. UH-60V MEDEVAC MEP Q13015000 OPA requirements are $5.7 million in FY 2022, $6.1 million in FY 2023, and $6.2 million in FY 2024. Total MEDEVAC MEP requirement in Q1301500 through FY 2034 is $88.1M.

D. Acquisition Strategy

The UH-60V program plans to leverage various test agencies, to design, integrate and build three production representative aircraft. The GOGO facility uses a cost plus contract vehicle and conducted full and open competition for the selection of the avionics solution provider.

Independent of the UH-60V Program of Record and Acquisition Program Baseline (APB), the MEDEVAC MEP program plans to utilize the U. S. Army Development Command (DEVCOM) Aviation and Missile Center (AvMC) and Prototype Integration Facility (PIF) to design and integrate MEDEVAC capability into the UH-60V. By leveraging the same GOGO facility utilized by the UH-60V program, efficient design, software development, integration, and testing will occur by eliminating redundant tasks and employing experienced government resources already in possession of pertinent UH-60V technical data required to support the MEDEVAC MEP nonrecurring engineering (NRE) effort. Prototype, validation, and verification of technical publications, as well as airworthiness testing, will be accomplished following completion of the UH-60V IOT&E, at which time up to two UH-60V EDM aircraft will be allocated to the MEDEVAC MEP program. Following completion of MEDEVAC MEP NRE, technical products will feed production and fielding contracts, which will be resourced by the U.S. Army Medical Department, AMEDD. Procurement funding is programmed on Q13015000 MEDICAL EVACUATION.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / *Blackhawk Product Improvement Program*	Project (Number/Name) ES3 / *Blackhawk Product Improvement Program*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UH-60V - Organic	MIPR	Various : Redstone Arsenal, AL	11.931	0.860	Oct 2019	-		-		-		-	0.000	12.791	-
UH-60V - Contractor	C/LH	Various : Redstone Arsenal, AL	9.647	0.413	Oct 2019	-		-		-		-	0.000	10.060	-
MEDEVAC MEP Integration - Organic	MIPR	Various : Redstone Arsenal	1.024	1.008	Oct 2019	0.121	Feb 2021	0.288	Oct 2021	-		0.288	Continuing	Continuing	-
MEDEVAC MEP Integration - Contractor	C/LH	Various : Redstone Arsenal, AL	0.705	0.800	Oct 2019	0.434	Feb 2021	0.198	Oct 2021	-		0.198	Continuing	Continuing	-
		Subtotal	23.307	3.081		0.555		0.486		-		0.486	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UH-60V Development Engineering	C/CPFF	CCDC AvMC : Redstone Arsenal, AL	169.277	1.179	Oct 2019	-		-		-		-	0.000	170.456	-
MEDEVAC MEP Product Development and Integration	C/CPFF	DEVCOM AvMC, PIF : Redstone Arsenal AL	14.131	5.383	Oct 2019	0.462	Feb 2021	-		-		-	0.000	19.976	-
SATCOM	TBD	To Be Determined : Redstone Arsenal AL	-	9.926	Jul 2020	-		-		-		-	0.000	9.926	-
		Subtotal	183.408	16.488		0.462		-		-		-	0.000	200.358	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UH-60V	MIPR	Various : Redstone Arsenal, AL	16.133	1.349	Oct 2019	0.350	Feb 2021	-		-		-	0.000	17.832	-
MEDEVAC MEP Integration Support	MIPR	Various : Redstone Arsenal AL	0.592	0.518	Oct 2019	0.840	Feb 2021	1.139	Oct 2021	-		1.139	Continuing	Continuing	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / *Blackhawk Product Improvement Program*	Project (Number/Name) ES3 / *Blackhawk Product Improvement Program*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	16.725	1.867		1.190		1.139		-		1.139	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UH-60V	MIPR	Redstone Test Center : Redstone Arsenal, AL	16.090	1.066	Oct 2019	5.081	Oct 2021	-		-		-	0.000	22.237	-
MEDEVAC	MIPR	Redstone Test Center : Redstone Arsenal, AL	-	-		1.012	Feb 2021	3.148	Oct 2021	-		3.148	Continuing	Continuing	-
		Subtotal	16.090	1.066		6.093		3.148		-		3.148	Continuing	Continuing	N/A

Remarks

Government Support

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	239.530	22.502		8.300		4.773		-		4.773	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607136A / *Blackhawk Product Improvement Program*	**Project (Number/Name)** ES3 / *Blackhawk Product Improvement Program*

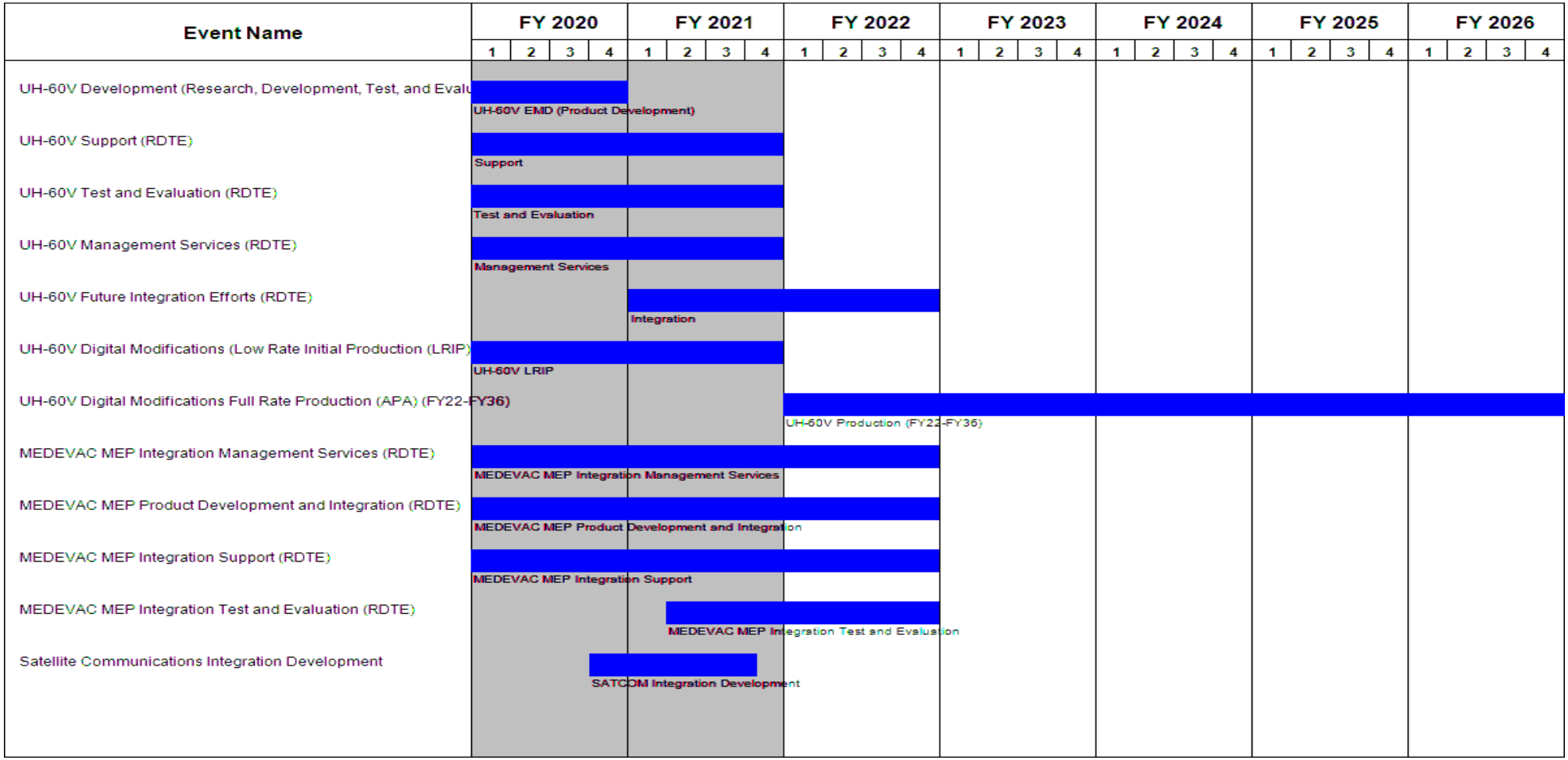

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607136A / *Blackhawk Product Improvement Program*	**Project (Number/Name)** ES3 / *Blackhawk Product Improvement Program*

Schedule Details

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607137A *I Chinook Product Improvement Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	164.820	49.409	52.372	-	52.372	-	-	-	-	-	-
ES4: *Chinook Product Improvement Program*	-	164.820	49.409	52.372	-	52.372	-	-	-	-	-	-
Program MDAP/MAIS Code: 577												

A. Mission Description and Budget Item Justification

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

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

The Cargo Project Management Office awarded the CH-47F Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase produced three production representative test articles to support contractor and government led system level qualification testing. The contractor led system level qualification testing includes both ground and flight test. The government led system level qualification testing includes Electromagnetic Environmental Effects (E3), Limited User Test (LUT), and aircraft subsystem Live-Fire Test and Evaluation (LFTE).

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607137A *I Chinook Product Improvement Program*

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	171.471	46.091	2.050	-	2.050
Current President's Budget	164.820	49.409	52.372	-	52.372
Total Adjustments	-6.651	3.318	50.322	-	50.322
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-6.651	-1.682			
• Adjustments to Budget Years	-	-	50.322	-	50.322

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: ES4: *Chinook Product Improvement Program*		
Congressional Add: *Program Increase - Expandable Rotorcraft Diagnostics*	3.300	-
Congressional Add: *Program increase - Block II Lightweight Improvements*	6.500	-
Congressional Add: *Program increase - carbon composite materials for helicopter wheels and brakes*	-	5.000
Congressional Add Subtotals for Project: ES4	9.800	5.000
Congressional Add Totals for all Projects	9.800	5.000

Change Summary Explanation

Increase in PB22 due to continuation of flight test operations in support of EMD system level qualification and Matrix and Contractor Support needed to align support requirements for approved development activities.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / *Chinook Product Improvement Program*	Project (Number/Name) ES4 / *Chinook Product Improvement Program*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
ES4: *Chinook Product Improvement Program*	-	164.820	49.409	52.372	-	52.372	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

The Cargo Project Management Office awarded the CH-47F Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase produced three production representative test articles to support contractor and government led system level qualification testing. The contractor led system level qualification testing includes both ground and flight test. The government led system level qualification testing includes Electromagnetic Environmental Effects (E3), Limited User Test (LUT), and aircraft subsystem Live-Fire Test and Evaluation (LFTE).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Improved Drive Train (IDT)	7.587	-	-
Description: This effort modernizes the CH-47 drive train by implementing design changes to operate at a higher power level to maximize engine power available, increase performance and restore payload lost through mission equipment package (MEP) growth. Additionally, this effort addresses Operations and Support (O&S) cost reductions while fully qualifying the improved drive train at the component level.			
Title: Transportable Flight Proficiency Simulator (TFPS)	1.000	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: The Transportable Flight Proficiency Simulator (TFPS) is a certified transportable flight trainer featuring a high fidelity visual display, detailed cockpit representation and motion cueing seats. It is capable of training mission tasks and emergency procedures and provides a cost savings when compared to using aircraft for these purposes. The TFPS will increase safety and mitigate risk to Block II Limited User Test (LUT) aircrews by allowing pilots to train aircraft differences in modifications, handling qualities, performance and human factors considerations before actual flight is performed. Training in the TFPS reduces LUT timelines and improves aircrew proficiency as confirmed in the CH-47F (Block I) Phase 2 User Test Report. The initial Block II TFPS will also serve as building block for upgrading the fielded TFPSs to the Block II configuration.			
Title: CH-47F Block II Engineering and Manufacturing Development (EMD)	112.485	19.081	35.682
Description: Conduct and support aircraft development, complete assembly and deliver three EMD test articles to include Advanced Chinook Rotor Blade (ACRB), airframe components, Improved Drive Train (IDT), rotor components, light weight fuel system and electrical components. Complete fabrication, assembly, initial functional checks of the Ground Test Vehicle (GTV) and remote control system (RCS), conduct GTV test operations, functional testing of the CH-47F Block II systems, Test Readiness Review (TRR) for EMD ground and flight testing. Release EMD flight test software. Begin contractor led system level ground and flight testing. Deliver documentation that demonstrates requirements verification and production configuration baseline. Continue Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) support for initial flight test activities. ***FY 2021 Plans:*** Mitigate technical challenges realized during system level test and continue system and component level qualification testing. Receipt and disposition of contract requirements to include test reports, qualification by similarity (QBS), Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) deliverables, and delivery of draft Production Configuration Baseline. ***FY 2022 Plans:*** Continue flight test operations in support of EMD system level qualification and initiate post flight test reporting requirements. Receipt and disposition of contract requirements to include test reports, qualification by similarity (QBS), Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) deliverables, and delivery of Production Configuration Baseline. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The 2022 increase of $16.601 million is the continuation of flight test operations in support of EMD system level qualification.			
Title: Matrix and Contractor Support	6.738	3.811	4.073
Description: This funding provides support costs for various government agencies, contractor support and matrix organizations supporting the Block II Engineering and Manufacturing Development (EMD) program with systems engineering, test support, airworthiness certification, project management, general engineering, logistics and business support.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: Continues funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD Program. ***FY 2022 Plans:*** Continues funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD program. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The FY2022 increase of $0.262 million aligns support requirements for FY22 approved development activities.			
Title: Advanced Chinook Rotor Blade (ACRB) ***Description:*** This effort designs, develops and performs contractor led component qualification for an improved rotor blade capability. This capability significantly increases lift capability, improves reliability, and is a form, fit replacement for the current blade, which will enable payload restoration to the ground force commander. Conduct additional flight testing to reduce risk for Engineering and Manufacturing Development (EMD) and validate Computational Fluid Dynamics (CFD) and Computational Structural Dynamics (CSD) models. ***FY 2021 Plans:*** Continue to build and test ACRB specimens in support of full component qualification. Begin specimen fabrication in support of material allowables test. ***FY 2022 Plans:*** Continue to build and test ACRB specimens to support full component qualification. Conduct engineering updates at completion of flight test for final design of the ACRB. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The FY2022 decrease of $6.416 million to support ACRB Component full qualification and coupon testing.	8.619	13.300	6.884
Title: Testing and Evaluation ***Description:*** This effort supports component and system level testing to qualify design improvements in the airframe, fuel system, avionics, drive train, rotor subsystem, and Advanced Chinook Rotor Blade (ACRB). Block II improvements will be validated through component endurance, testing of IDT, IRS, Live Fire Test and Evaluation (LFTE), Electromagnetic Environmental Effects (E3), Limited User Test (LUT), and developmental flight test activities. ***FY 2021 Plans:***	18.591	8.217	5.733

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Perform system level testing to address the technical challenges of the CH-47F Block II aircraft components in order to improve aircraft operational availability and reduce maintenance costs. Continue ballistic and live fire test and evaluation. ***FY 2022 Plans:*** Continue to perform system level testing to address the technical challenges of the CH-47F Block II aircraft components in order to improve aircraft operational availability and reduce maintenance costs. Continue live fire test and evaluation. Initiate the Limited User Test activities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The FY2022 decrease of $2.484 million to support Limited User Testing (LUT) and Live Fire Activities.			
Accomplishments/Planned Programs Subtotals	155.020	44.409	52.372

	FY 2020	FY 2021
Congressional Add: Program Increase - Expandable Rotorcraft Diagnostics ***FY 2020 Accomplishments:*** Program increase - expandable rotorcraft diagnostics	3.300	-
Congressional Add: Program increase - Block II Lightweight Improvements ***FY 2020 Accomplishments:*** Block II Lightweight Improvements	6.500	-
Congressional Add: Program increase - carbon composite materials for helicopter wheels and brakes ***FY 2021 Plans:*** Carbon Composite materials for helicopter wheels and brakes	-	5.000
Congressional Adds Subtotals	9.800	5.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A05105: *CH-47 SLEP*	177.137	368.122	163.777	-	163.777	-	-	-	-	-	-
• A05008: *CH-47 NEW BUILD*	25.000	50.472	-	-	-	-	-	-	-	-	-

Remarks

FY 2020 A05008 OCO is for Army Common MH-47G New Build War Replacement Aircraft Block II procurement.
FY 2021 A05008 OCO is for CH-47F New Build War Replacement Aircraft procurement.
FY 2020 A05105 All Funding is for Army Common MH-47G RENEW Block II procurement.
FY 2021 A05105 Funding is for 6 Army Common MH-47G RENEW Block II procurement.
FY 2021 A05105 Funding is for 5 CH-47F RENEW Block II procurement.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost

FY 2022 A05105 Funding is for 6 Army Common MH-47G RENEW Block II procurement.

D. Acquisition Strategy

Consolidated separate engineering change proposals into a single Block II upgrade to the CH-47F Block I. Current CH-47F Block I aircraft will enter into SLEP program to increase maximum gross weight to 54,000 pounds. The CH-47F Block II program provides additional benefits to increase commonality and interoperability between the two platforms, improve design life, lower maintenance cost, enhance reliability, safety, airworthiness,and cybersecurity. The CH-47F Block II program restores payload lost through mission equipment package (MEP) growth and enhances flight control systems, while providing the most effective procurement alternative to maintain heavy lift capability and reduce Operation and Support (O&S) costs.

Quantity of RDT&E Articles:
FY 2018 - Awarded: 1 - Ground Test Vehicle (GTV), 2 - CH-47F Block II Prototypes
FY 2019 - Awarded: 1 - CH-47F Block II Prototype

FY 2019 - Delivered: 1 - GTV, 2 - CH-47F Block II Prototypes
FY 2020 - Delivered: 1 - CH-47F Block II Prototype

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / *Chinook Product Improvement Program*	Project (Number/Name) ES4 / *Chinook Product Improvement Program*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Manufacturing Development (EMD)	SS/CPIF	Boeing Ridley : Park, PA	216.918	112.485	Dec 2019	24.081	Jun 2021	35.682	Nov 2021	-		35.682	Continuing	Continuing	Continuing
Advanced Chinook Rotor Blade (ACRB)	SS/CPFF	Boeing Ridley : Park PA	59.075	8.619	Nov 2019	13.300	Jul 2021	6.884	Mar 2022	-		6.884	Continuing	Continuing	Continuing
Improved Drive Train (IDT)	SS/CPFF	Boeing Ridley : Park, PA	45.475	7.587	Nov 2019	-		-		-		-	0.000	53.062	-
Transportable Flight Proficienct Simulator (TFPS)	MIPR	NAVAIR : Patuxent River NAS, MD	22.215	1.000	May 2020	-		-		-		-	0.000	23.215	-
FY 2019 NDAA SEC 825 MDAP Cost Overrun	Allot	To Be Determined : To Be Determined	0.020	-		-		-		-		-	0.000	0.020	-
Congressional Add Program Increase Expandable Rotorcraft Diagnostics	TBD	To Be Determined : To Be Determined	-	3.300		-		-		-		-	0.000	3.300	-
Congressional Add Program Increase Block II Lightweight Improvements	TBD	To Be Determined : To Be Determined	-	6.500		-		-		-		-	0.000	6.500	-
		Subtotal	343.703	139.491		37.381		42.566		-		42.566	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix and Contractor Support from External Sources	Various	Various Government and contractor : RSA & Huntsville, AL, Aberdeen Proving Ground MD,	22.447	6.738	Oct 2019	3.811	Oct 2020	4.073	Oct 2021	-		4.073	Continuing	Continuing	Continuing
		Subtotal	22.447	6.738		3.811		4.073		-		4.073	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / *Chinook Product Improvement Program*	Project (Number/Name) ES4 / *Chinook Product Improvement Program*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing and Evaluation	Various	Boeing Ridley : Park PA and Various Government	32.039	18.591	Dec 2019	8.217	Dec 2020	5.733	Nov 2021	-		5.733	Continuing	Continuing	Continuing
		Subtotal	32.039	18.591		8.217		5.733		-		5.733	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	398.189	164.820		49.409		52.372		-		52.372	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

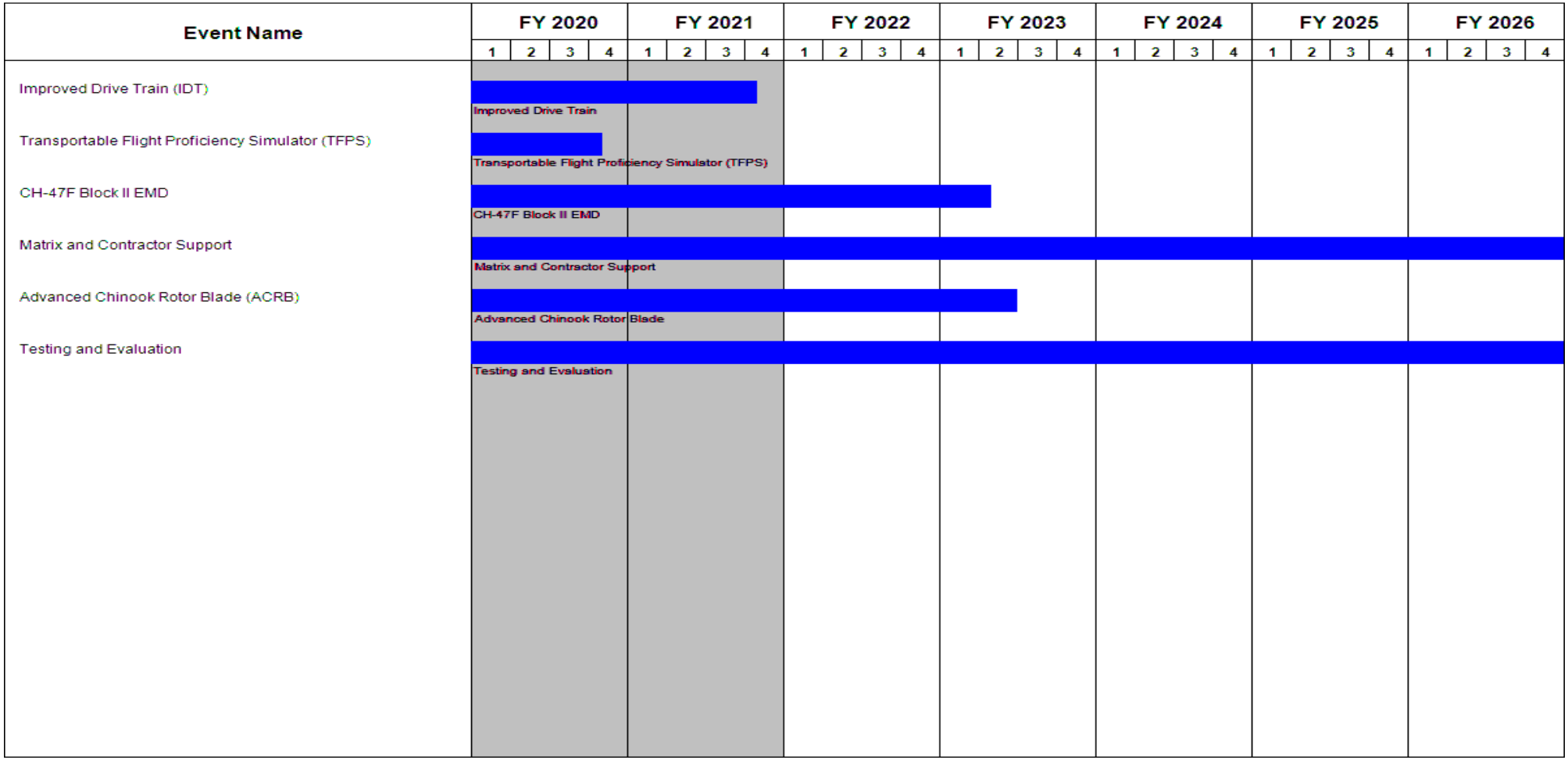

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607137A / *Chinook Product Improvement Program*	**Project (Number/Name)** ES4 / *Chinook Product Improvement Program*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Improved Drive Train (IDT)	3	2014	4	2021
Transportable Flight Proficiency Simulator (TFPS)	2	2018	4	2020
Milestone B	3	2017	3	2017
CH-47F Block II EMD	4	2017	2	2023
Matrix and Contractor Support	1	2017	4	2026
Advanced Chinook Rotor Blade (ACRB)	1	2011	2	2023
Testing and Evaluation	3	2015	4	2026

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607139A *I Improved Turbine Engine Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	197.941	232.159	275.024	-	275.024	-	-	-	-	-	-
ES6: *Improved Turbine Engine Program*	-	197.941	232.159	275.024	-	275.024	-	-	-	-	-	-
Program MDAP/MAIS Code: 487												

A. Mission Description and Budget Item Justification

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

FY 2020 funding continued the EMD effort initiated in FY 2019, platform/engine integration A-kit development, completion of engine Critical Design Review (CDR), initiation of engine component testing, completion of Apache Integrated Baseline Review (IBR), completion of engine fit check for Apache and Black Hawk platforms, completion of Apache A-Kit Preliminary Design Review (PDR), and completion of the Systems Requirements Review (SRR) for Apache and Black Hawk. FY 2021 funding completed Apache Incremental Critical Design Review #1 (iCDR), continues the EMD effort, continues engine component testing leading to First Engine To Test (FETT), will complete Black Hawk Integrated Baseline Review (IBR), will complete the Live Fire Test Design Plan, begins Preliminary Flight Rating (PFR) testing, begins physical airframe integration, initiates Apache A-Kit iCDR #2, and initiates Black Hawk A-Kit PDR. FY 2022 funding will continue PFR testing leading to a Preliminary Flight Rated engine in FY 2023, continues physical airframe integration, and continues Live Fire detailed test planning, completes Apache A-Kit iCDR #2, completes Black Hawk A-Kit PDR, and initiates Black Hawk A-Kit CDR. FY 2023 funding provides for completion of Black Hawk A-Kit CDR, completion of Live Fire detailed test planning, initiation of work to prepare for Live Fire static engine tests, initiation of aircraft flight/qualification testing for both Apache and Black Hawk, and the initiation of engine full qualification testing. FY 2024 funding provides for continuation of aircraft flight/qualification testing for both Apache and Black Hawk, completion of Live Fire static engine tests, completion of engine qualification, initiation of work to prepare for the Live Fire dynamic engine tests, and the beginning Low Rate Initial Production (LRIP). FY 2025 funding provides for completion of Live Fire dynamic engine tests, continuation of flight/qualification for both Black Hawk and Apache, continuation of LRIP, execution of Initial Operational Test and Evaluation (IOTE) for Black Hawk and Apache, beginning engine integration and A-kit development for the H-60V platform, and initiation of work to prepare for the Live Fire platform level testing (as needed). FY 2026 funding provides for H-60V A-kit CDR, and begins physical airframe integration.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0607139A / *Improved Turbine Engine Program*			
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	206.434	249.257	245.566	-	245.566
Current President's Budget	197.941	232.159	275.024	-	275.024
Total Adjustments	-8.493	-17.098	29.458	-	29.458
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-8.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-8.493	-9.098			
• Adjustments to Budget Years	-	-	29.458	-	29.458

Change Summary Explanation

Increase in PB22 due to increased engine testing of multiple systems engines, procurement of long-lead hardware for aircraft integration, Live Fire detailed test planning, and airframe integration.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607139A / *Improved Turbine Engine Program*	Project (Number/Name) ES6 / *Improved Turbine Engine Program*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
ES6: *Improved Turbine Engine Program*	-	197.941	232.159	275.024	-	275.024	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

FY 2020 funding continued the EMD effort initiated in FY 2019, platform/engine integration A-kit development, completion of engine Critical Design Review (CDR), initiation of engine component testing, completion of Apache Integrated Baseline Review (IBR), completion of engine fit check for Apache and Black Hawk platforms, completion of Apache A-Kit Preliminary Design Review (PDR), and completion of the Systems Requirements Review (SRR) for Apache and Black Hawk. FY 2021 funding completed Apache Incremental Critical Design Review #1 (iCDR), continues the EMD effort, continues engine component testing leading to First Engine To Test (FETT), will complete Black Hawk Integrated Baseline Review (IBR), will complete the Live Fire Test Design Plan, begins Preliminary Flight Rating (PFR) testing, begins physical airframe integration, initiates Apache A-Kit iCDR #2, and initiates Black Hawk A-Kit PDR. FY 2022 funding will continue PFR testing leading to a Preliminary Flight Rated engine in FY 2023, continues physical airframe integration, and continues Live Fire detailed test planning, completes Apache A-Kit iCDR #2, completes Black Hawk A-Kit PDR, and initiates Black Hawk A-Kit CDR. FY 2023 funding provides for completion of Black Hawk A-Kit CDR, completion of Live Fire detailed test planning, initiation of work to prepare for Live Fire static engine tests, initiation of aircraft flight/qualification testing for both Apache and Black Hawk, and the initiation of engine full qualification testing. FY 2024 funding provides for continuation of aircraft flight/qualification testing for both Apache and Black Hawk, completion of Live Fire static engine tests, completion of engine qualification, initiation of work to prepare for the Live Fire dynamic engine tests, and the beginning Low Rate Initial Production (LRIP). FY 2025 funding provides for completion of Live Fire dynamic engine tests, continuation of flight/qualification for both Black Hawk and Apache, continuation of LRIP, execution of Initial Operational Test and Evaluation (IOTE) for Black Hawk and Apache, beginning engine integration and A-kit development for the H-60V platform, and initiation of work to prepare for the Live Fire platform level testing (as needed). FY 2026 funding provides for H-60V A-kit CDR, and begins physical airframe integration.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: ITEP	197.941	232.159	275.024

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607139A / *Improved Turbine Engine Program*	**Project (Number/Name)** ES6 / *Improved Turbine Engine Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: ITEP - a multi-platform turbine engine development required across existing Army aircraft to fill the capability gaps for Army Aviation Operations ***FY 2021 Plans:*** FY 2021 completed Apache Incremental Critical Design Review #1 (iCDR), completes Live Fire Test Design Plan, completes Black Hawk Integrated Baseline Review (IBR), continues the EMD effort, continues engine component testing leading to First Engine To Test (FETT), begins Preliminary Flight Rating (PFR) testing, initiates Apache A-Kit iCDR #2, initiates Black Hawk A-Kit PDR, and begins physical airframe integration. ***FY 2022 Plans:*** FY 2022 funding will continue PFR testing, leading to a Preliminary Flight Rated engine in FY 2023, complete Apache A-Kit iCDR #2, complete Black Hawk A-Kit PDR, initiate Black Hawk A-Kit CDR, continue physical airframe integration, and continue Live Fire detailed test planning. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to PFR engine testing of multiple engines, Apache A-Kit iCDR #2, Black Hawk A-Kit PDR, initiation of Black Hawk CDR, procurement of long-lead hardware for aircraft integration, Live Fire detailed test planning, and airframe integration on both platforms.			
Accomplishments/Planned Programs Subtotals	197.941	232.159	275.024

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

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

D. Acquisition Strategy

Following a successful Milestone B decision, a cost-plus-incentive-fee contract was awarded to General Electric for EMD contractual effort in FY 2019.

ITEP Platform Integration Trade Studies Contracts were awarded to the Boeing Company and the Sikorsky Corporation in FY 2015. In FY 2019, two follow-on efforts were awarded to design and develop A-kits to integrate the ITE into both the Apache and Black Hawk platforms. Following a successful Apache A-Kit iCDR in FY 2021 and FY 2022, and Black Hawk A-Kit CDR in FY2023, the integration efforts will continue to include fabrication of the A-kits, flight test support, and pubs/provisioning.

Upon completion of EMD, an LRIP contract will be awarded in FY 2024.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607139A / *Improved Turbine Engine Program*	Project (Number/Name) ES6 / *Improved Turbine Engine Program*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ITEP SEPM - Organic	Allot	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	36.007	9.455	Oct 2019	9.550	Nov 2020	9.640	Oct 2021	-		9.640	Continuing	Continuing	Continuing
ITEP SEPM - Contractor	C/IDIQ	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	14.332	3.425	Oct 2019	3.608	Nov 2020	3.878	Oct 2021	-		3.878	Continuing	Continuing	Continuing
ITEP SEPM - OGA	MIPR	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	18.480	2.161	Oct 2019	2.215	Oct 2020	2.365	Oct 2021	-		2.365	Continuing	Continuing	Continuing
		Subtotal	68.819	15.041		15.373		15.883		-		15.883	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engine OEM EMD Contract	C/CPIF	General Electric Company (GE) : Lynn, MA	121.900	132.267	Oct 2019	148.510	Nov 2020	135.461	Oct 2021	-		135.461	Continuing	Continuing	Continuing
Platform Integration and Qualification Contracts	SS/CPIF	The Boeing Company, The Sikorsky Corporation :	22.529	35.939	Oct 2019	45.071	Apr 2021	99.025	Jan 2022	-		99.025	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607139A / *Improved Turbine Engine Program*	Project (Number/Name) ES6 / *Improved Turbine Engine Program*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Phoenix, AZ, Stratford, CT													
		Subtotal	144.429	168.206		193.581		234.486		-		234.486	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ITEP Engineering Support - Organic	Allot	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	0.657	0.178	Oct 2019	0.182	Oct 2020	0.186	Oct 2021	-		0.186	Continuing	Continuing	Continuing
ITEP Engineering Support - Contractor	C/IDIQ	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	8.484	2.296	Oct 2019	2.729	Oct 2020	2.894	Oct 2021	-		2.894	Continuing	Continuing	Continuing
ITEP Engineering Support - OGA	MIPR	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	21.678	7.959	Oct 2019	11.119	Nov 2020	12.205	Oct 2021	-		12.205	Continuing	Continuing	Continuing
Platform Integration Support	MIPR	Program Management Office (PMO) Apache and Black Hawk Project Offices : Redstone Arsenal, AL	-	3.765	Oct 2019	5.955	Oct 2020	6.075	Oct 2021	-		6.075	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607139A / *Improved Turbine Engine Program*	Project (Number/Name) ES6 / *Improved Turbine Engine Program*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	30.819	14.198		19.985		21.360		-		21.360	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Test Planning/Test Setup and Analysis	SS/TBD	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	0.128	0.496	Oct 2019	3.220	Oct 2020	3.295	Oct 2021	-		3.295	Continuing	Continuing	Continuing
		Subtotal	0.128	0.496		3.220		3.295		-		3.295	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	244.195	197.941		232.159		275.024		-		275.024	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607139A / *Improved Turbine Engine Program*	**Project (Number/Name)** ES6 / *Improved Turbine Engine Program*

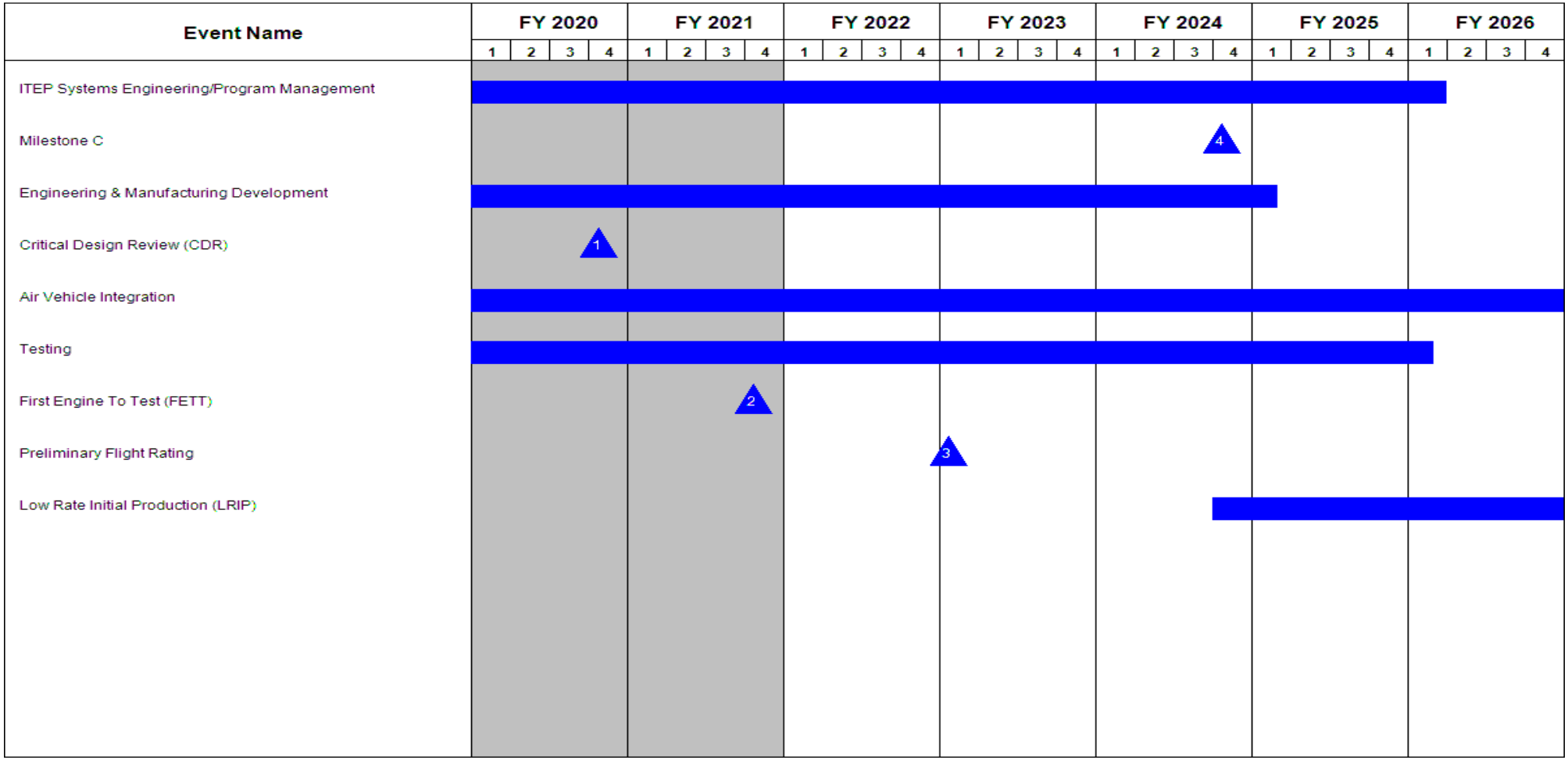

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607139A / *Improved Turbine Engine Program*	**Project (Number/Name)** ES6 / *Improved Turbine Engine Program*

Schedule Details

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607142A *I Aviation Rocket System Product Improvement and Development*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	1.847	13.421	12.417	-	12.417	-	-	-	-	-	-
EW9: *Aviation Rocket System Product Improvement and Dev*	-	1.847	13.421	12.417	-	12.417	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	1.927	17.155	13.596	-	13.596
Current President's Budget	1.847	13.421	12.417	-	12.417
Total Adjustments	-0.080	-3.734	-1.179	-	-1.179
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-3.108			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.080	-0.626			
• Adjustments to Budget Years	-	-	-1.179	-	-1.179

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607142A / *Aviation Rocket System Product Improvement and Development*	Project (Number/Name) EW9 / *Aviation Rocket System Product Improvement and Dev*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EW9: *Aviation Rocket System Product Improvement and Dev*	-	1.847	13.421	12.417	-	12.417	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Guided Air-to-Ground Rockets (AGR) variants (Advanced Precision Kill Weapon System (APKWS))	0.119	0.748	0.785
Description: These funds will be used to optimize current and future air-to ground variant integration on the Apache and for activities required to obtain an Army Full Materiel Release (FMR). This effort will utilize in-house expertise and Other Government Agencies in order to complete activities to include design and build of all-up-round (AUR) containers and test assets, conduct of environmental qualification testing, performance of ground firings, update of aviation platform software, support of Apache weapon survey firings, technical support to platform integration and testing, and development and revision of training/maintenance materiel.			
FY 2021 Plans: 1. Complete efforts to optimize fire control integration on the AH-64 Apache for rotary wing guided variants. 2. Begin efforts to optimize fire control integration for single software variant guided rockets.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607142A / *Aviation Rocket System Product Improvement and Development*	**Project (Number/Name)** EW9 / *Aviation Rocket System Product Improvement and Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
1. Complete development of fire control integration on the AH-64E Apache for current rotary wing guided variants, and continue fire control optimization for the single variant block upgrade variant. 2. Characterize performance changes/improvements of single software variant block upgrade of guided rockets and qualify for use on Army Aviation platforms. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding remains stable. Minimal increase accounts for inflation.			
Title: Army Aviation Weapons ***Description:*** These funds will be used for fielded Army Aviation modular weapon systems and their interface to fielded launchers and platforms. These efforts will utilize in-house subject matter expertise, Other Government Agencies, defense industry capabilities, and Other Transactional Agreements to complete activities to include technical assessment, risk reduction efforts, technology maturation, demonstration, engineering design, engineering/manufacturing development, test, integration and document preparation for Army Aviation manned and unmanned platforms. ***FY 2021 Plans:*** 1. Continue technical assessments, perform risk reduction efforts and prepare appropriate documentation for Army Aviation Weapons, Sub systems and Munitions (AAWSSM) Initial Capability Document and subordinately derived requirements. 2. Perform analysis to support emerging efforts such as extended range propulsion technology, sensors, and inertial guidance. ***FY 2022 Plans:*** 1. Perform analysis, engineering design, and demonstration of propulsion, sensor, datalink and navigation technologies that will enable future munitions to meet requirements of the Army Aviation Weapons, Sub systems and Munitions (AAWSSM) Initial Capability Document and the Army Aviation Munition Strategy and providing future munitions capabilities. 2. Assessments, development, risk reduction effort and documentation to determine feasibility of the adaptation of fielded/legacy launcher technologies with future launcher technologies. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increased due to additional emphasis on technology and concept maturation supporting the Army Aviation Munition Strategy as well as efforts to support the adaptation of fielded/legacy launcher technologies with future launchers/launch platforms.	1.728	0.762	4.193
Title: Integrated Munitions Launcher (IML)/Launcher Electronic Assembly (LEA) ***Description:*** These funds will be used to upgrade and enhance launcher components to support current and future munitions outlined in the Army Aviation Weapons, Sub Systems and Munitions Initial Capability Document, dated 17 July 2018 and the Air Launched Effects (ALE) Initial Capability Refinement Document (ICRD) dated 21 Oct 2019. This effort allows the government to align technology enabling solutions with the Army Aviation Weapons, Sub Systems and Munitions Initial Capability Document,	-	11.911	7.439

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607142A / *Aviation Rocket System Product Improvement and Development*	**Project (Number/Name)** EW9 / *Aviation Rocket System Product Improvement and Dev*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
maturing technological developments of Integrated Munitions Launcher (IML) components prototypes to mitigate Apache helicopter and Gray Eagle Unmanned Aerial System launcher obsolescence limitations. The launcher component efforts will define and provide the interfaces between aircraft and emerging munitions utilizing a non-proprietary, open systems architecture allowing easy compatibility when integrating on to aviation platforms. The inherent flexibility of an open architecture serves as a building block for future weapons systems. ***FY 2021 Plans:*** 1. Continue IML architecture design and structure concept development. 2. Complete sub-system System Requirements Review (SRR) and Preliminary Design Review (PDR). 3. Build select IML component prototypes. 4. Continue Launcher Electronics Assembly (LEA) architecture design and structure concept development. ***FY 2022 Plans:*** 1. Continue Launcher Electronics Assembly (LEA) development. 2. Inform fielded/legacy launcher capabilities against evolving threats and with future munitions/launch platform interface requirements. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease due to completion of SRR and PDR.			
Accomplishments/Planned Programs Subtotals	1.847	13.421	12.417

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• E37300: *Rocket, Hydra 70, All Types*	250.453	159.795	109.536	-	109.536	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607142A / *Aviation Rocket System Product Improvement and Development*	Project (Number/Name) EW9 / *Aviation Rocket System Product Improvement and Dev*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering/ Project Management	Various	Various : Performers	8.356	0.523	Oct 2019	1.902	Oct 2020	2.038	Nov 2021	-		2.038	Continuing	Continuing	-
		Subtotal	8.356	0.523		1.902		2.038		-		2.038	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Precision Kill Weapon System (APKWS)	MIPR	CCDC : Redstone Arsenal, AL	1.388	-		0.405	Apr 2021	0.667	Apr 2022	-		0.667	0.000	2.460	-
Modernized Rocket Launcher Increment 1	MIPR	CCDC : Redstone Arsenal, AL	7.041	-		-		-		-		-	0.000	7.041	-
Smart Digital Interface	MIPR	CCDC : Redstone Arsenal, AL	14.055	-		-		-		-		-	0.000	14.055	-
Army Aviation Weapons	MIPR	Various : Various Performers	11.839	0.124	Jan 2020	0.419	Mar 2021	0.678	Mar 2022	-		0.678	Continuing	Continuing	-
Integrated Munitions Launcher	MIPR	CCDC : Redstone Arsenal, AL	-	-		10.695	Mar 2021	6.165	Jan 2022	-		6.165	Continuing	Continuing	-
		Subtotal	34.323	0.124		11.519		7.510		-		7.510	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Research Studies	MIPR	CCDC : Redstone Arsenal, AL	2.076	-		-		2.869	Jan 2022	-		2.869	Continuing	Continuing	-
		Subtotal	2.076	-		-		2.869		-		2.869	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607142A / *Aviation Rocket System Product Improvement and Development*	Project (Number/Name) EW9 / *Aviation Rocket System Product Improvement and Dev*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Testing	C/Various	TBD : TBD	0.118	1.200	Dec 2019	-		-		-		-	Continuing	Continuing	-
		Subtotal	0.118	1.200		-		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	44.873	1.847		13.421		12.417		-		12.417	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607142A / *Aviation Rocket System Product Improvement and Development*	**Project (Number/Name)** EW9 / *Aviation Rocket System Product Improvement and Dev*

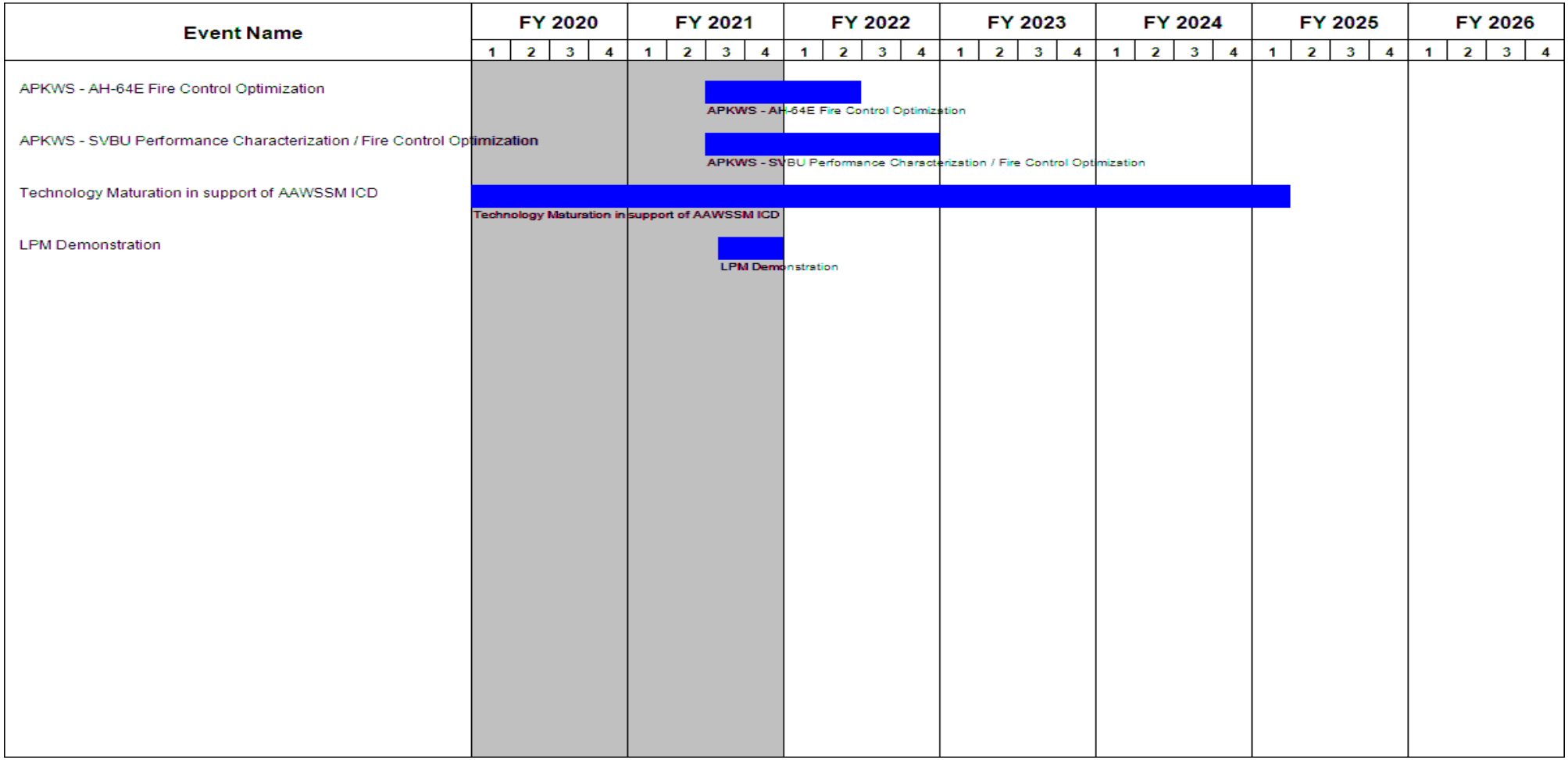

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607142A / *Aviation Rocket System Product Improvement and Development*	**Project (Number/Name)** EW9 / *Aviation Rocket System Product Improvement and Dev*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
APKWS - AH-64E Fire Control Optimization	3	2021	2	2022
APKWS - SVBU Performance Characterization / Fire Control Optimization	3	2021	4	2022
Technology Maturation in support of AAWSSM ICD	2	2019	1	2025
LPM Demonstration	3	2021	4	2021

Note

APKWS: Advanced Precision Kill Weapon System
AAWSSM ICD: Army Aviation Weapons, Sub-systems and Munitions Initial Capability Document
LPM: Lightweight Precision Munition
SVBU: Single Variant Block Upgrade

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607143A / *Unmanned Aircraft System Universal Products*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	17.386	19.460	4.594	-	4.594	-	-	-	-	-	-
EX1: *Unmanned Aircraft Systems Universal Products*	-	17.386	19.460	4.594	-	4.594	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

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

Justification: Fiscal Year (FY) 2022 SCI (Formerly Universal Product) Base funding of $4.610 million will be used to continue the development, testing, and demonstration of software applications needed to address the SCI MOSA/Future Airborne Capabilities Environment (FACE) Compliant Software requirements that support Nett Warrior, Mounted Family of Computer Systems (MFoCS), and Mission Command Tactical Server Infrastructure (TSI).

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	18.132	7.743	4.897	-	4.897
Current President's Budget	17.386	19.460	4.594	-	4.594
Total Adjustments	-0.746	11.717	-0.303	-	-0.303
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	12.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.746	-0.283			
• Adjustments to Budget Years	-	-	-0.303	-	-0.303

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607143A / *Unmanned Aircraft System Universal Products*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: EX1: *Unmanned Aircraft Systems Universal Products*		
Congressional Add: *Micro Identification Friend or Foe Transmitters*	-	5.000
Congressional Add: *Program increase - scalable control interface*	-	7.000
Congressional Add Subtotals for Project: EX1	-	12.000
Congressional Add Totals for all Projects	-	12.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607143A / *Unmanned Aircraft System Universal Products*	Project (Number/Name) EX1 / *Unmanned Aircraft Systems Universal Products*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EX1: *Unmanned Aircraft Systems Universal Products*	-	17.386	19.460	4.594	-	4.594	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

Justification: Fiscal Year (FY) 2022 SCI (Formerly Universal Product) Base funding of $4.594million will be used to continue the development, integration, testing, and demonstration of software applications needed to address the SCI MOSA/Future Airborne Capabilities Environment (FACE) Compliant Software requirements that support Nett Warrior, Mounted Family of Computer Systems (MFoCS), and Mission Command Tactical Server Infrastructure (TSI).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Scalable Control Interface (SCI)	17.386	7.460	4.594
Description: SCI will be the primary means of C2 for Program of Record Army UAS. SCI software will be hosted on Mission Command devices in both ground and airborne platforms serving as nodes on the Integrated Tactical Network to retrieve and provide data. SCI distributes UAS capabilities by greatly increasing the number of UAS control devices available to Soldiers and Commanders through the depth of the battlefield. SCI provides simultaneous control of multiple aircraft from a single node.			
FY 2021 Plans: Base Funding of $7.743 million will be used to continue the development of software applications needed to address the SCI MOSA/FACE compliant Software requirement that support NETT Warrior, MFoCS, and Mission Command TSI. Additional funding of $6.717 million will be used for additional development, refactoring, integration, and test of MOSA software components			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607143A / *Unmanned Aircraft System Universal Products*	**Project (Number/Name)** EX1 / *Unmanned Aircraft Systems Universal Products*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
required to progress SCI from Minimum Viable Product (MVP) toward Minimum Viable Capability Release (MVCR). $5 million for integration of Micro Identification Friend or Foe Transmitters. ***FY 2022 Plans:*** Base Funding of $4.594 million will be used to continue the development, integration, test, and demonstration of software applications meeting the SCI MOSA/FACE compliant Software requirement on host Mission Command devices. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Based on shifting Army priorities, the UAS Universal Products requirement/mission shifted to Scalable Control Interface (SCI) under the Army Modernization effort and aligned with the Future Vertical Lift program. This Universal Products funding line is reduced in anticipation of the SCI requirements being funded through the Future Unmanned Aircraft Systems line which is sponsored by the Army Futures Command Future Vertical Lift Cross Functional Team.			
Accomplishments/Planned Programs Subtotals	17.386	7.460	4.594

	FY 2020	FY 2021
Congressional Add: Micro Identification Friend or Foe Transmitters ***FY 2021 Plans:*** This funding is planned to take a micro transponder capable of Mode 5 through certification and integration in support of UAS Universal Products. This includes IFF capabilities added to include: ADS-B in support of Gray Eagle UAS; Diversity with dual antennas and processing both antenna signals; Mode 5 Level 2-B (added message set and extended squitter); and TCAS / Collision Avoidance support. .	-	5.000
Congressional Add: Program increase - scalable control interface ***FY 2021 Plans:*** This funding is planned to increase to scalable control interface.	-	7.000
Congressional Adds Subtotals	-	12.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A02706: *Universal Ground Control Equipment (UAS)*	2.090	7.509	-	-	-	-	-	-	-	-	-

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607143A / *Unmanned Aircraft System Universal Products*	**Project (Number/Name)** EX1 / *Unmanned Aircraft Systems Universal Products*

D. Acquisition Strategy

SCI Software development and integration efforts are conducted under the competitively awarded SCI Software Integrator contract. This effort is supplemented by contracts awarded to niche experts in Human Machine Interface, Mobile/Handheld and Mounted Computing Environment, and MOSA software. Government ownership and management of the MOSA software interface standards will streamline time and cost required to integrate future unmanned aircraft and payloads and reduce training resources by implementing a common user interface.

SCI promotes a competitive software application industry and provides warfighters with prompt updates by rapidly integrating best of breed software applications instead of relying on costly sole source sustainment of monolithic software well past its usable lifecycle.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607143A / *Unmanned Aircraft System Universal Products*	Project (Number/Name) EX1 / *Unmanned Aircraft Systems Universal Products*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Universal Products (UGCS) Improvements	C/CPFF	TBD : TBD	17.124	-		-		-		-		-	0.000	17.124	-
Training Device Improvements	C/CPFF	TBD : TBD	3.917	-		-		-		-		-	0.000	3.917	-
Scalable Control Interface (SCI) Software Development	Various	Various : Various	52.373	17.386	Mar 2020	14.460	Mar 2021	4.594	Mar 2022	-		4.594	0.000	88.813	-
Micro Identification Friend or Foe Transmitter	C/CPFF	R3 Engineering : Palmetto, FL	-	-		5.000	Apr 2021	-		-		-	0.000	5.000	-
		Subtotal	73.414	17.386		19.460		4.594		-		4.594	0.000	114.854	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	73.414	17.386		19.460		4.594		-		4.594	0.000	114.854	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607143A / *Unmanned Aircraft System Universal Products*	**Project (Number/Name)** EX1 / *Unmanned Aircraft Systems Universal Products*

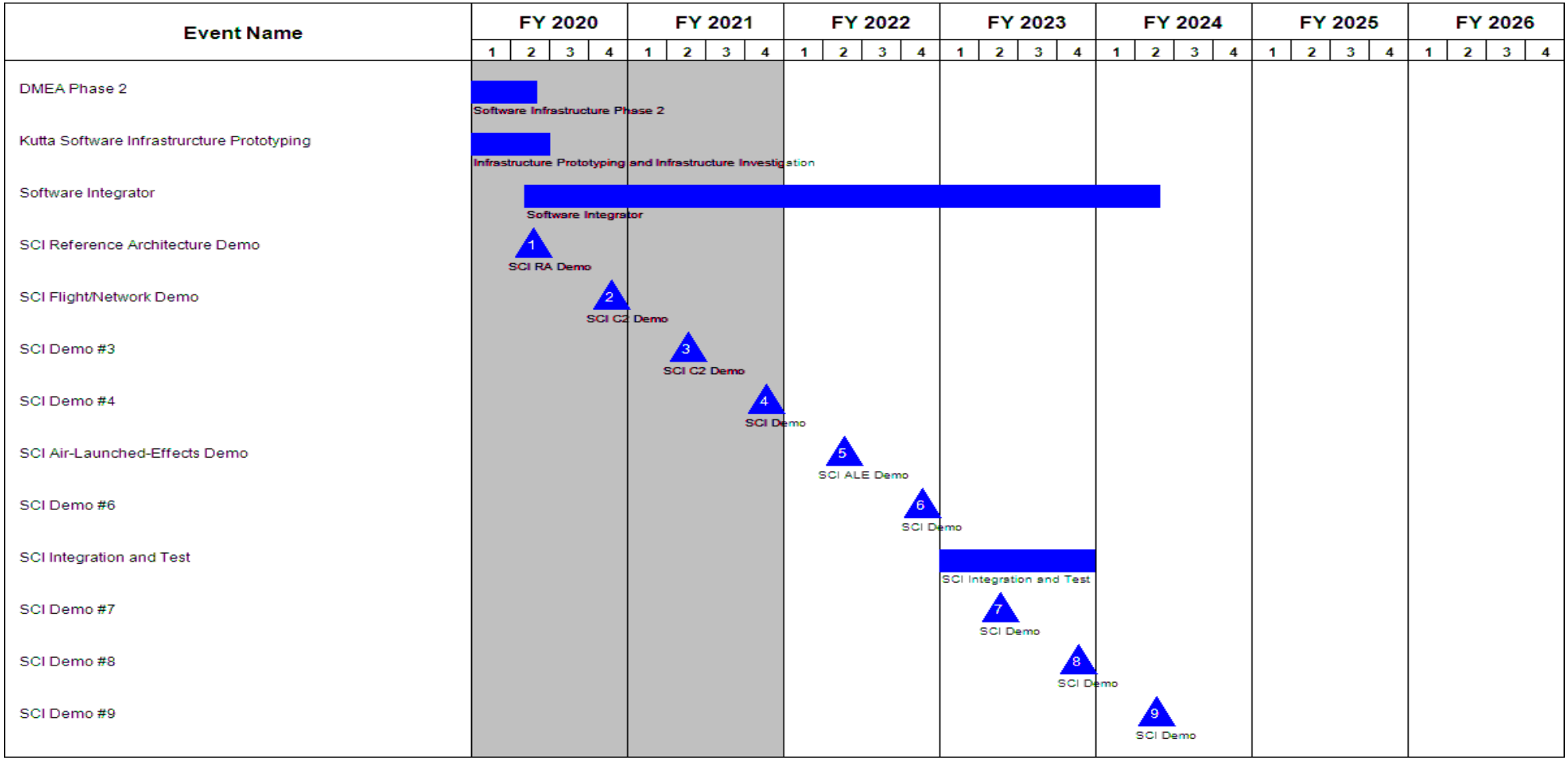

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607143A / *Unmanned Aircraft System Universal Products*	**Project (Number/Name)** EX1 / *Unmanned Aircraft Systems Universal Products*

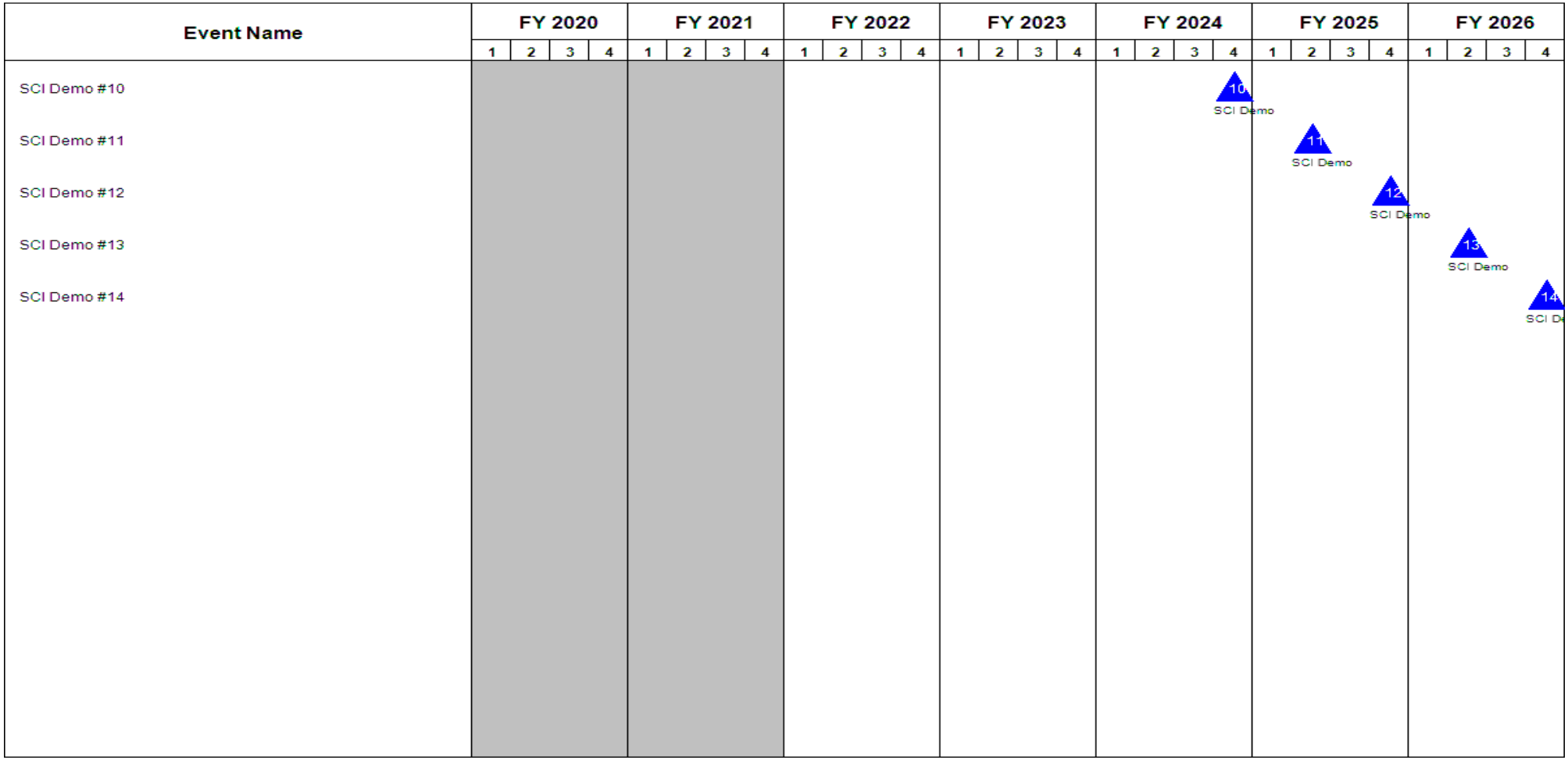

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607143A / *Unmanned Aircraft System Universal Products*	**Project (Number/Name)** EX1 / *Unmanned Aircraft Systems Universal Products*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
DMEA Phase 1	1	2017	4	2018
DMEA Phase 2	2	2019	2	2020
Kutta Software Infrastrurcture Prototyping	3	2019	2	2020
Software Integrator	2	2020	2	2024
SCI Reference Architecture Demo	2	2020	2	2020
SCI Flight/Network Demo	4	2020	4	2020
SCI Demo #3	2	2021	2	2021
SCI Demo #4	4	2021	4	2021
SCI Air-Launched-Effects Demo	2	2022	2	2022
SCI Demo #6	4	2022	4	2022
SCI Integration and Test	1	2023	4	2023
SCI Demo #7	2	2023	2	2023
SCI Demo #8	4	2023	4	2023
SCI Demo #9	2	2024	2	2024
SCI Demo #10	4	2024	4	2024
SCI Demo #11	2	2025	2	2025
SCI Demo #12	4	2025	4	2025
SCI Demo #13	2	2026	2	2026
SCI Demo #14	4	2026	4	2026

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607145A / *Apache Future Development*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	5.224	52.502	10.067	-	10.067	-	-	-	-	-	-
FD5: *Apache Product Improvement*	-	5.224	52.502	10.067	-	10.067	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.448	77.177	9.024	-	9.024
Current President's Budget	5.224	52.502	10.067	-	10.067
Total Adjustments	-0.224	-24.675	1.043	-	1.043
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-26.858			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.224	-2.817			
• Adjustments to Budget Years	-	-	1.043	-	1.043

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: FD5: *Apache Product Improvement*		
Congressional Add: *Program Increase - Crossbow*	-	5.000
Congressional Add Subtotals for Project: FD5	-	5.000
Congressional Add Totals for all Projects	-	5.000

Change Summary Explanation

Adjustment to Budget Year FY 2022 funding from Previous Presidents Budget to Current Presidents Budget position will be used to continue the development of the Improved Tail Rotor Drive System (ITRDS) requirement, with a focus on completing any remaining activities to successfully enter the PDR. The remainder

of the funding will be used to explore additive manufacturing opportunities, conduct a structural design impact analysis, and successfully complete the Critical Design Review (CDR).

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607145A / *Apache Future Development*	Project (Number/Name) FD5 / *Apache Product Improvement*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FD5: *Apache Product Improvement*	-	5.224	52.502	10.067	-	10.067	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Product Development	5.224	2.245	10.067
Description: Future development of production program.			
FY 2021 Plans: Apache Program management Office (PMO) needs to develop a phased approach to incorporate an Improved Tail Rotor Drive System (ITRDS) for the AH-64 platform. Several improvements to the existing drivetrain are necessary to increase safety margins on the tail rotor anti-torque capability. The platform overtime will continue to increase in gross weight through system upgrades and larger payloads being authorized. Missions being conducted at higher density altitudes and an increased gross weight will put the warfighters at risk of being in a loss of tail rotor authority scenario which can lead to a catastrophic situation. These product improvements would increase performance from the legacy design, decrease the maintenance burden on the warfighter, and reduce overall O&S costs. These improvements would also build the infrastructure for an improved Drive system that will be able to handle increased performance upgrades, provide a positive impact to future sustainment, support Multi-Domain Operations, and ensuring the warfighter is not placed in a catastrophic situation when it is preventable. The funding would be utilized to conduct analysis, determine feasibility of life limits, and initiate redesign plans on new components of the drive system to include hanger bearings, elastomeric mounts, Intermediate Gearbox (IGB), Tail Rotor Gearbox (TRGB), drive shafts, and other components impacted on the Tail Rotor Drive System found during testing.			
FY 2022 Plans: Apache Program management Office (PMO) will continue to develop a phased approach to incorporate an Improved Tail Rotor Drive System (ITRDS) for the AH-64 platform. This second phase will build on the previous efforts that culminated in Preliminary Design Review (PDR). This phase will used the			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607145A / *Apache Future Development*	**Project (Number/Name)** FD5 / *Apache Product Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
information gained previously and culminate in the Critical Design Review (CDR). Ultimately, these product improvements would increase performance from the legacy design, decrease the maintenance burden on the warfighter, and reduce overall O&S costs. These improvements would also build the infrastructure for an improved Drive system that will be able to handle increased performance upgrades, provide a positive impact to future sustainment, support Multi-Domain Operations, and ensuring the warfighter is not placed in a catastrophic situation when it is preventable. Additionally, As Joint Battle Spaces become more and more technically demanding, the need for greater processing power, hardware and software that supports Open System Architecture also increases. The Apache PMO needs to pursue trade studies and demonstrations on capabilities that support Open System Architecture and speeding insertions of technology. The funding would be utilized to conduct analysis, determine feasibility, identify integration challenges and ultimately prove out these capabilities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in funding for Project FD5 Apache Product Improvement from FY 2021 to FY 2022 will be used to continue the development of the Improved Tail Rotor Drive System (ITRDS) requirement. This funding will focus on completing any remaining activities to successfully enter the PDR. The remainder of funding will be used to explore additive manufacturing opportunities, conduct a structural design impact analysis, and successfully complete the Critical Design Review (CDR).			
Title: Spike NLOS (Non Line Of Sight) ***FY 2021 Plans:*** Apache will federate the Spike NLOS (Non Line of Sight) missile system by providing Program Management, Systems Engineering, Development Test, Live Fire Test, Life Cycle Management and Integrated Logistics. This effort will provide an interim Long Range Precision Munition Solution for the AH-64E.The Army will optimize the Aviation munitions portfolio as part of this strategy creating reinvestment opportunities to close existing lethality gaps by making the portfolio sufficiently lethal for both manned and unmanned platforms against a broad range of increasingly more sophisticated threats. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease in funding for Spike NLOS from FY 2021 to FY 2022 due to efforts ahead of need.	-	45.257	-
Accomplishments/Planned Programs Subtotals	5.224	47.502	10.067

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607145A / *Apache Future Development*	**Project (Number/Name)** FD5 / *Apache Product Improvement*

	FY 2020	FY 2021
Congressional Add: Program Increase - Crossbow	-	5.000
FY 2021 Plans: This is for demonstration of the AH?64 dual-piloted portion of the CROSSBOW System		
Congressional Adds Subtotals	-	5.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A05111: *AH-64 Apache Block IIIA Reman*	1,010.100	961.487	696.366	-	696.366	-	-	-	-	-	-
• A05133: *AH-64 Apache Block IIIB New Build*	-	69.154	-	-	-	-	-	-	-	-	-
• AA6605: *AH-64 MODS*	58.172	99.816	118.560	-	118.560	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607145A / *Apache Future Development*	Project (Number/Name) FD5 / *Apache Product Improvement*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
TBD or TBD	TBD	TBD : TBD	-	5.224	Mar 2020	7.252	Dec 2020	10.067	Aug 2022	-		10.067	0.000	22.543	-
TBD	TBD	TBD : TBD	-	-		45.250	Jan 2021	-		-		-	0.000	45.250	-
		Subtotal	-	5.224		52.502		10.067		-		10.067	0.000	67.793	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	5.224		52.502		10.067		-		10.067	0.000	67.793	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607145A / *Apache Future Development*	**Project (Number/Name)** FD5 / *Apache Product Improvement*

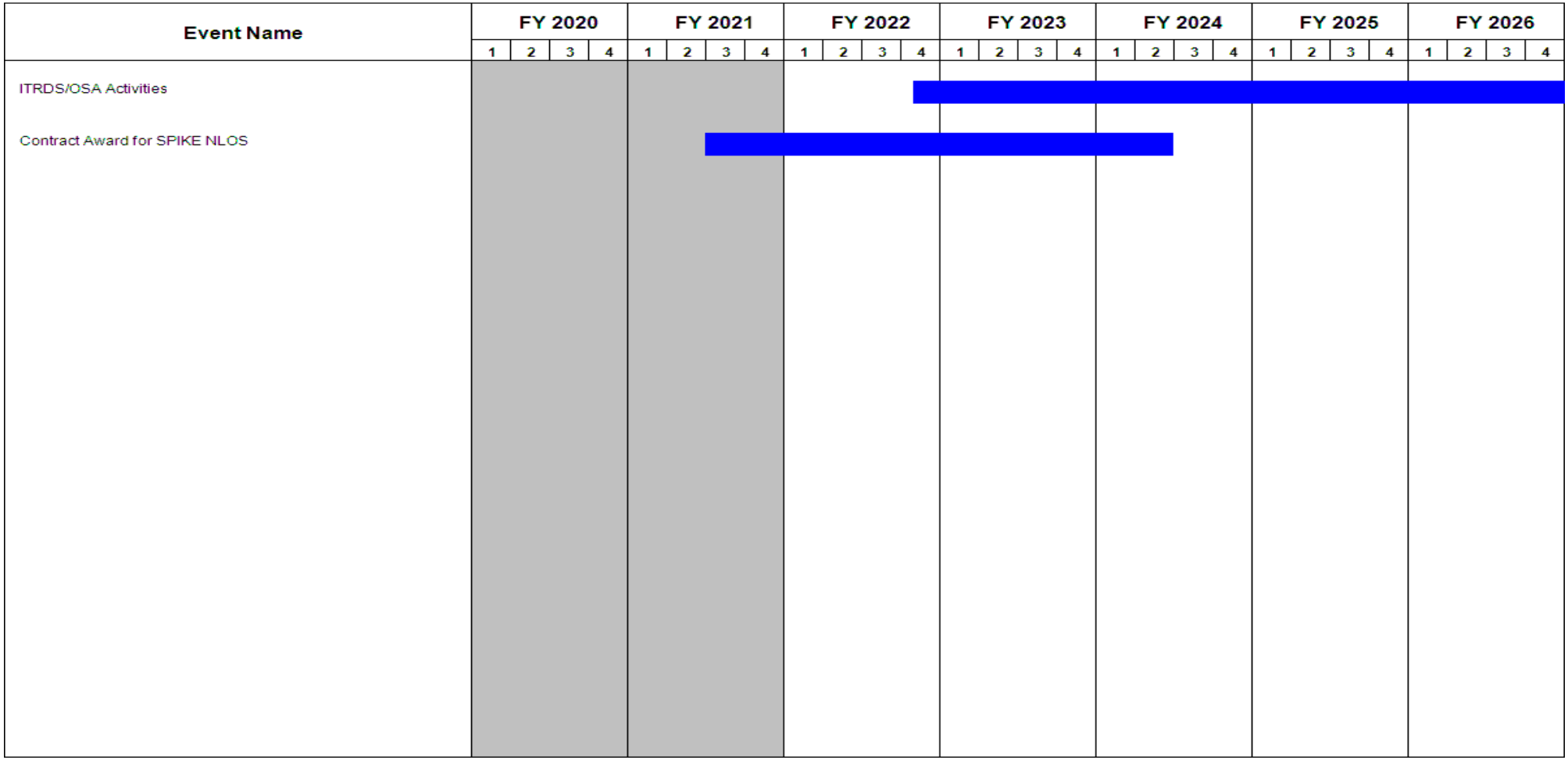

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607145A / *Apache Future Development*	**Project (Number/Name)** FD5 / *Apache Product Improvement*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
ITRDS/OSA Activities	4	2022	4	2028
Contract Award for SPIKE NLOS	3	2021	2	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607148A *I AN/TPQ-53 Counterfire Target Acquisition Radar System*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	-	-	56.681	-	56.681	-	-	-	-	-	-
BY8: *AN/TPQ-53 Counterfire Target Acquisition Radar Sys*	-	-	-	56.681	-	56.681	-	-	-	-	-	-

Note

This is a new start in FY 2022.

In Fiscal Year (FY) 2022, continuity of efforts transition from Program Element (PE) 0604823A Enhanced AN/TPQ 36 to PE 0607148A AN/TPQ-53 Counterfire Target Acquisition Radar System.

A. Mission Description and Budget Item Justification

The AN/TPQ-53 Counterfire Target Acquisition Radar System is a highly mobile radar set that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) and replaces the AN/TPQ-36 and AN/TPQ-37 Firefinder Radars. The AN/TPQ-53 system interoperates with mission command systems to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-53 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-53 currently supports contingency operations to include Operation Inherent Resolve (OIR) and is fielded to Brigade Combat Teams (BCTs), Field Artillery Brigades (FABs) and Division Artilleries (DIVARTYs).

Fiscal year (FY) 2022 modification-in-service research, development, test and evaluation (RDT&E) funds in the amount of $56.882 million supports the design and development of a hardware/software Multi Domain Operation (MDO) digitization upgrade kit to enhance system survivability (electronic protection (EP)) in a peer/near-peer threat environment and development, integration, testing, and fielding of a capability beyond the current range and location accuracy requirements. Funding also supports efforts required to counter indirect fire and improve survivability against electronic warfare threats identified in the Validated Online Lifecycle Threat (VOLT).

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0607148A / *AN/TPQ-53 Counterfire Target Acquisition Radar System*

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	56.681	-	56.681
Total Adjustments	0.000	0.000	56.681	-	56.681
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	56.681	-	56.681

Change Summary Explanation

Starting in FY 2022, funds are provided to address MDO digitization development and emerging threats in this modification-in-service line.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607148A / *AN/TPQ-53 Counterfire Target Acquisition Radar System*	Project (Number/Name) BY8 / *AN/TPQ-53 Counterfire Target Acquisition Radar Sys*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BY8: *AN/TPQ-53 Counterfire Target Acquisition Radar Sys*	-	-	-	56.681	-	56.681	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start in FY 2022.

In Fiscal Year (FY) 2022, continuity of efforts transition from Program Element (PE) 0604823A Enhanced AN/TPQ 36 to PE 0607148A AN/TPQ-53 Counterfire Target Acquisition Radar System.

A. Mission Description and Budget Item Justification

The AN/TPQ-53 Counterfire Target Acquisition Radar System is a highly mobile radar set that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) and replaces the AN/TPQ-36 and AN/TPQ-37 Firefinder Radars. The AN/TPQ-53 system interoperates with mission command systems to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-53 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-53 currently supports contingency operations to include Operation Inherent Resolve (OIR) and is fielded to Brigade Combat Teams (BCTs), Field Artillery Brigades (FABs) and Division Artilleries (DIVARTYs).

Fiscal year (FY) 2022 modification-in-service research, development, test and evaluation (RDT&E) funds in the amount of $56.882 million supports the design and development of a hardware/software Multi Domain Operation (MDO) digitization upgrade kit to enhance system survivability (electronic protection (EP)) in a peer/near-peer threat environment and development, integration, testing, and fielding of a capability beyond the current range and location accuracy requirements. Funding also supports efforts required to counter indirect fire and improve survivability against electronic warfare threats identified in the Validated Online Lifecycle Threat (VOLT).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: MDO Digitization / Distributed Digital Receiver Exciter (DDREX)	-	-	44.488
Description: MDO Digitization / Distributed Digital Receiver Exciter (DDREX) is a mod-in-service Engineering Change Proposal (ECP) that provides increased force protection by addressing emerging and evolving electronic attack threats, improving electronic protection capabilities against Cyber Electromagnetic Activity (CEMA), and improving performance in a congested spectrum/environment via waveform diversity, spectrum agility and broadening the operational bandwidth. The system is also less susceptible to directed energy, jamming and anti-radiation missiles and provides improved extended range capability to enable timely and accurate targetable data in support of Long Range Precision Fires (LRPF).			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607148A / *AN/TPQ-53 Counterfire Target Acquisition Radar System*	**Project (Number/Name)** BY8 / *AN/TPQ-53 Counterfire Target Acquisition Radar Sys*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 Plans: FY 2022 modification-in-service research, development, test and evaluation (RDT&E) funds in the amount of $48.429 million supports the DDREX modification kit system design, architecture and interface definition, hardware/software design and development, initial system integration and test and material required for engineering development models. This DDREX development effort also includes associated government engineering and program management support. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Starting in FY 2022, modernization efforts including requirements addressing MDO digitization will take place in this modification-in-service line.			
Title: Modernization Development Efforts and Emerging Threats ***Description:*** Modernization Development Efforts and Emerging Threats provides the ability to address upcoming threats on the battlefield by countering indirect fire and improving survivability against electronic warfare threats identified in the Validated Online Lifecycle Threat (VOLT). ***FY 2022 Plans:*** FY 2022 funding of $8.453 supports software updates to counter new and emerging indirect fire munitions and improve survivability against electronic warfare threats identified in the VOLT. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Starting in FY 2022, modernization efforts including requirements addressing new and emerging threats will take place in this modification-in-service line.	-	-	8.453
Title: Program Management Support ***Description:*** Funding is provided for all program management efforts on the AN/TPQ-53 Counterfire Target Acquisition Radar System. ***FY 2022 Plans:*** FY22 funding of $3.740 supports program management requirements. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Starting in FY 2022, program management requirements will take place in this modification-in-service line.	-	-	3.740
Accomplishments/Planned Programs Subtotals	-	-	56.681

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607148A / *AN/TPQ-53 Counterfire Target Acquisition Radar System*	**Project (Number/Name)** BY8 / *AN/TPQ-53 Counterfire Target Acquisition Radar Sys*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• 0604823A: *Firefinder*	16.583	18.278	-	-	-	-	-	-	-	-	-
• B05310: *AN/TPQ-53 Counterfire Target Acquisition Radar*	16.416	71.404	-	-	-	-	-	-	-	-	-
• BA5315: *AN/TPQ-53 MOD-IN-SERVICE LINE*	-	-	31.694	-	31.694	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The AN/TPQ-53 leverages technology developed in the multi-mission radar advanced technology objective (ATO) program. A Full Rate Production (FRP) decision was obtained in December 2015. The FRP contract to fill the remainder of the Army Acquisition Objective (AAO) was awarded in March 2017. Additionally, all initial production systems will be retrofitted to the FRP configuration. The AAO was increased from 174 to 189 systems in May 2017; the program has procured the AAO of 189 systems. Army approved a Total Army Analysis (TAA) force structure change in FY 2020. The AN/TPQ-53 system replaces all of the AN/TPQ-36 and AN/TPQ-37 systems in the fleet.

The AN/TPQ-53 multi-domain operations digitization effort full-up development begins in FY 2022. This effort will build upon ongoing full rate production (FRP) configuration risk mitigation activities and upgrades such as Gallium Nitride (GaN), signal data processor (SDP), extended range (ER), electronic protection, and secure contractor facilitization efforts. The initial development task order will take place on the follow-on FRP Indefinite Delivery Indefinite Quantity (IDIQ) contract in FY 2022 and will include engineering development, design, prototyping, and assessments. Initial production representative assets to include initial survivability capability are planned for FY 2023 and will undergo integration and testing leading to an operational assessment in FY 2024 to support a procurement decision for 60 digitization mod kits. The program will utilize FY 2024-2026 procurement funds to support the mod kit buys, depot facilitization, updates to technical manuals, and training materials. Supply transition and full material release are planned for FY 2026. The program will utilize procurement funds to retrofit and re-field systems with digitization mod kits beginning in FY 2026. In FY 2027, the digitization configuration transitions to depot support and its software transitions to sustainment.

The AN/TPQ-53 program will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607148A / *AN/TPQ-53 Counterfire Target Acquisition Radar System*	**Project (Number/Name)** BY8 / *AN/TPQ-53 Counterfire Target Acquisition Radar Sys*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Modernization Development Efforts and EmergingThreats	SS/CPFF	Lockheed Martin : Syracuse, NY	-	-		-		8.453	Dec 2021	-		8.453	0.000	8.453	Continuing
MDO Digitization / Distributed Digital Receiver Exciter (DDREX)	SS/CPFF	Lockheed Martin : Syracuse, NY	-	-		-		44.488	Dec 2021	-		44.488	0.000	44.488	Continuing
		Subtotal	-	-		-		52.941		-		52.941	0.000	52.941	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support - Government	Various	Various : Various	-	-		-		1.907		-		1.907	0.000	1.907	Continuing
Program Management Support - Contractor	Various	Various : Various	-	-		-		1.833		-		1.833	0.000	1.833	Continuing
		Subtotal	-	-		-		3.740		-		3.740	0.000	3.740	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		56.681		-		56.681	0.000	56.681	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607148A / *AN/TPQ-53 Counterfire Target Acquisition Radar System*	**Project (Number/Name)** BY8 / *AN/TPQ-53 Counterfire Target Acquisition Radar Sys*

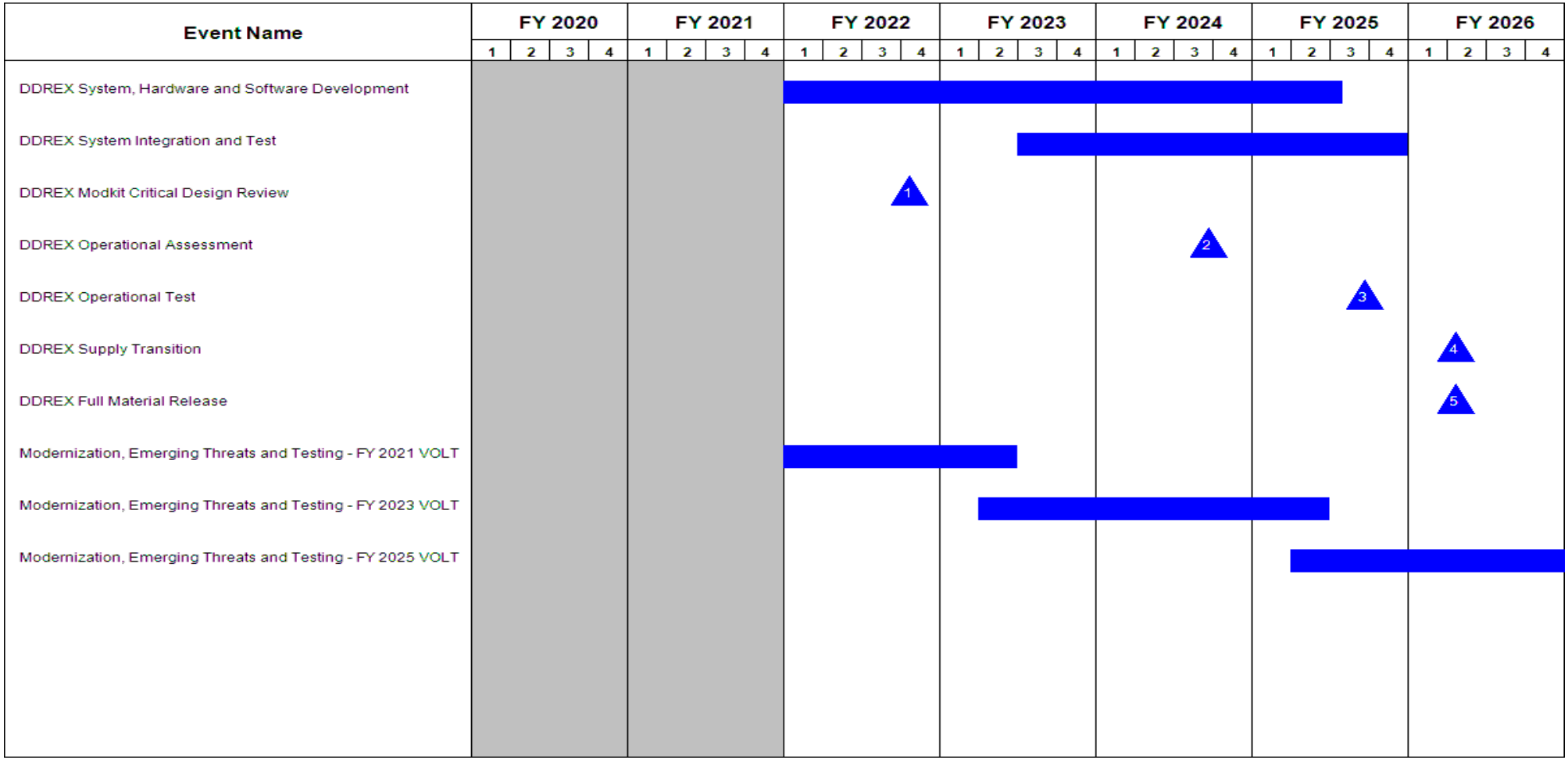

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607148A / *AN/TPQ-53 Counterfire Target Acquisition Radar System*	**Project (Number/Name)** BY8 / *AN/TPQ-53 Counterfire Target Acquisition Radar Sys*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
DDREX System, Hardware and Software Development	1	2022	3	2025
DDREX System Integration and Test	3	2023	4	2025
DDREX Modkit Critical Design Review	4	2022	4	2022
DDREX Operational Assessment	3	2024	3	2024
DDREX Operational Test	3	2025	3	2025
DDREX Supply Transition	2	2026	2	2026
DDREX Full Material Release	2	2026	2	2026
DDREX Organic Repair Transition	1	2028	1	2028
DDREX Software Transition	1	2028	1	2028
Modernization, Emerging Threats and Testing - FY 2021 VOLT	1	2022	2	2023
Modernization, Emerging Threats and Testing - FY 2023 VOLT	2	2023	2	2025
Modernization, Emerging Threats and Testing - FY 2025 VOLT	2	2025	2	2027

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607150A / *Intel Cyber Development*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	-	14.652	3.611	-	3.611	-	-	-	-	-	-
BS5: *Intel Cyber Development*	-	-	14.652	3.611	-	3.611	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced multi-domain intelligence collection and cyberspace technologies (SIGINT, EW, Cyberspace) designed to collect, process, exploit and, when directed, degrade, deny, disrupt, destroy, or manipulate adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.

INSCOM conducts RDTE of multi-domain intelligence collection and cyberspace technologies (SIGINT, EW, Cyberspace) in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, NSPD-38, NSPD-54 and HSPD-23.

FY 2022 request includes $23.839 million for these activities in support of Combatant Command Operations.

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

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	14.652	14.592	-	14.592
Current President's Budget	0.000	14.652	3.611	-	3.611
Total Adjustments	0.000	0.000	-10.981	-	-10.981
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-10.981	-	-10.981

Change Summary Explanation

Initiative reduces PSI as the Continuous Evaluation (CE) tool is utilized.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607150A / *Intel Cyber Development*	Project (Number/Name) BS5 / *Intel Cyber Development*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BS5: *Intel Cyber Development*	-	-	14.652	3.611	-	3.611	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

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

A. Mission Description and Budget Item Justification

INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced multi-domain intelligence collection and cyberspace technologies (SIGINT, EW, Cyberspace) designed to collect, process, exploit and, when directed, degrade, deny, disrupt, destroy, or manipulate adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.

INSCOM conducts RDTE of multi-domain intelligence collection and cyberspace technologies (SIGINT, EW, Cyberspace) in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, NSPD-38, NSPD-54 and HSPD-23.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Offensive Cyberspace Operations Capability Development	-	14.652	3.611
Description: INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced multi-domain intelligence collection and cyberspace technologies (SIGINT, EW, Cyberspace) designed to collect, process, exploit, and when directed, degrade, deny, disrupt, or destroy adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.			
FY 2021 Plans: Develop and support leading-edge Cyberspace technologies designed to exploit, degrade, deny, disrupt, or destroy threat command, control, communications, computers and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept.			
FY 2022 Plans: Develop and support leading-edge multi-domain intelligence and cyberspace operations technologies designed to collect, process, exploit, and, when directed, degrade, deny, disrupt, or destroy threat command, control, communications, computers			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607150A / *Intel Cyber Development*	**Project (Number/Name)** BS5 / *Intel Cyber Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of multi-domain intelligence and cyberspace operations technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept. INSCOM will address the operational force reports of increasing threat sophistication that requires matching pace in development of offensive capabilities to maintain critical advantage across the operational domains, particularly within the electromagnetic spectrum focused on signals intelligence (SIGINT), electronic warfare (EW, composed of the sub-domains of Electronic Support and Electronic Attack), and cyberspace operations. Expand combatant command focal points in accordance with Secretary of the Army service component commander's emerging needs. The requirement to address NEER-PEER threat actors and Army multi-domain operations that are expanding across the warfighting domains drive the need to reduce development gaps in these capabilities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The decrease from 2021 to 2022 is due to DA Reprogramming Decision; INSCOM and DA G2 rolled up together in the FY21 total; in FY22, there is no projected BS5 funding in the current POM data for DA G2, so FY22 only reflects what INSCOM is programmed for. Note, in FY21, INSCOM gets $12.260M, then $6.611M in FY22, the decrease is a DA Reprogramming Decision.			
Accomplishments/Planned Programs Subtotals	-	14.652	3.611

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607150A / *Intel Cyber Development*	Project (Number/Name) BS5 / *Intel Cyber Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MDI Cyberspace Operations Capability Development	TBD	TBD : TBD	-	-		14.652		3.611		-		3.611	Continuing	Continuing	Continuing
		Subtotal	-	-		14.652		3.611		-		3.611	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		14.652		3.611		-		3.611	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607150A / *Intel Cyber Development*	**Project (Number/Name)** BS5 / *Intel Cyber Development*

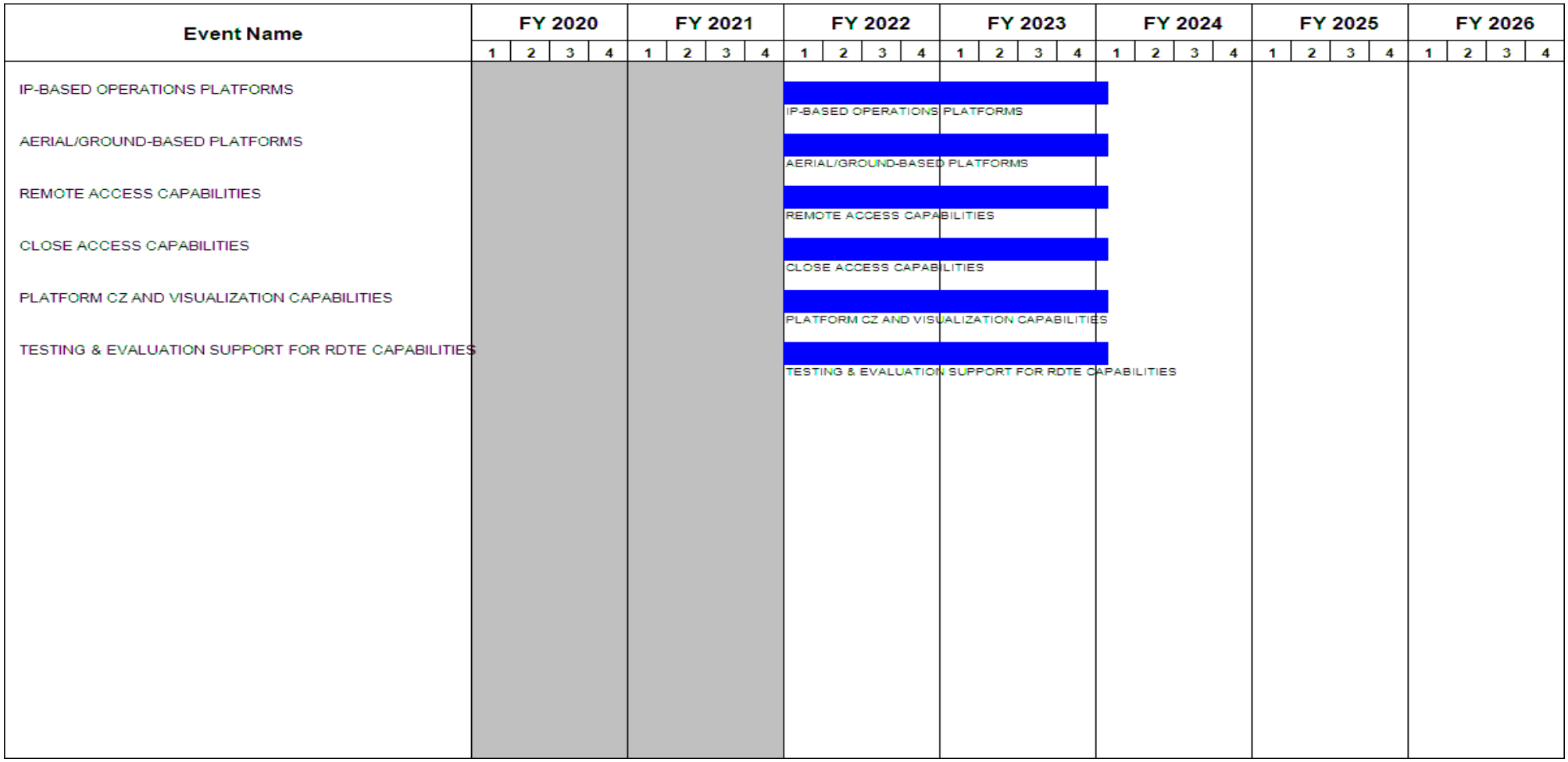

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607150A / *Intel Cyber Development*	**Project (Number/Name)** BS5 / *Intel Cyber Development*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
IP-BASED OPERATIONS PLATFORMS	1	2022	1	2024
AERIAL/GROUND-BASED PLATFORMS	1	2022	1	2024
REMOTE ACCESS CAPABILITIES	1	2022	1	2024
CLOSE ACCESS CAPABILITIES	1	2022	1	2024
PLATFORM CZ AND VISUALIZATION CAPABILITIES	1	2022	1	2024
TESTING & EVALUATION SUPPORT FOR RDTE CAPABILITIES	1	2022	1	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607312A *I Army Operational Systems Development*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	45.026	35.851	28.029	-	28.029	-	-	-	-	-	-
BR5: *Army Operational Systems Development*	-	45.026	35.851	28.029	-	28.029	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

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

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	45.026	35.851	33.858	-	33.858
Current President's Budget	45.026	35.851	28.029	-	28.029
Total Adjustments	0.000	0.000	-5.829	-	-5.829
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-5.829	-	-5.829

Change Summary Explanation

Funding realigned to support Army priorities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607313A / *Electronic Warfare Development*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	-	-	5.673	-	5.673	-	-	-	-	-	-
CE2: *Prophet*	-	-	-	5.673	-	5.673	-	-	-	-	-	-

Note

Funding for PE 0607313A / Electronic Warfare Development (BA7) / Project CE2 Prophet is a realignment from PE 0304270A / Project EW5 Electronic Warfare Development (BA5).

A. Mission Description and Budget Item Justification

This Program Element encompasses operational system development for tactical Electronic Warfare (EW) terrestrial (ground) employment applications. The systems under this program provide the Army with the capability to detect, identify, locate, collect/process, report, and engage (disrupt, degrade or deny) hostile forces to prevent their effective use of communications & non-communications networks, counter-mortar/counter-battery radars, surveillance radars, electronically fused munitions and other enemy threats using the Electro-Magnetic Spectrum (EMS).

Project CE2 supports the Prophet Enhanced Program of Record, the Army's current terrestrial SIGINT system. Funding provides for development of relevancy efforts for state-of-the-art Signals Intelligence (SIGINT) exploitation to pace near peer and emerging enemy threat signals as well as engineering to mitigate component obsolesce. Prophet Enhanced's primary mission is to provide 24-hour Situation Development and Information Superiority to the supported maneuver brigade enabling the most effective engagement of enemy forces. Prophet Enhanced provides a modular, scalable, open architecture based system solution optimized for ease of use in a variety of configurations.

FY 2022 funds the Prophet Enhanced efforts (Project CE2); Project CE2 is not a new start, this funding supports the Prophet Enhanced Program of Record transitioning from Engineering and Manufacturing Development (PE 0304270A / EW5) to Operational System Development (CE2).

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0607313A / *Electronic Warfare Development*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	5.673	-	5.673
Total Adjustments	0.000	0.000	5.673	-	5.673
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	5.673	-	5.673

Change Summary Explanation

FY2022 CE2 zero sum realignment of $6.212 million from PE 0304270A/EW5 (BA5) to PE 0607313A/CE2 (BA7) to support Prophet Enhanced. FY2022 budget decrease of $0.539 million to PE 0607313A/CE2.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607313A / *Electronic Warfare Development*	Project (Number/Name) CE2 / *Prophet*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
CE2: *Prophet*	-	-	-	5.673	-	5.673	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Funding for PE 0607313A / Electronic Warfare Development (BA7) / Project CE2 Prophet is a realignment from PE 0304270A / Project EW5 Electronic Warfare Development (BA5).

A. Mission Description and Budget Item Justification

Project CE2 supports the Prophet Enhanced Program of Record, the Army's current fielded terrestrial SIGINT system. Funds provide for development and integration of signal of interest Technical Insertion engineering for Next Generation Signals and state-of-the-art Signals Intelligence (SIGINT) exploitation techniques to increase the capabilities of Prophet Enhanced, enabling the system to pace near peer and emerging enemy threat signals. Additionally funds provide for efforts to include, but not limited to engineering, development and testing to mitigate component obsolesce. The Prophet Enhanced is the tactical commander's organic ground-based SIGINT/ Electronic Warfare system for the Multi-Function Teams (MfTs) organic to the Brigade Combat Teams (BCTs) and Expeditionary-Military Intelligence Brigades (E-MIBs). Its primary mission is to provide 24-hour Situation Development and Information Superiority to the supported maneuver brigade to enable the most effective engagement of enemy forces. Prophet Enhanced provides a modular, scalable, open architecture-based system solution optimized for ease of use in a variety of configurations. It also incorporates product modification, integration, evaluation and demonstration events of equipment for rapid integration of Technical Insertions (TI) and product development to ensure operational relevance.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Program Management ***Description:*** Engineering, technical and programmatic oversight of the development of next generation signals. ***FY 2022 Plans:*** Funds will provide for matrix and contractor system engineering and program management support for the Prophet program. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Zero sum funding realignment from PE 0304270A Project EW5.	-	-	0.567
Title: Signal of Interest upgrades ***Description:*** The Signal Environment that Prophet Systems exploit is constantly contested with evolving threats. This environment creates gaps in Prophet's ability to collect and exploit these signals. Prophet must integrate the latest emerging Intelligence Community (IC), commercial solutions and capabilities from other sources to remain relevant against these numerous, key, and high-priority emerging threats.	-	-	2.553

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607313A / *Electronic Warfare Development*	**Project (Number/Name)** CE2 / *Prophet*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 Plans: Development and integration of Next Generation SIGINT capabilities into the Prophet SIGINT Software (PS2). The new signals and libraries of signals address key exploitation gaps in the Prophet system's ability to collect against key tactical near peer signals and emerging threats. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Zero sum funding realignment from PE 0304270A Project EW5.			
Title: Componnet Obsolescence Engineering ***Description:*** Due to the highly technical nature of Prophet Enhanced, over the course of time, many components on the system are no longer produced or supported, which necessitates non-recurring engineering (NRE) to integrate and incorporate new and replacement parts. ***FY 2022 Plans:*** Including, but not limited to the obsolescence engineering for components on the Prophet Enhanced systems. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Zero sum funding realignment from PE 0304270A Project EW5.	-	-	2.553
Accomplishments/Planned Programs Subtotals	-	-	5.673

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BZ9751: *SPECIAL PURPOSE SYSTEMS*	4.000	48.979	3.739	-	3.739	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The Prophet Research and Development (R&D) Acquisition Strategy is structured to maintain operational relevancy of Prophet Enhanced systems in a dynamic threat environment while reducing risk and streamlining business and engineering processes. Contracting activities are to maintain SIGINT relevance and complete Technical Insertion (TI) to Prophet Enhanced systems to pursue the latest Signals of Interest and design against obsolescence. The Technical Insertion (TI) contract supports R&D and other developmental work.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607313A / *Electronic Warfare Development*	Project (Number/Name) CE2 / *Prophet*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/Various	PM Electronic Warfare & Cyber : APG, MD	-	-		-		0.567	Nov 2021	-		0.567	0.000	0.567	-
		Subtotal	-	-		-		0.567		-		0.567	0.000	0.567	N/A

Remarks

Efforts will be accomplished via a combination of Matrixed Government Support as well Systems Engineering and Technical Assistance (SETA) via competitive contract #W15P7T-10-D-D421.

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Signal of Interest Upgrades	SS/CPFF	GD Mission Systems and Various Supporting Organizations : Scottsdale, AZ	-	-		-		2.553	Dec 2021	-		2.553	0.000	2.553	-
Component Obsolence Engineering	SS/CPFF	GD Mission Systems and Various Supporting Organizations : Scottsdale, AZ	-	-		-		2.553	Dec 2021	-		2.553	0.000	2.553	-
		Subtotal	-	-		-		5.106		-		5.106	0.000	5.106	N/A

Remarks

Efforts will be accomplished contract # W56KGY-17-D-0006 to ensure systems remain relevant against emerging enemy threat signals and that any components of the system that become obsolete or are no longer produced can be re-engineered.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		5.673		-		5.673	0.000	5.673	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607313A / *Electronic Warfare Development*	Project (Number/Name) CE2 / *Prophet*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607313A / *Electronic Warfare Development*	**Project (Number/Name)** CE2 / *Prophet*

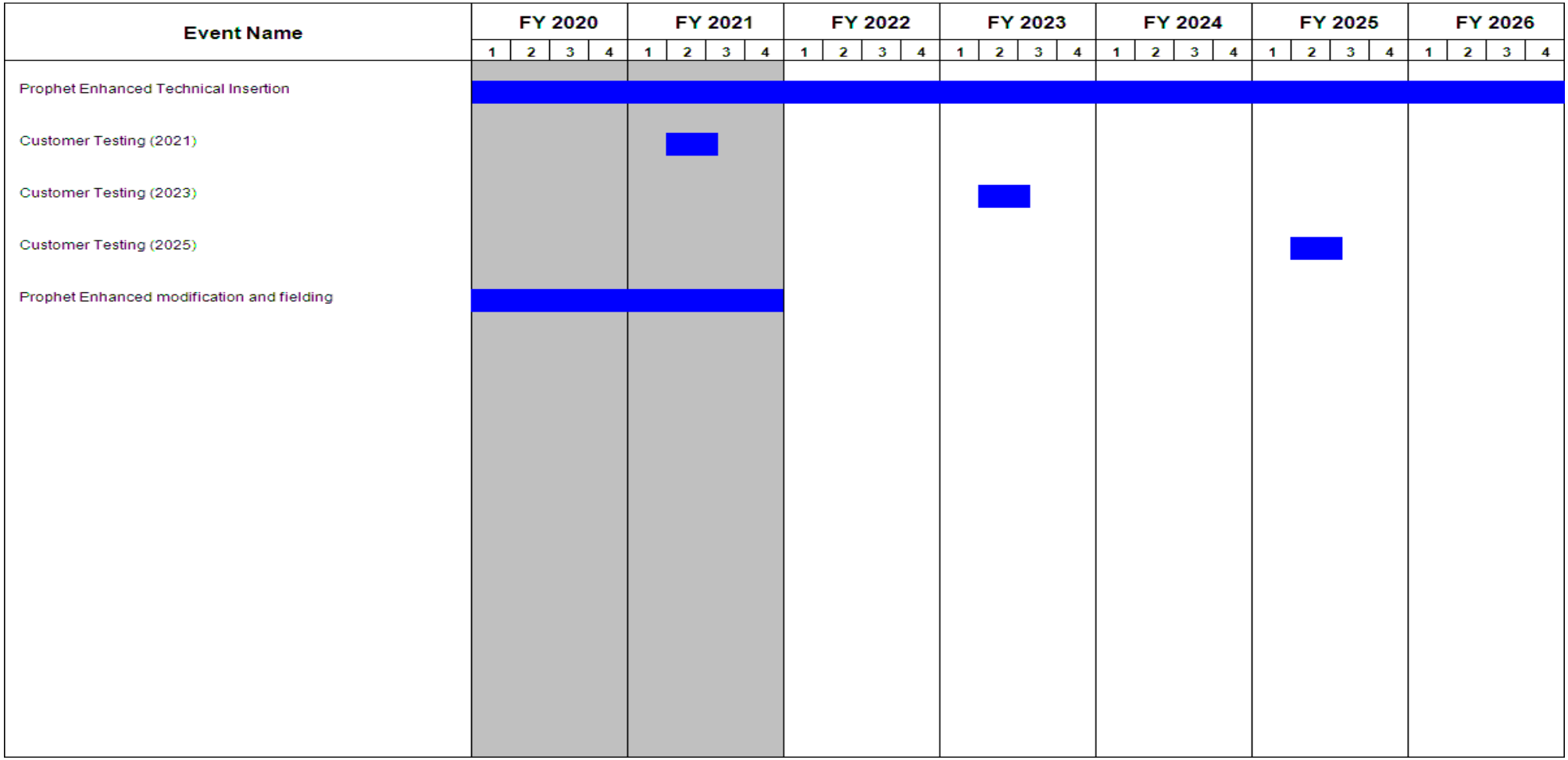

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607313A / *Electronic Warfare Development*	**Project (Number/Name)** CE2 / *Prophet*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Prophet Enhanced Technical Insertion	1	2020	3	2028
Customer Testing (2021)	2	2021	3	2021
Customer Testing (2023)	2	2023	3	2023
Customer Testing (2025)	2	2025	3	2025
Prophet Enhanced modification and fielding	3	2017	4	2021

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607665A / *Family of Biometrics*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	1.576	1.276	1.178	-	1.178	-	-	-	-	-	-
DT2: *Biometrics*	-	0.213	-	-	-	-	-	-	-	-	-	-
DU2: *Management Agency*	-	1.363	1.276	1.178	-	1.178	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

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

Justification:

FY 2022 funding in the amount of $1.178 million for Project DU2 will provide DFBA the ability to actively manage research efforts to address DoD biometrics objectives and requirements. DFBA supports the conduct of biometric and forensics activities (e.g. standards conformance and interoperability assessments), provides guidance to the research and development community, assists DoD acquisition organizations, and coordinates efforts with DoD and interagency stakeholders. This level of engagement promotes information sharing across the biometrics community to maximize utility of RDT&E efforts.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0607665A / *Family of Biometrics*			
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	1.702	1.324	1.192	-	1.192
Current President's Budget	1.576	1.276	1.178	-	1.178
Total Adjustments	-0.126	-0.048	-0.014	-	-0.014
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.057	-			
• SBIR/STTR Transfer	-0.069	-0.048			
• Adjustments to Budget Years	-	-	-0.014	-	-0.014

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607665A / *Family of Biometrics*	Project (Number/Name) DT2 / *Biometrics*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
DT2: *Biometrics*	-	0.213	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

BEC Increment 0 is in sustainment.

A. Mission Description and Budget Item Justification

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

Justification:

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: DoD ABIS (BEC 0) ***Description:*** The BEC 0 program is in sustainment.	0.213	-	-
Accomplishments/Planned Programs Subtotals	0.213	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BA1300: *FAMILY OF BIOMETRICS*	1.000	-	-	-	-	-	-	-	-	-	-

Remarks

The FY 2020 OPA funds in the amount of $1M were used to purchase IT licenses and maintenance for the Biometrics Operation Division.

D. Acquisition Strategy

The BEC Increment 0 program is in sustainment.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607665A / *Family of Biometrics*	Project (Number/Name) DT2 / *Biometrics*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/CPFF	Various : various	87.351	-		-		-		-		-	0.000	87.351	-
Service Life Extension	Option/ Various	Leidos : Fairmont, WV	19.559	0.208		-		-		-		-	0.000	19.767	-
		Subtotal	106.910	0.208		-		-		-		-	0.000	107.118	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PM Civilian Personnel	TBD	Alexandria : Virginia	3.358	-		-		-		-		-	0.000	3.358	-
ABIS in a box NATO Demonstration	Option/ Various	Fibertek : Virginia	-	0.005		-		-		-		-	0.000	0.005	-
		Subtotal	3.358	0.005		-		-		-		-	0.000	3.363	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation (System Testing)	MIPR	Army Test and Evaluation (ATEC); Joint Interoperability Test Command : Various Locations	3.282	-		-		-		-		-	0.000	3.282	-
		Subtotal	3.282	-		-		-		-		-	0.000	3.282	N/A

	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	113.550	0.213		0.000		-		-		-	0.000	113.763	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607665A / *Family of Biometrics*	**Project (Number/Name)** DT2 / *Biometrics*

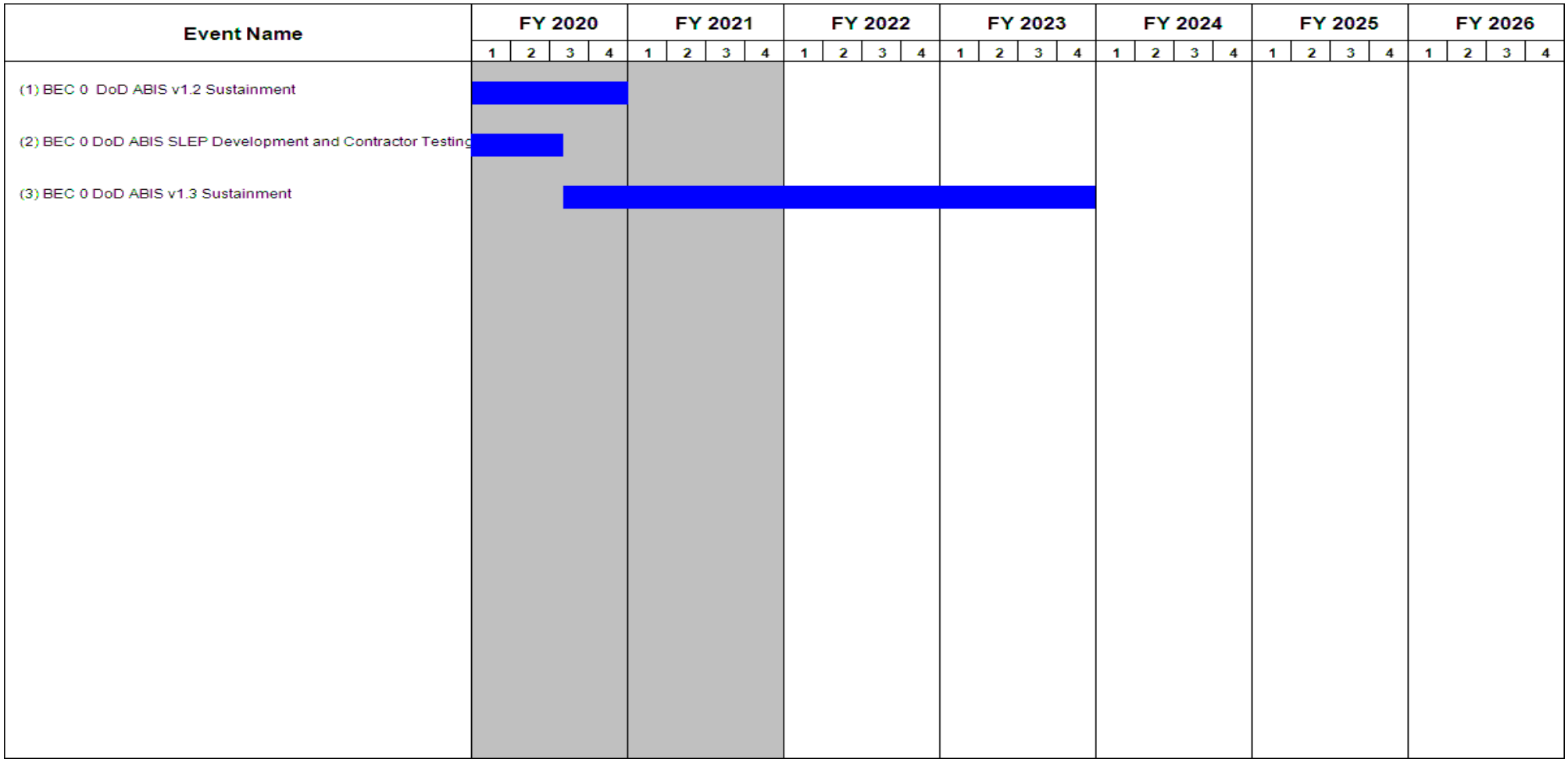

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607665A / *Family of Biometrics*	**Project (Number/Name)** DT2 / *Biometrics*

Schedule Details

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

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army									Date: May 2021			
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607665A / *Family of Biometrics*				Project (Number/Name) DU2 / *Management Agency*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
DU2: *Management Agency*	-	1.363	1.276	1.178	-	1.178	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

Justification:
FY 2022 funding in the amount of $1.178 million for Project DU2 will provide DFBA the ability to actively manage research efforts to address DoD biometrics objectives and requirements. DFBA supports the conduct of biometric and forensics activities (e.g. standards conformance and interoperability assessments), provides guidance to the research and development community, assists DoD acquisition organizations, and coordinates efforts with DoD and interagency stakeholders. This level of engagement promotes information sharing across the biometrics community to maximize utility of RDT&E efforts."

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Development and Implementation of Biometric Technologies	1.363	1.276	1.178
Description: Biometrics and Forensics Technologies Research			
FY 2021 Plans: FY 2021 funding in the amount of $1.276 million for Project DU2 will provide DFBA the ability to actively manage research efforts to ensure scientific merit, feasibility, and DFBA objectives and requirements are met. DFBA supports the conduct of biometric and forensics activities (e.g. standards conformance and interoperability assessments), support to DoD acquisition organizations, and provision of subject matter expertise to DoD and non-DoD government stakeholders.			
FY 2022 Plans: FY 2022 funding in the amount of $1.178 million for Project DU2 will provide DFBA the ability to actively manage research efforts to ensure scientific merit, feasibility, and DFBA objectives and requirements are met. DFBA supports the conduct of biometric and forensics activities (e.g. standards conformance and interoperability assessments), support to DoD acquisition organizations, and provision of subject matter expertise to DoD and non-DoD government stakeholders.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607665A / *Family of Biometrics*	**Project (Number/Name)** DU2 / *Management Agency*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
DFBA requested $1.5 million for RDTE across the FYDP but received a decrement in funding across the FYDP. For FY21 DFBA is scheduled to receive $1.276 million, decrement of $0.224 million prior to any decrements or taxes; additional decrements may result. For FY22 DFBA is scheduled to receive $1.178 million, decrement of $0.322 million, resulted from OSD cuts.			
Accomplishments/Planned Programs Subtotals	1.363	1.276	1.178

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607665A / *Family of Biometrics*	Project (Number/Name) DU2 / *Management Agency*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	0.065		-		-		-		-	0.000	0.065	-
		Subtotal	-	0.065		-		-		-		-	0.000	0.065	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
DFBA RDTE efforts	MIPR	Various Activities : Various locations	12.418	1.298	Jun 2020	1.276	Jun 2021	1.178	Jun 2021	-		1.178	Continuing	Continuing	-
		Subtotal	12.418	1.298		1.276		1.178		-		1.178	Continuing	Continuing	N/A

Remarks

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

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	12.418	1.363		1.276		1.178		-		1.178	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607665A / *Family of Biometrics*	**Project (Number/Name)** DU2 / *Management Agency*

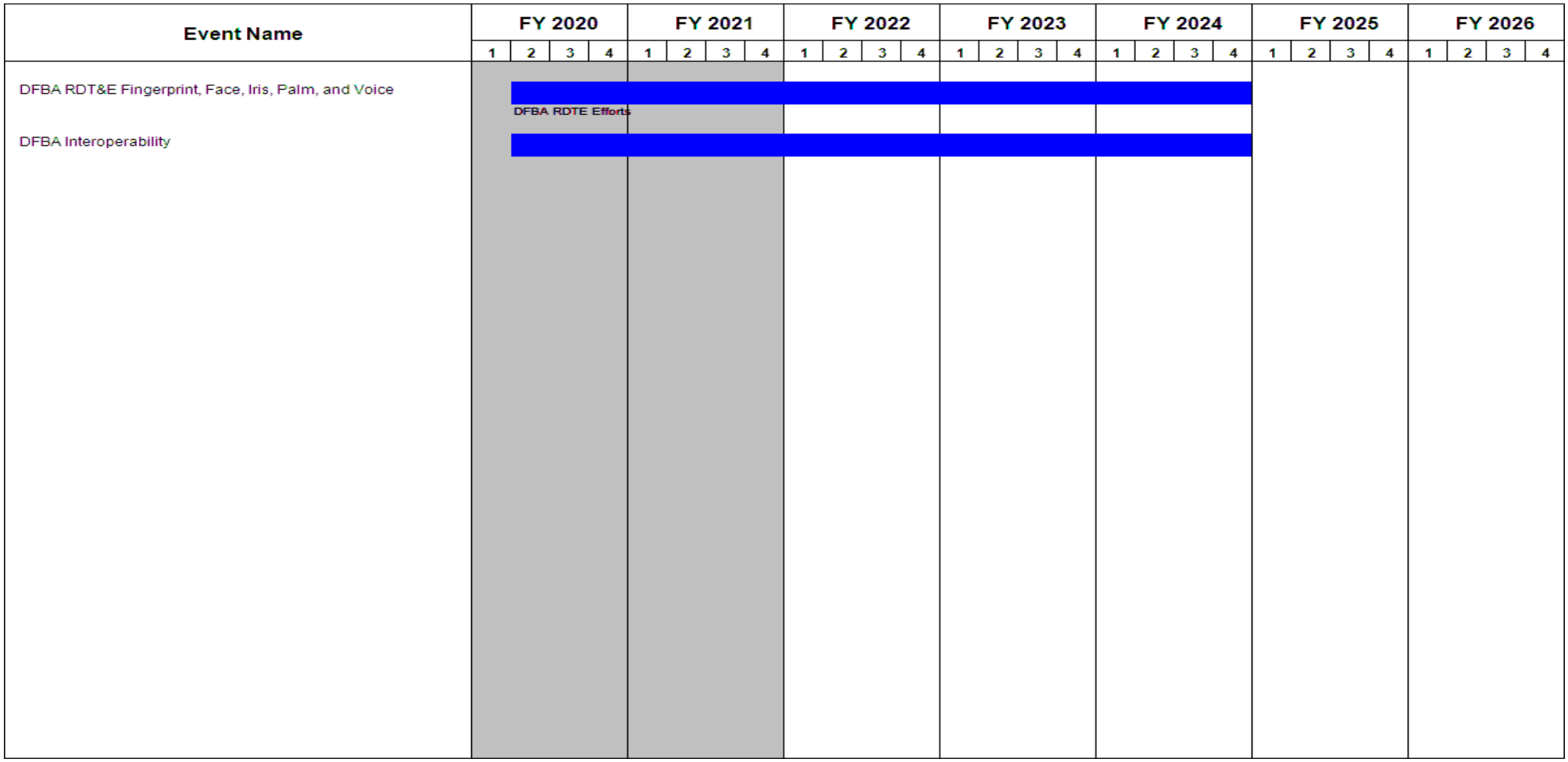

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607665A / *Family of Biometrics*	**Project (Number/Name)** DU2 / *Management Agency*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
DFBA RDT&E Fingerprint, Face, Iris, Palm, and Voice	2	2020	4	2024
DFBA Interoperability	2	2020	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0607865A / *Patriot Product Improvement*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	83.833	178.984	125.932	-	125.932	-	-	-	-	-	-
DV8: *Patriot Product Improvement*	-	83.833	178.984	125.932	-	125.932	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The PATRIOT Product Improvement Program (PIP) provides for the upgrade of the PATRIOT System and the Army Integrated Air and Missile Defense (IAMD) system through individual materiel changes and upgrades to current force and IAMD-connected PATRIOT system components (interceptors, ground system equipment, launcher, and current radar) to address operational lessons-learned and other system performance improvements as well as providing enhancements to joint force interoperability, emerging technologies; and software improvements, and convergence enabling transition to IBCS and LTAMDS to provide overmatch capability against emerging threats. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against emerging threats in a manner that is not practical to demonstrate with live fire flight tests alone due to cost, target availability, and range constraints. Flight testing is periodically required for validation of the modeling and simulation as well as satisfying Army Test and Evaluation Command/ Director, Operational Test and Evaluation (ATEC/DOTE) requirements of segment improvements.

This effort supports work with national agencies to evaluate, assess, and develop means to mitigate threat trends and specific threat developments potentially impacting system performance including effective detection, tracking, discrimination, and engagement. Specific improvements may be developed and fielded under this task if warranted. The effort maintains the Mission Tailoring Database, responding to immediate tactical concerns. Database updates are fielded between major software upgrades as necessary.
The PIP line also supports the identification, analysis, design, and test of materiel solutions to counter cyber security and electronic warfare shortcomings to all elements of the Lower Tier Battle Space.

PATRIOT is an integral part of the Integrated Air and Missile Defense (IAMD) Architecture, and enables the incremental fielding of the IBCS capability for Army Air and Missile Defense Battalions.

FY 2022 base dollars in the amount of $125.932 million support the continuance of critical software improvements for current force PATRIOT and Army IAMD, including Software Improvement for Threat Evolution, PAC-3 Seeker Software Improvement, Advanced Electronic Counter Measures (AECM), Combat ID enhancements, Tasks 2, 6, and 7 activities, program integration, modeling and simulation, acquisition of test assets and targets, Mobile Flight Mission Simulator (MFMS), PDB-8.1 and Patriot Component Software Build (PCSB) software, convergence with the IAMD Battle Command System (IBCS), Lower Tier Air and Missile Defense Sensor (LTAMDS), and government and contractor support.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0607865A *I Patriot Product Improvement*			
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	87.430	187.840	161.960	-	161.960
Current President's Budget	83.833	178.984	125.932	-	125.932
Total Adjustments	-3.597	-8.856	-36.028	-	-36.028
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.597	-6.856			
• Adjustments to Budget Years	-	-	-36.028	-	-36.028

Change Summary Explanation

The $36.028M decrease in funding from Previous President's Budget 2022 to Current President's Budget 2022 reflects Army decision to realign funding to support advancement of other Army priority development efforts.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607865A / *Patriot Product Improvement*				Project (Number/Name) DV8 / *Patriot Product Improvement*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
DV8: *Patriot Product Improvement*	-	83.833	178.984	125.932	-	125.932	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. PATRIOT system components (interceptors, launcher, and radar) are integrated with current force PATRIOT and Army Integrated Air and Missile Defense (IAMD) components, including IBCS and LTAMDS. As PATRIOT system components software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against specific threats in a manner that is not practical to demonstrate with live fire flight tests alone due to cost, target availability, and range constraints. Flight testing is periodically required for M&S validation as well as satisfying ATEC/DOTE requirements of segment improvements.

-PATRIOT system components software and hardware improvements for threat evolution: Performs necessary analysis and development efforts to maintain PATRIOT system (interceptors, ground support equipment, and current radar) effectiveness against evolving threat technologies, convergence with the IBCS, LTAMDS, and PATRIOT Component Software Builds (PCSB), and specific threat capabilities. This effort identifies evolving threats and threat characteristics that present a challenge to PATRIOT's current capabilities and develops initial concepts to maintain system effectiveness including detection, tracking, discrimination, and engagement relative to these threats. Additionally, evolving threat information is used to develop, integrate, and assess evolving lethality models in high-fidelity interceptor simulations supporting system level assessment of hit-to-kill and warhead interceptor performance.

-Advanced Electronic Counter Measures (AECM): This task investigates the implications of advanced technology Digital Radio Frequency Memory available on airborne platforms that enables new ECM techniques which could adversely degrade Air and Missile Defense System effectiveness. AECM efforts support PATRIOT system interceptors, ground support equipment, and current radar.

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

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

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

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

-Combat ID Enhancements: Develop and implement improvements to the Radar Digital Processor-Capability Combat ID capabilities and additional Non-Cooperative Target Recognition techniques to further mitigate misclassification and fratricide risk, and to provide the Warfighter with improved situational awareness. This effort mitigates detection, tracking, and engagement errors on friendly targets.
-PAC-3 Seeker Software Improvements: Perform PAC-3 MSE Software improvements to address evolving and newly fielded Electronic Attack threats providing analysis, engineering, prototyping, testing, and tactical software implementation of improvements.
-Program Integration MSE LMMFC: This task support interceptor flight mission analysis, test missile preparation, flight mission interceptor integration, and range safety tasks allowing execution of required PATRIOT flight test activities.
-Mobile Flight Mission Simulator (MFMS) is a real-time system exerciser integrated with tactical ground hardware to simulate signals into the radar. The MFMS is part of the simulation and testing infrastructure required to support fielded PATRIOT.
-Post Deployment Build 8 (PDB-8) continues system testing and analysis for PATRIOT Component Software Build Developmental Test and Evaluation and Limited User Testing required to support fielded PATRIOT. MSE/PAC-3 Raytheon effort provides integration into PATRIOT and associated Raytheon/PATRIOT ground system flight test support.
-US Government and contractor support for PIP efforts supporting system interceptors, ground support equipment, and current radar provide studies and support to ensure the system and its components continue to evolve to defeat emerging threats.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: PATRIOT Product Improvement	79.436	178.984	125.932
Description: Patriot Product improvement line provides continuous improvement to current force PATRIOT and Army IAMD to keep pace with and counter evolving and emerging threats. ***FY 2021 Plans:*** -Continue Software Improvement for Threat Evolution and AECM -Continue Combat ID enhancements, ARM Asset Defense, and Assured PNT -Continue Tasks 2, 6, and 7 activities -Continue program development through system level modeling, simulation, integration and test support -Continue test program to include utilization of targets/threat simulators, flight simulator and modeling efforts -Continue test activities to support the TEMP -Continue Ballistic Missile Defense System (BMDS) Integration Testing -Continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements -U.S. Government and contractor support to counter emerging threat -Continue PAC-3 Seeker Software Improvements ***FY 2022 Plans:*** -Continue Software Improvement for Threat Evolution and AECM to address emerging threats and convergence with IBCS and LTAMDS			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
-Continue Combat ID enhancements -Continue Tasks 2, 6, and 7 activities to develop hardware and software to maintain PATRIOT system effectiveness in the field -Continue program development through system level modeling, simulation, integration and test support to address emerging threats and convergence with IBCS and LTAMDS -Continue test program to include utilization of targets/threat simulators, flight simulator and modeling efforts to maintain system effectiveness -Continue test activities to support the TEMP -Continue Ballistic Missile Defense System (BMDS) Integration Testing -Continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements -U.S. Government and contractor support to ensure force effectiveness is maintained to keep pace with evolving and emerging threats -Continue IBCS convergence and PCSB effort (IBCS convergence and PCSB efforts begin in FY21) , and begin LTAMDS integration -Continue PAC-3 Seeker Software Improvements to counter Electronic Attack Threats -Continue interceptor design reviews, system integration activities, test and analysis, and threat analysis and modeling -Continue MSS-2 laboratory support for high fidelity seeker data collection, modeling and analysis ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The $36.028M decrease in funding from Previous President's Budget to Current President's Budget reflects Army decision to realign funding to support advancement of other Army priority development efforts.			
Title: FY 2020 Army Withhold for Pending ATR ***Description:*** Pending ATR	4.397	-	-
Accomplishments/Planned Programs Subtotals	83.833	178.984	125.932

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C50700: *Patriot Mods*	278.716	278.050	205.469	-	205.469	-	-	-	-	-	-

Remarks

The improvements/enhancements developed through the PATRIOT Product Improvement Program (PIP) are interrelated with the hardware kits that are procured and installed under the Missile Procurement, Army (MIPA) appropriation's PATRIOT Mods program and maximizes PAC-3 MSE capabilities.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

D. Acquisition Strategy

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / *Patriot Product Improvement*	Project (Number/Name) DV8 / *Patriot Product Improvement*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	MIPR	RSA, AL : RSA, AL	11.428	1.600	Oct 2019	5.444	Oct 2020	5.474	Oct 2021	-		5.474	Continuing	Continuing	-
U.S. Contracts	Various	Multiple : Multiple	8.561	1.239	Feb 2020	1.700	Feb 2021	1.770	Feb 2022	-		1.770	Continuing	Continuing	-
PAC-3 Product Office	RO	Project Office : Huntsville, AL	-	-		1.900	Oct 2020	-		-		-	Continuing	Continuing	-
FY 2020 Army Withhold Pending ATR	TBD	Various : Various	-	4.397		-		-		-		-	0.000	4.397	-
		Subtotal	19.989	7.236		9.044		7.244		-		7.244	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Improvement for Threat Evolution	Various	Multiple : Multiple	55.287	7.983	Jan 2020	8.756	Jan 2021	6.486	Jan 2022	-		6.486	Continuing	Continuing	-
Advanced Electronic Counter Measures (AECM)	Various	Multiple : Multiple	83.738	17.059	Jan 2020	16.390	Jan 2021	7.736	Jan 2022	-		7.736	Continuing	Continuing	-
Task 2 Non-Ballistic Tactical Ballistic Missile (TBM)	Various	Multiple : Multiple	42.500	5.839	Feb 2020	6.300	Feb 2021	6.648	Feb 2022	-		6.648	Continuing	Continuing	-
Task 6 Discrimination Improvements	Various	Multiple : Multiple	41.200	6.339	Feb 2020	6.100	Feb 2021	5.074	Feb 2022	-		5.074	Continuing	Continuing	-
Task 7 TBM Countermeasures / Effectors	Various	Multiple : Multiple	37.700	8.939	Feb 2020	9.561	Feb 2021	8.787	Feb 2022	-		8.787	Continuing	Continuing	-
Assured PNT	Various	Multiple : Multiple	14.340	2.439	Jan 2020	1.900	Jan 2021	-		-		-	Continuing	Continuing	-
Combat ID Enhancements	Various	Multiple : Multiple	34.657	14.171	Feb 2020	14.736	Feb 2021	2.912	Feb 2022	-		2.912	Continuing	Continuing	-
Anti-Radiation Missile (ARM) Asset Defense	Various	Raytheon : Andover, Massachusetts	5.000	-		1.200	May 2021	-		-		-	Continuing	Continuing	-
PAC-3 Seeker SW Improvement	TBD	Multiple : Multiple	7.526	13.489	Nov 2020	13.874	Feb 2021	2.649	Feb 2022	-		2.649	Continuing	Continuing	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CDCC and OGAs	MIPR	RSA : RSA	-	-		0.800	Oct 2020	0.836	Oct 2021	-		0.836	Continuing	Continuing	-
Program Integration MSE LMMFC	Various	LMMFC : Dallas, TX	-	-		21.262	Feb 2021	13.308	Feb 2022	-		13.308	Continuing	Continuing	-
MSE/PAC-3 Raytheon	Various	Raytheon : Watham, Massachusetts	-	-		7.900	Feb 2021	5.100	Feb 2022	-		5.100	Continuing	Continuing	-
SETA Contracts	Various	Multiple : Multiple	-	-		2.800	Feb 2021	2.900	Feb 2022	-		2.900	Continuing	Continuing	-
		Subtotal	321.948	76.258		111.579		62.436		-		62.436	Continuing	Continuing	N/A

Remarks

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

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CCDC and Other Govt Agencies	MIPR	RDEC and OGA'S : RSA, AL	5.912	0.339	Jan 2020	6.800	Jan 2021	7.000	Jan 2022	-		7.000	Continuing	Continuing	-
Targets/Threat Simulation	MIPR	Various : Huntsville, AL	-	-		26.396	Jan 2021	23.650	Jan 2022	-		23.650	Continuing	Continuing	-
Modeling and Simulation	MIPR	Various : Huntsville, AL	-	-		3.022	Jan 2021	3.700	Jan 2022	-		3.700	Continuing	Continuing	-
Contractor T&E	Various	Multiple : Various	-	-		8.328	Feb 2021	6.012	Feb 2022	-		6.012	Continuing	Continuing	-
Other T&E	MIPR	Various : WSMR, NM	-	-		4.600	Jan 2021	4.600	Jan 2022	-		4.600	Continuing	Continuing	-
Mobile Flight Mission Simulator	SS/FPIF	Raytheon : Massachusetts	-	-		1.000	Feb 2021	1.175	Feb 2022	-		1.175	Continuing	Continuing	-
PDB-8	MIPR	Various : WSMR, NM	-	-		8.215	Feb 2021	10.115	Feb 2022	-		10.115	Continuing	Continuing	-
		Subtotal	5.912	0.339		58.361		56.252		-		56.252	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	347.849	83.833		178.984		125.932		-		125.932	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / *Patriot Product Improvement*	Project (Number/Name) DV8 / *Patriot Product Improvement*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

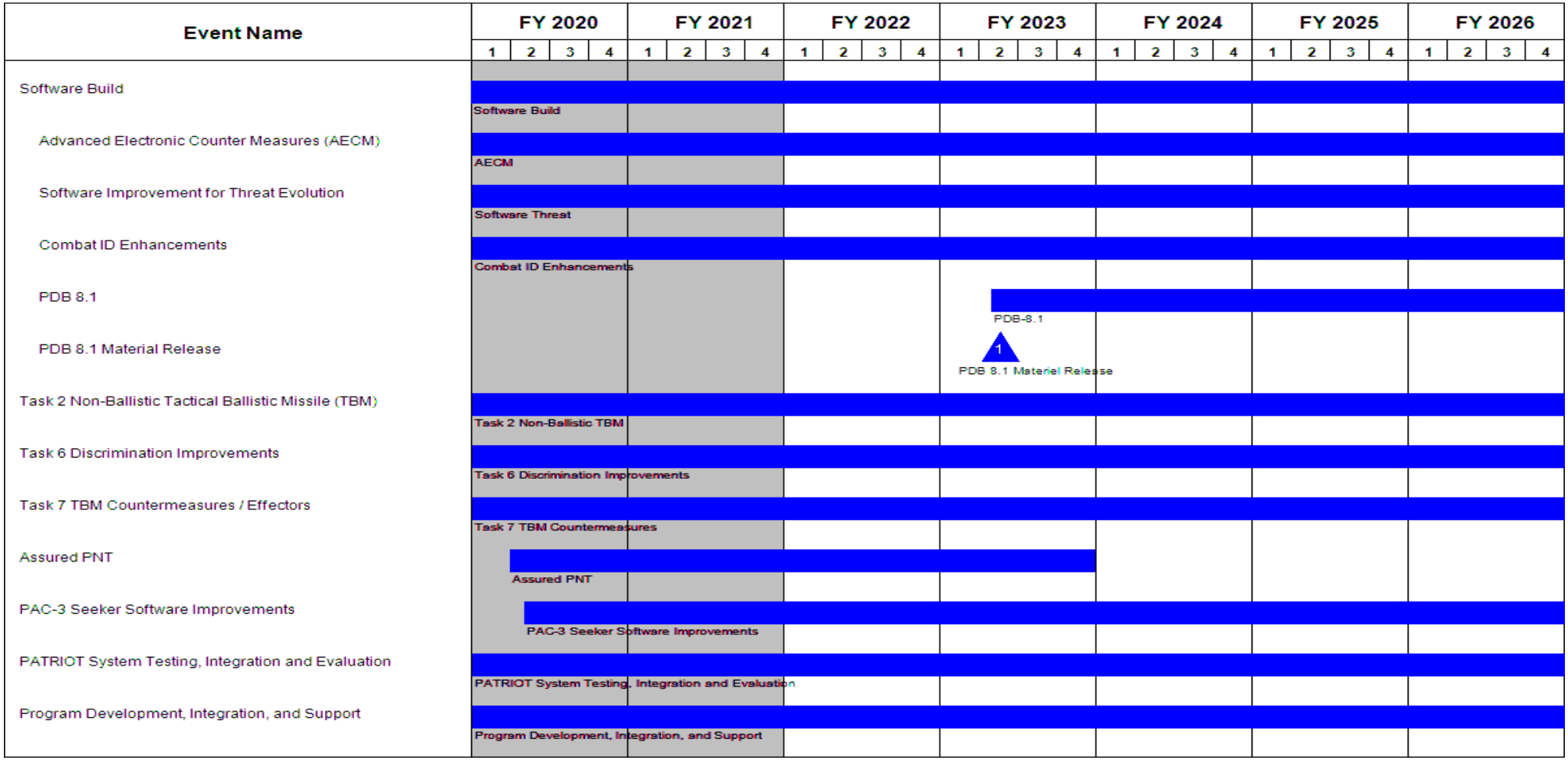


Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

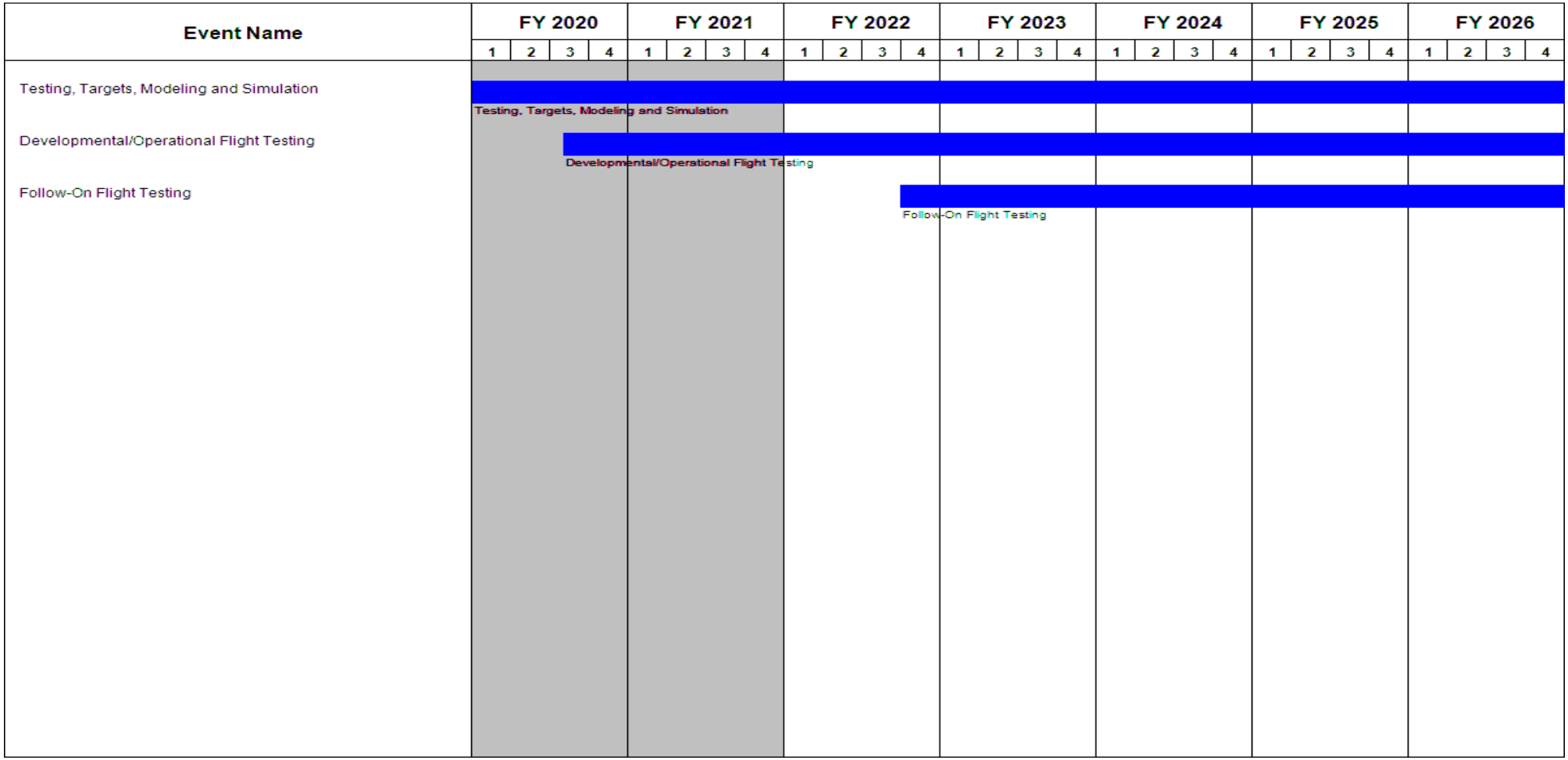


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0607865A / *Patriot Product Improvement*	**Project (Number/Name)** DV8 / *Patriot Product Improvement*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Software Build	4	2005	4	2028
Advanced Electronic Counter Measures (AECM)	1	2014	4	2028
Software Improvement for Threat Evolution	1	2014	4	2028
Combat ID Enhancements	1	2014	4	2028
PDB 8.1	2	2023	1	2029
PDB 8.1 Material Release	2	2023	2	2023
Task 2 Non-Ballistic Tactical Ballistic Missile (TBM)	1	2015	4	2028
Task 6 Discrimination Improvements	1	2014	4	2028
Task 7 TBM Countermeasures / Effectors	1	2015	4	2028
Assured PNT	1	2017	4	2023
PAC-3 Seeker Software Improvements	2	2020	4	2028
PATRIOT System Testing, Integration and Evaluation	1	2016	4	2028
Program Development, Integration, and Support	1	2016	4	2028
Testing, Targets, Modeling and Simulation	1	2016	4	2028
Developmental/Operational Flight Testing	3	2020	4	2028
Follow-On Flight Testing	4	2022	4	2028

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	45.447	43.060	25.547	-	25.547	-	-	-	-	-	-
EF7: *Precision Fires Warrior Dismounted & Mounted*	-	3.356	3.199	3.024	-	3.024	-	-	-	-	-	-
EF8: *AFATDS Increment 1*	-	42.091	39.861	22.523	-	22.523	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

Product Manager (PdM) FSC2 oversees the development and fielding of the Advanced Field Artillery Tactical Data System (AFATDS), Precision Fires-Dismounted/ Mounted (PF-D/M) and Joint Automated Deep Operations Coordination System (JADOCS) programs. In support of the LRPF CFT, it also supports development of the Extended Range Canon Artillery (ERCA), Extended Range Guided Multiple Launch Rocket System (ER-GMLRS) and Precision Strike Missile System (PRSM) initiatives. To support these initiatives, PdM FSC2 also began supporting the Long Range Hypersonic Weapons (LRHW) program in FY 2020.

FSC2 systems automate the planning and execution of fire support operations so that suitable weapons or a group of weapons adequately cover targets. Fire support is the effect of lethal and non-lethal weapons (fires) that directly support land, maritime, amphibious and special operations forces to engage enemy forces, combat formations and facilities in pursuit of tactical and operational objectives.

The Advanced Field Artillery Tactical Data System (AFATDS) provides the Army and Marine Corps automated fire support command, control and communications. AFATDS is used to plan, execute, and deliver lethal and non-lethal effects. AFATDS provides Joint/Coalition Situational Awareness for fires execution and mission management. The system interoperates and integrates with over 80 different battlefield systems, including Navy and Air Force command and control weapons systems. As a member of the Artillery System Cooperation Agreement (ASCA), AFATDS is interoperable with coalition partner fire support systems. Currently fielding AFATDS 6.8 baseline, which automates the planning, coordination, and control of all fire support assets (field artillery, mortars, close air support, naval gunfire, attack helicopters, offensive electronic warfare, fire support meteorological systems, forward observers, and fire support radars).

The Advanced Field Artillery Tactical Data System (AFATDS) funding line supports the Army Modernization Strategy Common Operating Environment. Efforts are aligned to support the Network-Cross Functional Team (CFT) capability set approach to achieve the network modernization strategy. AFATDS 7 modernizes the software currently in the field and enhances the existing legacy baseline by: (1) Providing a modernized web service backend that will simplify long-term maintenance of the software, (2) Bringing AFATDS into full compliance with the Army's Common Operating Environment (COE) Command Post Computing Environment (CPCE) initiative and (3) Enhancing overall usability of the system through the implementation of a role-based capability architecture with embedded training that allows the AFATDS operator to receive on-the-spot training for any aspect of AFATDS via interactive instruction.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0203728A *I Joint Automated Deep Operation Coordination System (JADOCS)*

AFATDS supports Long Range Precision Fires (LRPF) CFT, Extended Range Canon Artillery (ERCA), Extended Range Guided Multiple Launch Rocket System (ER-GMLRS), Precision Strike Missile System (PRSM) and emerging sensor to shooter initiatives. To support these initiatives, AFATDS will serve as the key sensor to shooter link for the Army and US Marine Corps providing fully automated support for planning, coordinating, controlling and executing fires and effects. AFATDS began supporting Long Range Hypersonic Weapons in Fiscal Year 20. FY22 funding of $22.523 million will be used for continued development of AFATDS 7 capabilities, specifically, code conversion from Ada to Java, cyber enhancements and some User Interface improvements.

Precision Fires Dismounted/Mounted (PF-D/M) provides the dismounted and mounted Forward Observer (FO) and Fire Support Teams (FISTs) the ability to execute fire missions.
Precision Fires Dismounted (PF-D), is a software application that operates on the Nett Warrior End User Device (EUD). It provides the dismounted Forward Observer (FO) and (FISTs) the capability and functionality to accurately and rapidly locate ground targets and digitally process a Call for Fire. PF-D answers the Mobile Handheld Computing Environment requirement that all handheld applications reside on the Nett Warrior EUD. PF-M replaces the Lightweight Forward Entry Device's (LFED) Forward Observer Software (FOS) at the maneuver company FIST. PF-M answers the Mounted Computing Environment requirement and will reside on the Mounted Family of Computing Systems (MFoCS) computer. FY2022 funding of $3.312 million will be utilized to continue the enhancement of PF-D software onto the NW EUD for dismounts and porting the dismounted software to the MFoCS vehicle platforms through software development/hardware integration efforts with development of PF-M.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	47.398	44.691	26.114	-	26.114
Current President's Budget	45.447	43.060	25.547	-	25.547
Total Adjustments	-1.951	-1.631	-0.567	-	-0.567
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.951	-1.631			
• Adjustments to Budget Years	-	-	-0.567	-	-0.567

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	Project (Number/Name) EF7 / *Precision Fires Warrior Dismounted & Mounted*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EF7: *Precision Fires Warrior Dismounted & Mounted*	-	3.356	3.199	3.024	-	3.024	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Precision Fires Dismounted (PF-D), formerly known as Pocket-sized Forward Entry Device (PFED) Increment II is a software application that operates on the Nett Warrior (NW) End User Device (EUD). It provides the dismounted Forward Observer (FO) and Fire Support Teams (FISTs) the capability and functionality to accurately and rapidly locate ground targets and digitally process a Call For Fire. PF-D answers the Mobile Handheld Computing Environment requirement that all handheld applications reside on the NW EUD. PF-M replaces the Lightweight Forward Entry Device's (LFED) Forward Observer Software (FOS) at the maneuver company FIST. PF-M answers the Mounted Computing Environment requirement and will reside on the Mounted Family of Computing Systems (MFoCS) computer. FY2022 funding of $3.312 million will be utilized to continue the enhancement of PF-D software onto the NW EUD for dismounts and porting the dismounted software to the MFoCS vehicle platforms through software development/hardware integration efforts with development of PF-M.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Program Management Support Costs for PF-D/M	-	0.410	0.409
Description: Program support for Precision Fires Dismounted/Mounted (PF-D/M) software development efforts.			
FY 2021 Plans: Will provide Program Management Office (PMO) support for all aspects of the PF-D/M program including requirements development, software development efforts, logistics, and business management support.			
FY 2022 Plans: Will provide PMO support for all aspects of the PF-D/M program including requirements development, software development efforts, logistics and business management support.			
FY 2021 to FY 2022 Increase/Decrease Statement: Funding remains constant.			
Title: PF-D/M Software Development	3.189	2.291	2.117
Description: PF-D/M Software Development			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF7 / *Precision Fires Warrior Dismounted & Mounted*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Will complete development of Block 2 capabilities. Complete Hardware and Software integrating with NW EUD. Begin the development of block 3 capabilities with vehicle integration onto MFoCS and begin development of PF-M 1.0. ***FY 2022 Plans:*** PF-M Block 3 development. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding remains relatively constant.			
Title: Testing for PF-D/M ***Description:*** Conduct and Support Army Testing Activities for PF-D/M ***FY 2021 Plans:*** DT/OT and AIC testing. ***FY 2022 Plans:*** DT/OT testing of Block 3.	0.167	0.498	0.498
Accomplishments/Planned Programs Subtotals	3.356	3.199	3.024

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BZ9851: *POCKET FORWARD ENTRY DEVICE (PFED)*	8.620	3.896	2.648	-	2.648	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

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

PF-D Block 1 leverages an Army Science and Technology (S&T) investment by transitioning a software application that was been developed and used in proponent experimentation
events (e.g. Army Expeditionary Warrior Experiment (AEWE) and Bold Quest). Upon a successful Milestone B decision in FY15, this software application transitioned to PM Mission Command (PMMC) to conduct all Army developmental and operational test and evaluation requirements. With both the Mobile and Mounted Computing

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF7 / *Precision Fires Warrior Dismounted & Mounted*

environments migrating towards a technical foundation that operates on an ATAK software baseline, the PF-D software was further adapted to coalesce to a new common operating environment. Reusable components and services were taken from the S&T baseline to help satisfy operational requirements and enhance the end user experience provided with the ATAK infrastructure.

PF-D/M is developed using a block approach where capability is incrementally added to the overall baseline over the course of five blocks. PF-D Block 2 focuses on transitioning from a standalone Android application to a plugin on the Android Tactical Assault Kit (ATAK) architecture. Capabilities include Sensor Interoperability, Digital Precision Strike Suite, and Digitally Aided Close Air Support over the Link 16 network. PF-D/M Block 3 encompasses both the continuation of PF-D Block 2 software with additional capabilities for the handheld environment, and starts the new development of PF-M by transitioning it to the mounted environment. This will move the PF-M Block 2 baseline onto the MFoCS, which is a complete replacement for the Lightweight Forward Entry Device (LFED)/Forward Observer System (FOS) and offers enhanced interoperability to Fire Support Sensors mounted on the platform and offer capabilities of interacting with Net-Enabled munitions. PF-D/M Blocks 4 and 5 will be determined by the Fires Center of Excellence (FCoE) Governance Board under the Information Technology (IT) Box process.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	Project (Number/Name) EF7 / *Precision Fires Warrior Dismounted & Mounted*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support for PF-D/M (CORE)	Sub Allot	PM Mission Command (MC) : APG, MD	0.100	-		-		-		-		-	0.000	0.100	-
Program Management Support for PF-D/M (Matrix)	IA	Various Mix Orgs (Govt) : APG, MD	0.491	-		0.205		0.205		-		0.205	0.000	0.901	Continuing
Program Management Support for PF-D/M (SETA)	C/FFP	CACI : APG, MD	0.650	-		0.205		0.204		-		0.204	0.000	1.059	Continuing
		Subtotal	1.241	-		0.410		0.409		-		0.409	0.000	2.060	N/A

Remarks

FY21 and out account for a reduction in matrix support from the realignment of business management support matrixed from AMC to direct.

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PF-D/M Software Development efforts	IA	CCDC C5ISR : APG, MD	13.301	3.189		2.291		2.117		-		2.117	Continuing	Continuing	Continuing
		Subtotal	13.301	3.189		2.291		2.117		-		2.117	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	Various	PM Mission Command (MC) : APG, MD	1.517	-		-		-		-		-	Continuing	Continuing	-
		Subtotal	1.517	-		-		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	Project (Number/Name) EF7 / *Precision Fires Warrior Dismounted & Mounted*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support (Engineering Release)	Various	Testing : Various	1.406	0.167		0.498		0.498		-		0.498	Continuing	Continuing	Continuing
		Subtotal	1.406	0.167		0.498		0.498		-		0.498	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	17.465	3.356		3.199		3.024		-		3.024	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF7 / *Precision Fires Warrior Dismounted & Mounted*

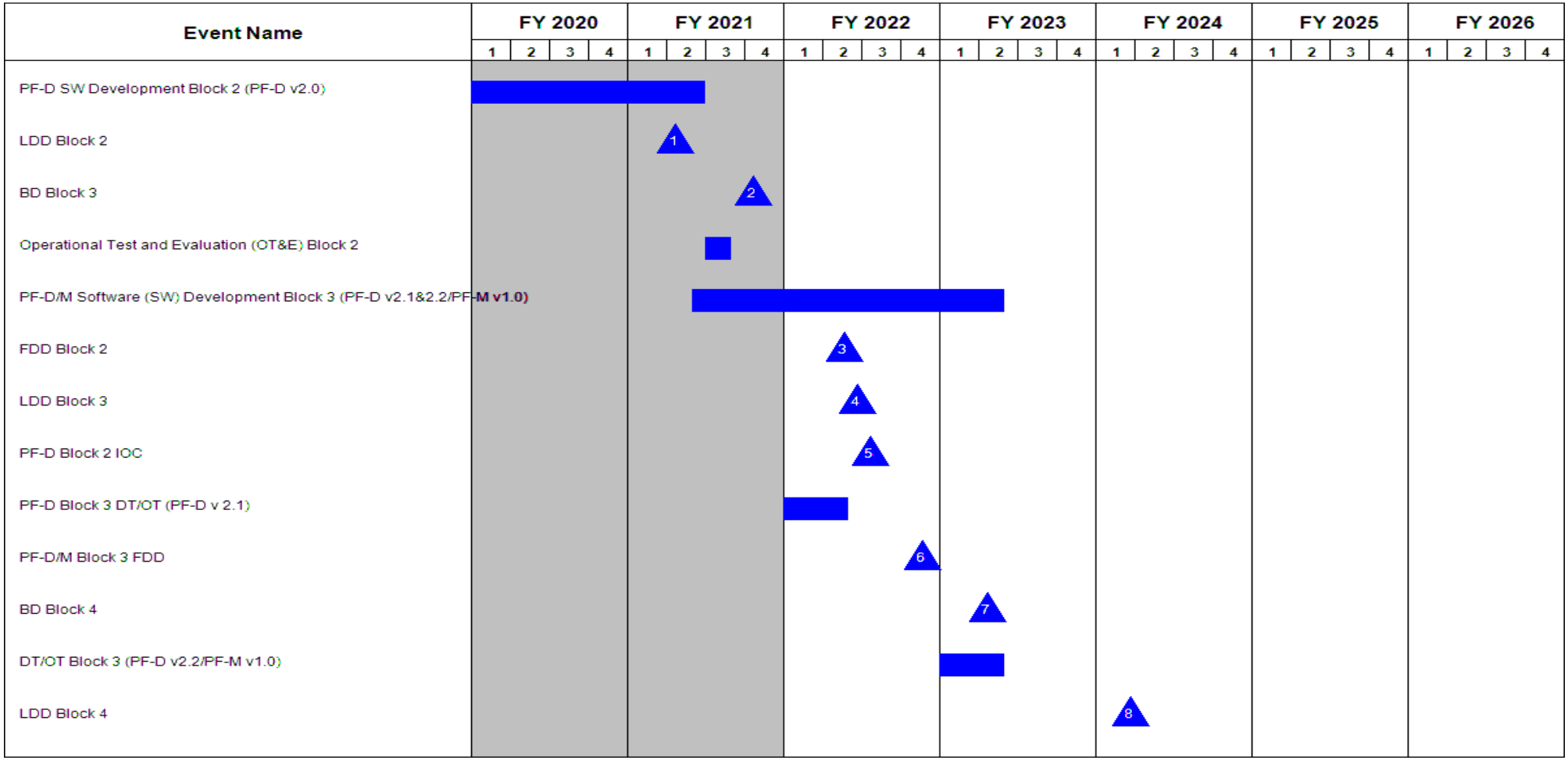


Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF7 / *Precision Fires Warrior Dismounted & Mounted*

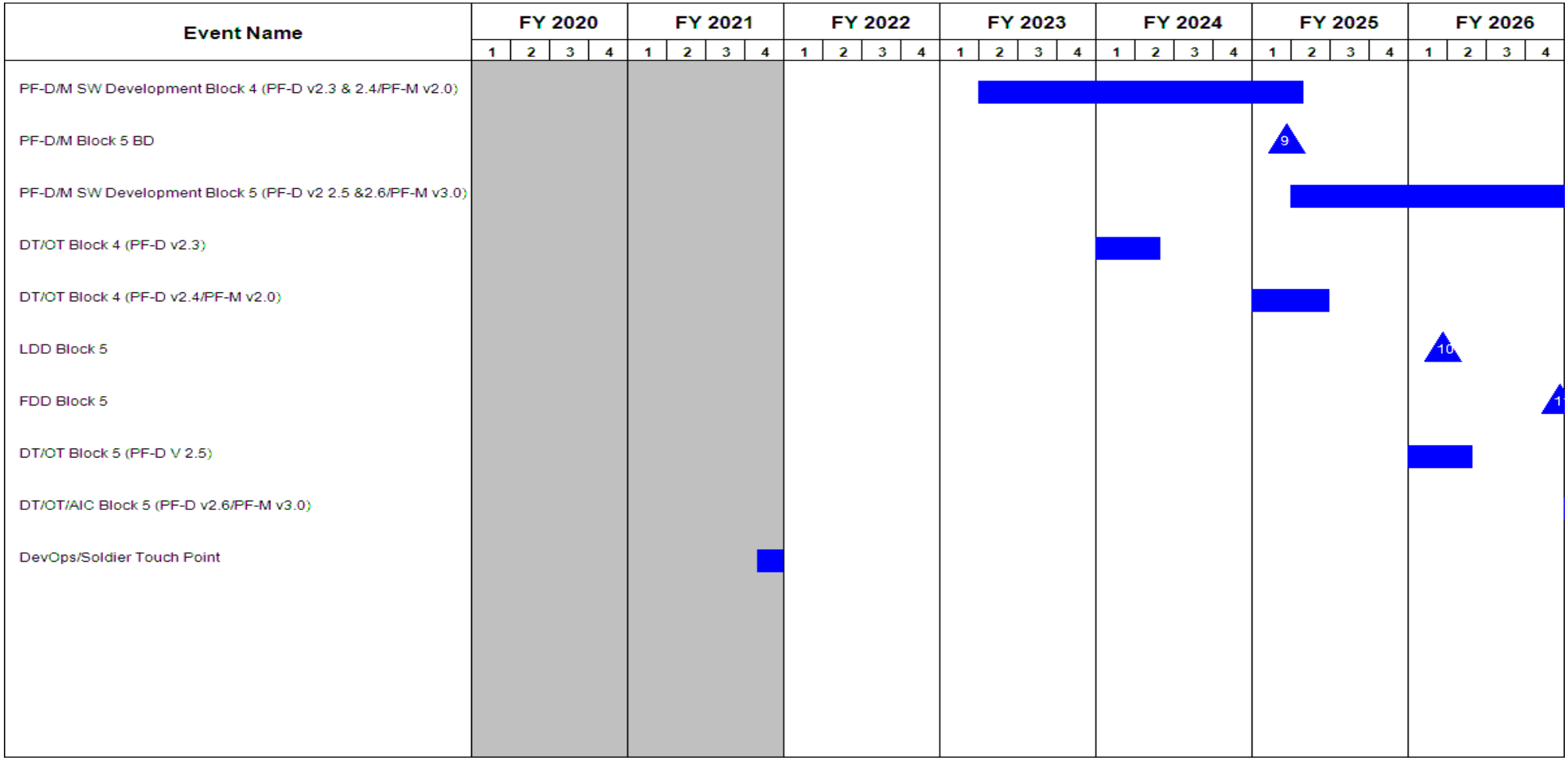


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF7 / *Precision Fires Warrior Dismounted & Mounted*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Milestone B	3	2015	3	2015
Limited Deployment Decision (LDD)	4	2016	4	2016
Operational Test (OT)	4	2016	4	2016
Full Deployment Decision (FDD)	2	2017	2	2017
Initial Operational Capability (IOC)	3	2017	3	2017
Build Decision (BD) Block 2	2	2018	2	2018
PF-D SW Development Block 2 (PF-D v2.0)	2	2019	2	2021
LDD Block 2	2	2021	2	2021
BD Block 3	4	2021	4	2021
Operational Test and Evaluation (OT&E) Block 2	3	2021	3	2021
PF-D/M Software (SW) Development Block 3 (PF-D v2.1&2.2/PF-M v1.0)	2	2021	2	2023
FDD Block 2	2	2022	2	2022
LDD Block 3	2	2022	2	2022
PF-D Block 2 IOC	3	2022	3	2022
PF-D Block 3 DT/OT (PF-D v 2.1)	1	2022	2	2022
PF-D/M Block 3 FDD	4	2022	4	2022
BD Block 4	2	2023	2	2023
DT/OT Block 3 (PF-D v2.2/PF-M v1.0)	1	2023	2	2023
LDD Block 4	1	2024	1	2024
PF-D/M SW Development Block 4 (PF-D v2.3 & 2.4/PF-M v2.0)	2	2023	2	2025
PF-D/M Block 5 BD	1	2025	1	2025
PF-D/M SW Development Block 5 (PF-D v2 2.5 &2.6/PF-M v3.0)	2	2025	1	2028

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF7 / *Precision Fires Warrior Dismounted & Mounted*

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
DT/OT Block 4 (PF-D v2.3)	1	2024	2	2024
DT/OT Block 4 (PF-D v2.4/PF-M v2.0)	1	2025	2	2025
LDD Block 5	1	2026	1	2026
FDD Block 5	4	2026	4	2026
DT/OT Block 5 (PF-D V 2.5)	1	2026	2	2026
DT/OT/AIC Block 5 (PF-D v2.6/PF-M v3.0)	1	2027	2	2027
DevOps/Soldier Touch Point	4	2021	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	Project (Number/Name) EF8 / *AFATDS Increment 1*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EF8: *AFATDS Increment 1*	-	42.091	39.861	22.523	-	22.523	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Field Artillery Tactical Data System (AFATDS) funding line supports the Army Modernization Strategy Common Operating Environment. Efforts are aligned to support the Network-Cross Functional Team (CFT) capability set approach to achieve the network modernization strategy. AFATDS 7 modernizes the existing AFATDS software currently in the field and enhances the existing legacy baseline by: (1) Providing a modernized web service backend that will simplify long-term maintenance of the software, (2) Bringing AFATDS into full compliance with the Army's Common Operating Environment (COE) Command Post Computing Environment (CPCE) initiative and (3) Enhancing overall usability of the system through the implementation of a role-based capability architecture with embedded training that allows the AFATDS operator to receive on-the-spot training for any aspect of AFATDS via interactive instruction.

AFATDS supports Long Range Precision Fires (LRPF) CFT, Extended Range Canon Artillery (ERCA), Extended Range Guided Multiple Launch Rocket System (ER-GMLRS), Precision Strike Missile System (PRSM) and emerging sensor to shooter initiatives. To support these initiatives, AFATDS will serve as the key sensor to shooter link for the Army and US Marine Corps providing fully automated support for planning, coordinating, controlling and executing fires and effects. AFATDS began supporting Long Range Hypersonic Weapons in Fiscal Year 20.

FY22 funding of $22.523 million will be used for continue development of AFATDS 7.0 capabilities, specifically, code conversion from Ada to Java, cyber enhancements and some User Interface improvements.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Program Management Costs for AFATDS software development	1.137	4.004	3.074
Description: Provide program support for AFATDS software development efforts. ***FY 2021 Plans:*** Continue to provide Program Management Office (PMO) support (Matrix, and Systems Engineering and Technical Assistance (SETA)) for all aspect of the AFATDS program including requirements analysis, software development efforts, logistics, and business management support. ***FY 2022 Plans:*** Continue to provide PMO support (Matrix, and Systems Engineering and Technical Assistance (SETA)) for all aspects of the AFATDS program including requirements analysis, software development efforts, logistics and business management support. ***FY 2021 to FY 2022 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF8 / *AFATDS Increment 1*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Reduction of SETA and matrix support to align with the software development effort.			
Title: AFATDS software development efforts ***Description:*** Development of AFATDS 7.0 software ***FY 2021 Plans:*** continue development of AFATDS 7 capabilities, specifically, code conversion from Ada to Java, cyber enhancements and some User Interface improvements. ***FY 2022 Plans:*** continue development of AFATDS 7 capabilities, specifically, code conversion from Ada to Java, cyber enhancements and some User Interface improvements. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease cost and time table for code conversion.	40.500	33.982	19.449
Title: AFATDS 7.0 test events ***Description:*** AFATDS 7.0 Test Support ***FY 2021 Plans:*** AFATDS 7.0 Blocks 1 & 2 Product Verification/Customer Support and Independent Verification and Validation testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Testing resources decreased to align with software development effort.	0.454	1.875	-
Accomplishments/Planned Programs Subtotals	42.091	39.861	22.523

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• B28620: *MOD OF IN-SVC EQUIP, AFATDS*	4.083	5.494	7.205	-	7.205	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The AFATDS 7 requirement was validated by the Joint Requirements Oversight Council (JROC) under the AFATDS Increment 2 Capability Definition Document (CDD) in June 2011. On 13 May 2015, the Army Acquisition Executive (AAE) approved AFATDS as a modification to the existing program baseline, continuing as an

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF8 / *AFATDS Increment 1*

Acquisition Category (ACAT) II defense acquisition program (DAP) (non-Automated Information System) with PEO C3T oversight. The AFATDS 7 is a software only modification/modernization effort that will be hosted on already fielded hardware used for legacy AFATDS software.

The overall acquisition approach to delivering AFATDS 7 is to modernize and redesign the software to create a single software baseline featuring web services and a suite of Common Operating Environment (COE) applications that meet threshold values of all key performance parameters identified in the AFATDS Increment 2 CDD. The AFATDS Increment 2 CDD was approved under an IT Box construct, which promotes evolutionary development by facilitating requirement refinement and the incorporation of the latest technology. While the JROC Memorandum (JROCM) 083-11 validated the AFATDS 7 performance parameters, it also delegated authority for identifying and approving future capability requirements that fall within the CDD's scope to the Fires Support Command and Control (FSC2) Tactical Software Requirements Governance Board.

In October 2020, the MDA redirected the overall concept for a modernized AFATDS 7.0 to include code conversion (Ada to Java) while redesigning the front end, to ensure a strong technical foundation is in place for the continued expansion of capability and adoption of emerging technology initiatives. This strategy will eliminate cyber vulnerabilities, update back end code to a modern language (Java) and make changes to the user interface. This approach will eliminate archaic code and allow for a true modernization of back end software. Subsequent versions of AFATDS 7 will be developed to achieve full compliance with the Army's COE, Command Post Computing Environment (CPCE) initiative, and enhance overall usability
of the system through the implementation of a role-based capability architecture with embedded training that allows the AFATDS operator to receive on-the-spot training for any aspect of AFATDS via interactive instruction.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	Project (Number/Name) EF8 / *AFATDS Increment 1*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support for AFATDS (Core)	Sub Allot	PM Mission Command (MC) : APG, MD	4.008	-		-		-		-		-	0.000	4.008	-
Program Management Support for AFATDS (Matrix)	IA	Various Matrix Orgs (Govt) : Aberdeen PG, MD	3.769	-		1.750		1.277		-		1.277	0.000	6.796	-
Program Management Support for AFATDS (SETA Contr)	C/FFP	CACI : Aberdeen PG, MD	2.610	-		1.254	Mar 2021	1.797	Mar 2022	-		1.797	0.000	5.661	-
Program Management Support for AFATDS (FFRDC)	FFRDC	MITRE : APG, MD	0.383	-		-		-		-		-	0.000	0.383	-
Taxes	TBD	PEO C3T : APG, MD	0.214	1.137		-		-		-		-	0.000	1.351	-
		Subtotal	10.984	1.137		3.004		3.074		-		3.074	0.000	18.199	N/A

Remarks

FY21 and out account for a reduction in matrix support from the realignment of business management support matrixed from AMC to direct.

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development of AFATDS Version 6.8.1.1	C/CPFF	Raytheon Systems Corp. : Ft. Wayne, IN	21.636	-		-		-		-		-	0.000	21.636	33.188
Software Development of AFATDS Version 7.0	C/CPIF	Leidos : Abingdon, MD	71.368	40.500		34.982	Jul 2021	19.449		-		19.449	0.000	166.299	-
		Subtotal	93.004	40.500		34.982		19.449		-		19.449	0.000	187.935	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	Project (Number/Name) EF8 / *AFATDS Increment 1*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Information Assurance and Engineering Support for AFATDS requirements	C/CPFF	CSC : Various Locations	1.060	-		-		-		-		-	0.000	1.060	-
Defensive Cyber Tools (T-PKI)	TBD	TBD : TBD	1.100	-		-		-		-		-	0.000	1.100	-
		Subtotal	2.160	-		-		-		-		-	0.000	2.160	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Confidence Demo for AFATDS V6.8.x requirements.	IA	Army Test & Evaluation Command (ATEC)/Fires Test Directorate (FTD) : Various Locations	0.626	-		-		-		-		-	0.000	0.626	-
Independent Verification and Validation of AFATDS V7.0 requirements	C/CPFF	Engility : Various Locations	1.538	0.454		0.274		-		-		-	0.000	2.266	-
Developmental Testing for AFATDS v7.0	IA	Multiple Govt Test Agencies (ATEC, ATC, EPG) : Multiple	0.750	-		1.601		-		-		-	0.000	2.351	-
		Subtotal	2.914	0.454		1.875		-		-		-	0.000	5.243	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	109.062	42.091		39.861		22.523		-		22.523	0.000	213.537	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF8 / *AFATDS Increment 1*

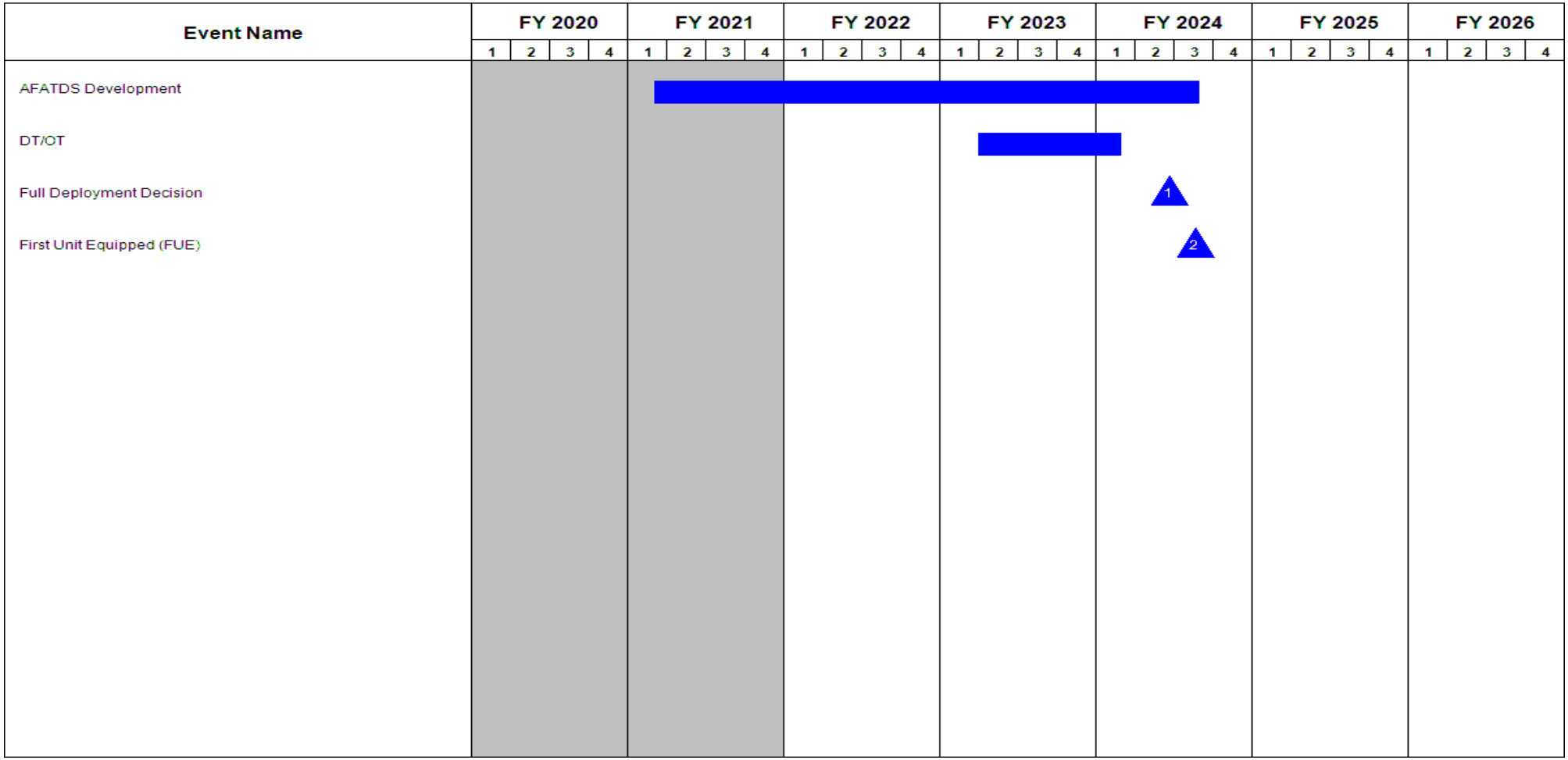


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203728A / *Joint Automated Deep Operation Coordination System (JADOCS)*	**Project (Number/Name)** EF8 / *AFATDS Increment 1*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
AFATDS Development	1	2021	3	2024
DT/OT	2	2023	1	2024
Full Deployment Decision	2	2024	2	2024
First Unit Equipped (FUE)	3	2024	3	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	266.197	213.728	211.523	-	211.523	-	-	-	-	-	-
280: *RECOV VEH IMPROV PROG*	-	64.006	121.811	108.954	-	108.954	-	-	-	-	-	-
330: *Abrams Tank Improve Prog*	-	114.723	61.039	50.331	-	50.331	-	-	-	-	-	-
371: *Bradley Improve Prog*	-	45.813	8.773	21.271	-	21.271	-	-	-	-	-	-
EE2: *Stryker Improvement*	-	41.655	22.105	30.967	-	30.967	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

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

The Recovery Vehicle Improvement program is an Engineering Change Proposal (ECP) that will allow the current recovery vehicle to regain Single Vehicle Recovery (SVR) for the heaviest tracked combat vehicle as defined in the Heavy Equipment Recovery Combat Utility Lift and Evacuation System (HERCULES) Enhanced M88A2E1 Capability Production Document Increment 2 dated 20 January 2017. The fielded M88A2 HERCULES lacks the necessary power, weight, and braking ability to safely support the recovery of the M1A2SEPv2 in all situations and with the next generation M1A2SEPv3 weight growth, the problem will get worse. The M88A3 vehicles will bring back the operational capability of the single vehicle recovery. The increased winching and lifting capability accommodates all 80 ton Abrams variants. Without this increased capability, units must use two M88A2 Medium Recovery Vehicles to perform the necessary spectrum of recovery operations.

The Abrams M1A2 SEP V2 and M2/M3A3 Bradley Fighting Vehicles are at or exceed Space, Weight, and Power-Cooling (SWaP-C) limitations. In order to host and restore lost platform capability, the Abrams Tank and Bradley Fighting Vehicle programs will execute a series of ECPs to support the current embedded systems and to facilitate integration of technologies currently in development under other existing Programs of Record. The ECPs are not intended to exceed the operational capability outlined in current system requirements documents, but rather to ensure that the existing system performance is not further degraded and that Army mission equipment packages can be integrated on the Abrams and Bradley Platforms.

Stryker Improvement will address the development of Lethality, Survivability, Mobility, Network Lethality, and Communication, Command and Control (C3) improvements within the Stryker Family of Vehicles (FoV). Principal development efforts include upgrades associated with the Stryker Double V-Hull A1 (DVH A1) Engineering Change

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0203735A *I Combat Vehicle Improvement Programs*

Proposal (ECP), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS), Common Remotely Operated Weapon Station-Javelin (CROWS-J) ONS, Stryker Survivability Enhancement, and Stryker Lethality ECPs. DVH A1 ECP upgrades restore Stryker DVH Space, Weight, and Power-Cooling (SWaP-C) lost as a result of incorporating vehicle changes to counter threats encountered during deployment operations while allowing the future network to be hosted without further degradation in vehicle protection and mobility. The Stryker 30mm ICVD and CROWS-J ONS efforts addressed Urgent Operational Need to increase the lethality of Stryker Infantry Carrier Vehicles (ICV) within the United States Army European Command (USAREUR). The 30mm ICVD ONS effort integrates a 30mm-equipped weapon station providing, USAREUR with precision direct firepower to overwhelm the enemy in encounter actions and suppressive fire to preserve mounted and dismounted freedom of movement. The Stryker Survivability Enhancements address evolving threats by assessing survivability improvements, to include but not limited to, passive protection systems, active protection systems, an under-armor fire capability for Stryker-equipped reconnaissance troops, 360 Situational Awareness, reactive armor tiles, and integration of emerging and existing technologies such as the Fire Direction Center, Integrated Visual Augmentation System (IVAS), and other Stryker based platform solutions. The Stryker Fire Direction Center (FDC) will provide an on-the move capability that processes voice and digital data while maintaining contact with the indirect fire team over extended distances. Stryker Lethality ECP efforts (30mm Medium Caliber Weapon System (MCWS), CROWS-J, Anti-Tank Guided Missile (ATGM), and other capabilities) focus on the integration of a suite of complementary Mission Equipment Package (MEP) lethality upgrades that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's Stryker Brigade Combat Teams (SBCTs). Additionally, the Lethality MEP upgrades will address existing obsolescence issues of the Remote Weapon Station (RWS) with the CROWS and CROWS-J upgrade. The ATGM ECP will upgrade the Modified Improved Target Acquisitions System (MITAS), incorporating a far target locator and enabling the dissemination of target acquirement information utilizing networked lethality, providing a common operating picture. Upgrades of the Stryker flat-bottom hull and DVH variants were completed to mitigate known system deficiencies.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	277.633	268.919	218.391	-	218.391
Current President's Budget	266.197	213.728	211.523	-	211.523
Total Adjustments	-11.436	-55.191	-6.868	-	-6.868
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-45.376			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.014	-			
• SBIR/STTR Transfer	-11.422	-9.815			
• Adjustments to Budget Years	-	-	-6.868	-	-6.868

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 280 / *RECOV VEH IMPROV PROG*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
280: *RECOV VEH IMPROV PROG*	-	64.006	121.811	108.954	-	108.954	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

Fiscal Year (FY) 2022 Base dollars will fund preparations for USG prototype testing and continue the Program Management Office support; to include labor, training, travel, supplies, and equipment to effectively manage the program. Finalizing Prototype assembly in FY 2022 and execute initial contractor testing.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Program Management Office (PMO) Support	1.752	1.926	2.344
Description: PMO support includes Systems Engineering, Logistics, Government and in-house support Contractor salaries, travel and other support costs required to effectively manage the program. ***FY 2021 Plans:*** The program continues OTA project oversight, supports technical solution development for continued M88A3 prototype builds and continued preparation of follow-on Other Transactional Award (OTA) production contract(s). Continue Government Systems Engineering and Program Management office support in FY 2021. This will include labor, training, travel, supplies, and equipment to effectively manage the program. ***FY 2022 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 280 / *RECOV VEH IMPROV PROG*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
The program continues OTA project oversight, supports technical solution development for continued M88A3 prototype builds, support for system-level verification and test, and preparation of production contract(s). Continue Government Systems Engineering, Logistics, test support at multiple sites and Program Management office support in FY 2022. This will include labor, training, travel, supplies, and equipment to effectively manage the program. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in PMO support is accounted for by the increased support required for assisting contractor's increased workload and the start of prototype testing.			
Title: Product Development ***Description:*** Design and Development of ECPs. ***FY 2021 Plans:*** The program continues development of M88A3 prototype builds, component qualification testing, and finalizing design and integration activities though FY 2022. ***FY 2022 Plans:*** The program completes development of the M88A3 prototype builds, contractor component qualification and systems shakedown testing to support (8) M88A3 prototype vehicle Government Acceptance. Program starts Government System Level test and verification in FY 2023. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The decrease in the FY 2022 funding is due to the completion of (8) M88A3 prototype builds, completion of the OEM prove-out, and delivery of the vehicles to the government. The predominance of the FY 2021 efforts included M88A3 prototype material deliveries and engineering design activities. The overall program activities in FY 2022 involve finishing the ECP design, the delivery of the (8) M88A3 prototype vehicles to the government, and preparing for extensive government DT&E of the M88A3 at multiple test site locations.	62.244	119.388	101.201
Title: Test and Evaluation ***Description:*** The Army is conducting Developmental Test and Evaluation (DT&E) on (8) prototype M88A3 vehicles to confirm Single Vehicle Recovery capability for an 80T Main Battle Tank. Test data supports an evaluation of the M88A3 for use in a production decision in FY 2023. DT&E for the M88A3 includes safety testing, automotive performance, recovery, transportability, Reliability Availability and Maintainability (RAM), Electromagnetic Interference (EMI), Cybersecurity, Survivability-Live Fire Test & Evaluation (LFT&E), environmental effects, logistics demonstration, and Operational Testing. ***FY 2021 Plans:***	0.010	0.497	5.409

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 280 / *RECOV VEH IMPROV PROG*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Testing for FY 2021 Aberdeen Proving Grounds site improvements to support full vehicle level testing and test planning starting in FY 2022. ***FY 2022 Plans:*** The Contractor and USG Test Readiness Reviews, as well as all associated M88A3 test planning and preparations, will occur in FY 2022. Vehicle inspection and characterization, instrumentation, and operator training will commence upon arrival of prototype vehicles at both Aberdeen Test Center (ATC) and Yuma Proving Grounds (YPG), followed by the startup of Automotive Performance and RAM testing. Modeling and Simulation (M&S) in support of LFT&E will begin upon receipt of technical data at Test Readiness Review (TRR). Technical manual validation will also start in FY 2022. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The Test and Evaluation funding increase in FY 2022 is due to the conduct of Test Readiness Reviews, test planning, and preparation of vehicles for start of M88A3 Developmental Test and Evaluation.			
Accomplishments/Planned Programs Subtotals	64.006	121.811	108.954

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• GA0570: *Improved Recovery Vehicle (M88A2 HERCULES)*	80.146	-	52.059	-	52.059	-	-	-	-	-	-
• G80571: *M88 FOV MODS*	4.500	18.382	-	-	-	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The Project Director (PD) for Main Battle Tank Systems (MBTS) is executing an Engineering Change Proposal (ECP) to regain single vehicle recovery capability of the M88A2 HERCULES vehicle. The strategy utilizes the Detroit Arsenal Automotive Other Transaction Authority (DA2 OTA) which competitively awarded a single contract to develop, integrate and produce up to (8) prototype vehicles entering testing in FY 2022. After achieving OTA success criteria, a contract award using procurement dollars procures up to (70) initial production vehicles, as well as the procurement of hardware kits/components comprised of engines, transmissions, track and suspensions. Federal Acquisition Regulation (FAR) based contract for follow on M88A3 production contract through the defined Army Acquisition Objective (AAO). The M88A2 HERCULES production vehicles continue fielding to Units through FY 2023.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 280 / *RECOV VEH IMPROV PROG*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	Various	BAE Systems : TBD	33.527	62.244	Nov 2019	119.388	Oct 2020	101.201	Oct 2021	-		101.201	0.000	316.360	-
		Subtotal	33.527	62.244		119.388		101.201		-		101.201	0.000	316.360	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Office (PMO) Support	MIPR	PMO Support Offices, Ricardo Defense, DCS and Army Research Labs (ARL) : Various	3.623	1.752	Jan 2020	1.926	Jan 2021	2.344	Dec 2021	-		2.344	0.000	9.645	-
		Subtotal	3.623	1.752		1.926		2.344		-		2.344	0.000	9.645	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	Various	Aberdeeen Test Center (ATC), Yuma Test Center (YTC) : Various	0.502	0.010	Sep 2020	0.497	May 2021	5.409	Aug 2022	-		5.409	0.000	6.418	-
		Subtotal	0.502	0.010		0.497		5.409		-		5.409	0.000	6.418	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	37.652	64.006		121.811		108.954		-		108.954	0.000	332.423	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 280 / *RECOV VEH IMPROV PROG*

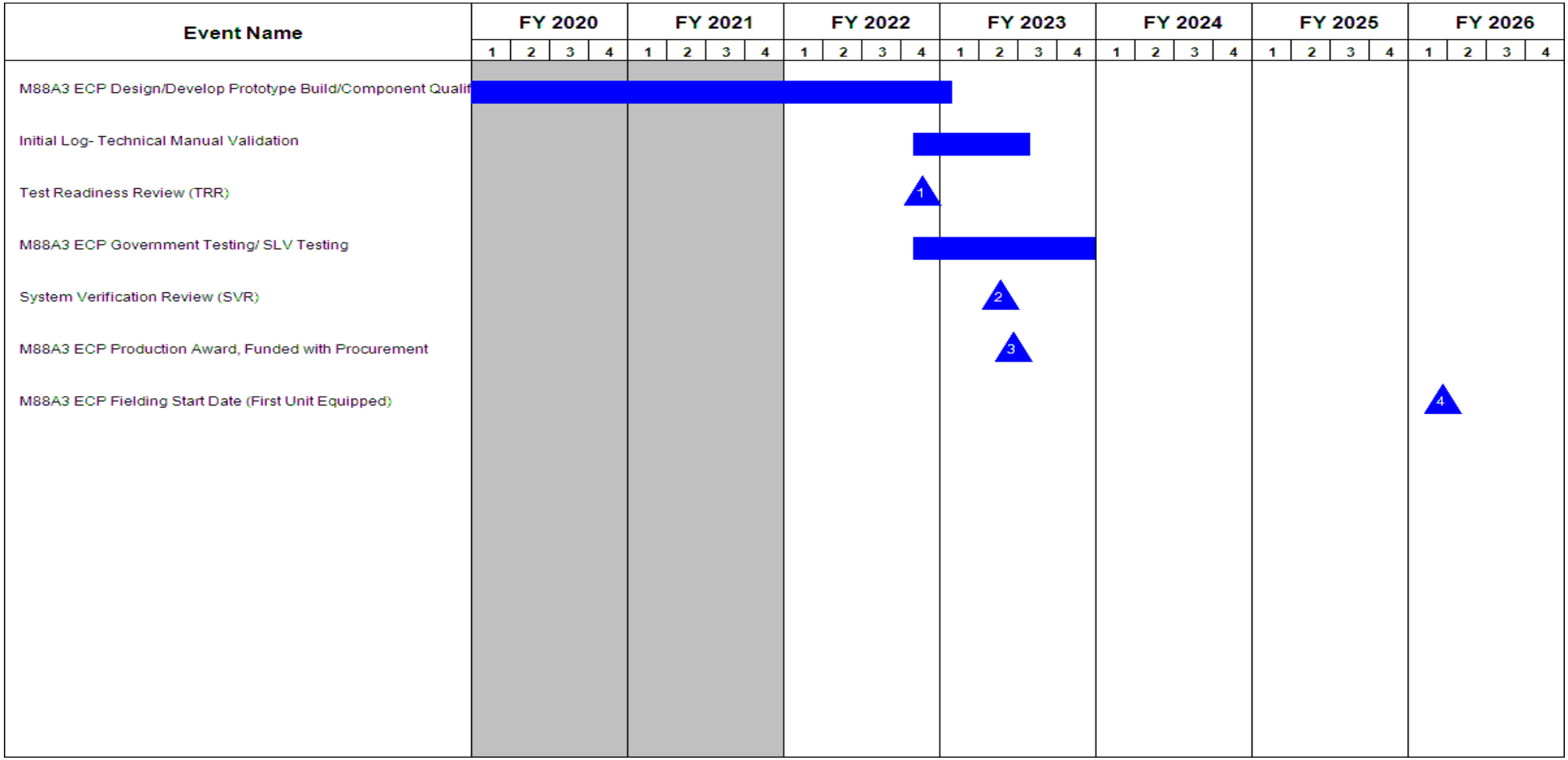


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 280 / *RECOV VEH IMPROV PROG*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
M88A3 ECP Design/Develop Prototype Build/Component Qualification	4	2019	1	2023
Initial Log- Technical Manual Validation	4	2022	3	2023
Test Readiness Review (TRR)	4	2022	4	2022
M88A3 ECP Government Testing/ SLV Testing	4	2022	4	2023
System Verification Review (SVR)	2	2023	2	2023
M88A3 ECP Production Award, Funded with Procurement	2	2023	2	2023
M88A3 ECP Fielding Start Date (First Unit Equipped)	1	2026	1	2026

Note

Survivability, lethality and vulnerability (SLV) Testing

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 330 / *Abrams Tank Improve Prog*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
330: *Abrams Tank Improve Prog*	-	114.723	61.039	50.331	-	50.331	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Abrams Power Engineering Change Proposal M1A2SEP V3/ECP 1A ***Description:*** The improvements implemented through the M1A2SEP (System Enhancement Program) v3/ECP 1A Abrams Power program will restore lost power generation and distribution, mitigate impending obsolescence, and incorporate inbound technologies currently under development.	8.340	-	-
Title: Abrams Lethality Engineering Change Proposal M1A2SEP V4/ECP 1B ***Description:*** The Abrams SEP (System Enhancement Program) v4 program consists of lethality improvements primarily focused on the integration of 3rd Generation Forward Looking Infrared (FLIR). Additional improvements include a Laser Warning Receiver (LWR), Improved Thermal Management System (ITMS), and target acquisition sensor upgrades consisting of inclusion of color cameras, laser capabilities, and image processing. Other potential improvements include vehicle smoke generation, survivability enhancements, signature management improvements, embedded training enhancements, 360 Situational Awareness cameras, and weight reduction efforts. Trade studies, analysis and technology maturation will be performed to evaluate prospective improvements, along with obsolescence mitigation, and incorporation of inbound technologies currently under development.	88.181	49.619	39.832

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: The program will complete prototype vehicle build, component qualification testing, and Original Equipment Manufacturer (OEM) vehicle testing. The USG will conduct a Test Readiness Review (TRR) in preparation to begin USG vehicle testing in FY 2022. ***FY 2022 Plans:*** As a result of late contractor deliveries the prototype vehicle build and component qualification testing will continue longer than originally expected and delay the start of Original Equipment Manufacturer (OEM) vehicle testing until late FY 2022. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding is decreased to the minimum amount owed on the SEPv4 development contract. The total amount is lower due to all prototype materials being ordered in prior years and transitioning primarily to labor to complete build and test of prototype vehicles.			
Title: Program Management Office (PMO) Support ***Description:*** Program Management Office Support includes Systems Engineering and Government and Contractor salaries, travel and other support costs required to effectively manage the program. ***FY 2021 Plans:*** Will continue Government Systems Engineering and Program Management office support in FY 2021. This will include labor, training, travel, supplies, and equipment to effectively manage the program. ***FY 2022 Plans:*** Continue Government Systems Engineering and Program Management office support in FY 2022. This will include labor, training, travel, supplies, and equipment to effectively manage the program. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** PMO Support decreased in line with overall program amount.	5.542	5.760	4.800
Title: Test & Evaluation ***Description:*** Test and Evaluation activities includes contractor and government testing, as well as test documentation development. Contractor shakedown/proveout testing will be conducted using U.S. Army test facilities. Government development testing of prototype vehicles will evaluate vehicle performance, to include Reliability, Availability, and Maintainability testing. Early User evaluation will also be performed. Test and evaluation activities also include the testing of other platform inbound technologies, along with the development of test documentation to include Test and Evaluation Master Plans, test procedures, and reports.	5.226	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Test & Evaluation - Engineering Change Proposal M1A2SEP V4/ECP 1B ***Description:*** Comprises government test and evaluation of the SEP (System Enhancement Program) v4. Testing includes developmental, operational, and live fire test and evaluation. Government test modeling and simulation, detailed vehicle test planning, and initial test site preparation are also included. ***FY 2021 Plans:*** Continues preparation of SEPv4 testing with live fire modeling and simulation, detailed developmental test planning, and test site preparation (spares, test equipment, instrumentation, etc.). ***FY 2022 Plans:*** Finalize preparation and planning of SEPv4 testing and continue live fire modeling and simulation. Begin test site support of Original Equipment Manufacturer (OEM) testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** SEPv4 test cost increases slightly as vehicle deliveries to test sites compressed and activities conducted in parallel to ensure OEM test support initiates in late FY 2022.	4.749	3.125	3.729
Title: Lethality and Survivability Enhancements ***Description:*** Enhances lethality primarily through integration of improved munitions (smart rounds), gun turret drive improvements, cannon improvements, image processing enhancements and advanced algorithms. Survivability enhancements will focus on improved sensors, 360 Situational Awareness, active protection systems, armor improvements, and unmanned system defeat. Mobility enhancements will focus on efforts to reduce the weight of the tank to ensure operational mobility. ***FY 2021 Plans:*** Abrams will continue the integration of next generation smart rounds, survivability enhancements, and improved sensors. ***FY 2022 Plans:*** Abrams will initiate trade study to identify and evaluate technology that has the potential to reduce the weight of the tank to ensure operational mobility. Abrams to conduct trade study to investigate potential technology integration pathways that may reduce the increasing cognitive burden upon tank crew. Abrams continues integration of survivability enhancements. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decreased to minimum trade study and survivability enhancement integration as a result of decrement to overall program amount.	2.685	2.535	1.970
Accomplishments/Planned Programs Subtotals	114.723	61.039	50.331

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• GA0700: *M1 Abrams Tank (MOD)*	325.292	375.107	-	-	-	-	-	-	-	-	-
• GA0750: *Abrams Upgrade Program*	1,746.007	968.094	981.337	-	981.337	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Abrams SEP (System Enhancement Program) v3: Research & Development Contract - Sole Source, Cost Plus Incentive Fee (CPIF); SEP v4 - Research & Development Contract - Sole Source, CPIF.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Abrams SEPV3	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	339.032	8.340	Feb 2020	-		-		-		-	0.000	347.372	-
SEPV3 Training Device Upgrades	MIPR	PEO, STRI : Orlando, FL	4.252	-		-		-		-		-	0.000	4.252	-
Abrams SEPV4	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	231.182	88.131	Nov 2019	49.619	Feb 2021	39.832	Feb 2022	-		39.832	Continuing	Continuing	Continuing
Advanced Multi-Purpose (AMP) Round	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	7.128	-		-		-		-		-	0.000	7.128	-
Lethality and,Survivability Enhancements	Option/ Various	Various : Various	9.200	2.685	Mar 2020	2.535	Mar 2021	1.970	Jan 2022	-		1.970	Continuing	Continuing	-
		Subtotal	590.794	99.156		52.154		41.802		-		41.802	Continuing	Continuing	N/A

Remarks

Government Testing/SEPV4 includes prior Government testing for prior vehicles and SEPv4 testing projected to begin in FY2021.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Office (PMO) Support	MIPR	PMO Support Offices : TACOM, GVSC, ARDEC, ARL, Picatinny	86.867	5.591	Jan 2020	5.760	Jan 2021	4.800	Jan 2022	-		4.800	Continuing	Continuing	Continuing
Program Management Office (PMO) Support - Survivability Enhancements	MIPR	PMO Support Offices : GVSC/ Various	2.207	-		-		-		-		-	0.000	2.207	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	TBD : TBD	0.160	-		-		-		-		-	0.000	0.160	-
		Subtotal	89.234	5.591		5.760		4.800		-		4.800	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 330 / *Abrams Tank Improve Prog*	

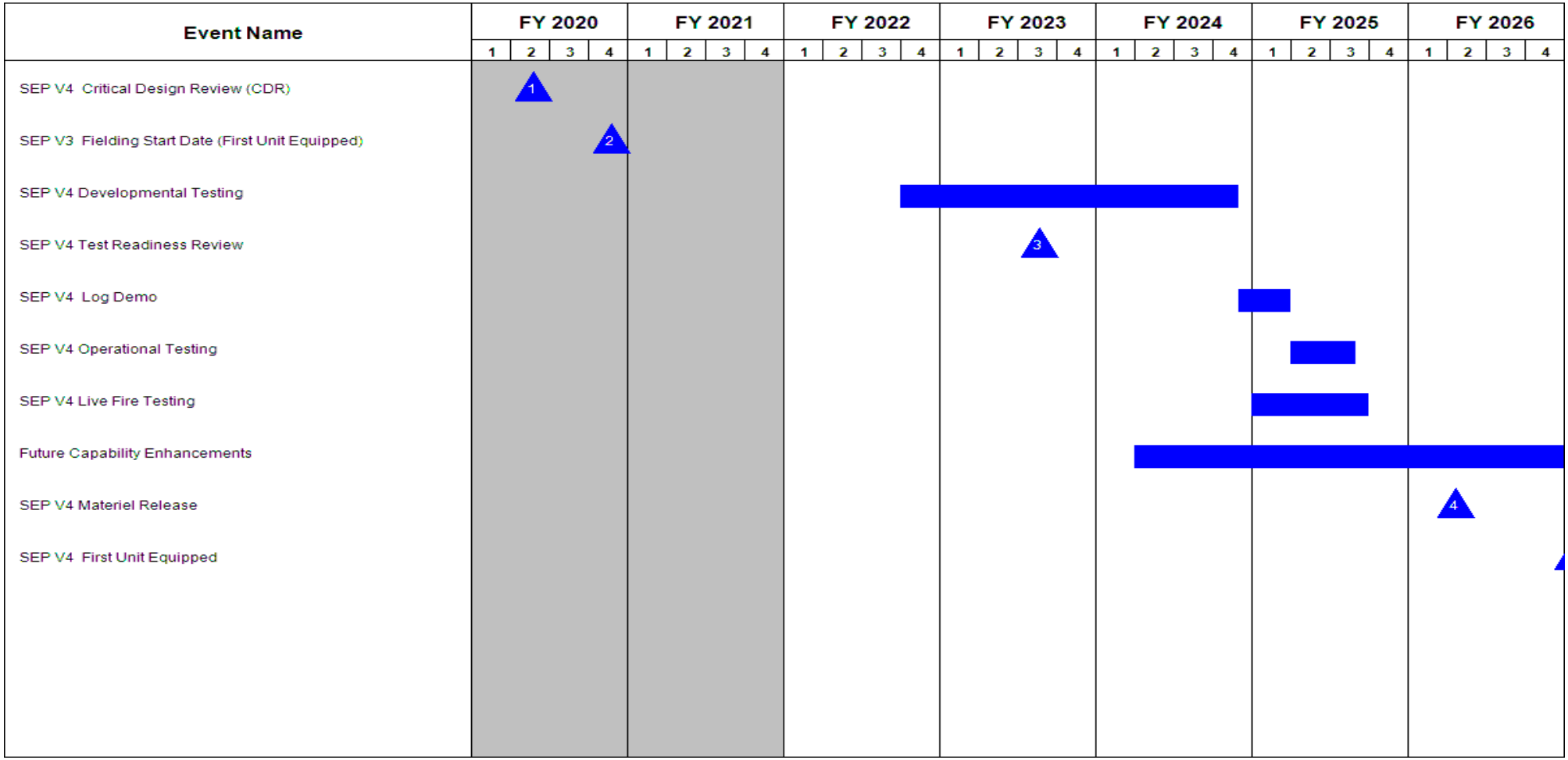
Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Testing / SEPV4	MIPR	Aberdeen Proving Ground; Yuma Proving Ground; White Sands Missile Range, : Various	58.509	3.566	Jan 2020	3.125	Jan 2021	3.729	Jun 2022	-		3.729	Continuing	Continuing	Continuing
Government Testing SEPV3	MIPR	Various : Various	-	2.721	Jan 2020	-		-		-		-	0.000	2.721	-
Contractor Testing SEPV3	SS/CPIF	General Dynamics Land Systems : Various	38.903	1.660	Feb 2020	-		-		-		-	0.000	40.563	-
Contractor Testing SEPV4	SS/CPIF	General Dynamics Land Systems : Various	-	2.029	Nov 2019	-		-		-		-	0.000	2.029	-
Government Testing - Survivability Enhancements	Various	Various : Various	24.491	-		-		-		-		-	0.000	24.491	-
		Subtotal	121.903	9.976		3.125		3.729		-		3.729	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	801.931	114.723		61.039		50.331		-		50.331	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*



Note

SEP (System Enhancement Program)

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 330 / *Abrams Tank Improve Prog*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
SEP V4 Critical Design Review (CDR)	2	2020	2	2020
SEP V3 Fielding Start Date (First Unit Equipped)	4	2020	4	2020
SEP V4 Developmental Testing	4	2022	4	2024
SEP V4 Test Readiness Review	3	2023	3	2023
SEP V4 Log Demo	4	2024	1	2025
SEP V4 Operational Testing	2	2025	3	2025
SEP V4 Live Fire Testing	1	2025	3	2025
Future Capability Enhancements	2	2024	4	2026
SEP V4 Materiel Release	2	2026	2	2026
SEP V4 First Unit Equipped	1	2027	1	2027

Note

SEP (System Enhancement Program)

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 371 / *Bradley Improve Prog*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
371: *Bradley Improve Prog*	-	45.813	8.773	21.271	-	21.271	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Bradley Fighting Vehicle will continue to be a major combat vehicle in the Army Operational Force for the next 20-25 years. Current modernization efforts, such as the Track and Suspension Engineering Change Proposal (ECP) and the A4 Mobility ECP, address current space, weight, and power-cooling (SWAP-C) limitations. The Bradley will continue to modernize to support additional capabilities required to counter evolving threats in multi-domain operations including, but not limited to improved vehicle diagnostics and systems to increase maintainability, mobility, survivability, sensor digitization, improved power distribution, and cyber and software improvements. These improvements increase the Bradley Fighting Vehicle's ability to survive in a cyber and electronic warfare permissive environment.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Bradley Improvements	25.086	5.461	13.322
Description: Provides funding for the analysis, engineering, development, and integration to support Army directed inbound technologies, address critical obsolescence concerns and other improvements to the Bradley vehicles. ***FY 2021 Plans:*** Conducts integration activities for Army directed improvements and inbound technologies such as, but not limited to, power architecture, sensor digitization, force protection, system survivability enhancements, diagnostics, and cyber security. ***FY 2022 Plans:*** Will conduct integration activities for Army directed improvements and inbound technologies such as, but not limited to, Next Generation Automatic Test System (NGATS), power architecture, sensor digitization, and cyber security. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase is due to qualification testing required for the redesigned IBAS and NGATS Bradley specific development.			
Title: Test & Evaluation	7.241	2.226	4.449
Description: Test & Evaluation efforts support developmental and operational test events. These events include test planning, system and subsystem testing, and development of test documentation. ***FY 2021 Plans:*** Provides funding to test additional Bradley modifications to include, but not limited to, diagnostics and vehicle software qualification testing, and sensor digitization. It also provides funding to support test asset overhaul. ***FY 2022 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 371 / *Bradley Improve Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Provides funding to conduct cyber testing, software development and refurbish/overhaul prototype vehicles due to very high mileage and wear, will refurbish prototype Engineering & Manufacturing Development (EMD) A4 vehicles used during developmental testing (DT). ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to higher than previously estimated A4 Prototype overhaul costs on the EMD Test Assets due to excessive wear and tear from continual training.			
Title: Bradley A4 ECP Program ***Description:*** Current projections indicate the Bradley Fighting Vehicle and the Bradley Fire Support Vehicle will remain in the armored brigade combat team (ABCT) formation until the 2050s. Given this, additional Research and Development (R&D) is required to keep the force relevant. The Bradley Fighting Vehicle System (BFVS) improvements implemented through the ECP Program will focus on restoring lost platform capability and provide capacity to support Army inbound technologies and to facilitate integration of technologies currently in development under other existing programs of record. ***FY 2022 Plans:*** Provides funding to support National Maintenance Work Request (NMWR) pilot program to finalize draft NMWR currently in development. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to support of the NMWR Pilot program planned for Fiscal Year (FY) 2022.	7.484	-	1.000
Title: Program Management Office (PMO) Support ***Description:*** Program Management Office Support includes systems engineering, government and contractor salaries, travel, training and other support costs required to effectively manage the program. ***FY 2021 Plans:*** Government program management and system engineering support costs. These funds cover the costs of government and direct support contractor salaries, travel, training, supplies, equipment and facilities to manage the issues resulting from Bradley A4 ECP testing and developing logistics products and other development activities. ***FY 2022 Plans:*** Will continue government program management and system engineering support costs. These funds will cover the costs of government and direct support contractor salaries, travel, training, supplies, equipment and facilities to manage the issues resulting from Bradley A4 ECP testing and developing logistics products and other development activities. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	3.473	1.086	2.500

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 371 / *Bradley Improve Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 to FY 2022 increase is to account for increased personnel support to support additional A4 testing and Improved Bradley Acquisition Subsystem (IBAS) redesign qualification efforts.			
Title: Survivability Enhancements ***Description:*** Developing force protection and survivability improvements to counter evolving threats to include, but not limited to the underbelly interim solution (UBIS). The Bradley Fighting Vehicle (BFV) will integrate underbelly armor for improved survivability against underbelly blast events.	2.529	-	-
Accomplishments/Planned Programs Subtotals	45.813	8.773	21.271

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• GZ2400: *Bradley Program (MOD)*	415.740	277.259	461.385	-	461.385	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Product Manager Bradley will execute modification work orders following completion of development to support integrating FY 2022 funded capabilities into the formation at an average rate of three Armored Brigade Combat Teams (ABCT) per year. Software capability upgrades, including cyber, will be included in the next iteration of Voice, Video and Integrated Data (VVID) software in FY 2022 - FY 2024 time frame.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 371 / *Bradley Improve Prog*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Bradley Improvements	MIPR	TBD : TBD	51.681	25.086	Nov 2020	0.534	Sep 2021	13.322	Sep 2022	-		13.322	Continuing	Continuing	Continuing
Bradley A4 Engineering Change Proposal (ECP) Program	MIPR	PMO : Warren, Picatinny NJ	102.401	-		-		1.000	Dec 2022	-		1.000	0.000	103.401	-
Bradley Improvements - IBAS	SS/TBD	DRS : Melbourne, FL	-	-		3.427	Mar 2021	-		-		-	Continuing	Continuing	Continuing
Bradley Imrovements - Power Architecture	SS/TBD	BAE : Sterling Heights, MI	-	-		1.500	Jul 2021	-		-		-	Continuing	Continuing	Continuing
Non Recurring Engineering- Bradley A4 ECP	SS/CPIF	BAE : Sterling Heights, MI	276.530	-		-		-		-		-	0.000	276.530	-
Non Recurring Engineering- Bradley A4 ECP TADDS	TBD	TBD : TBD	-	7.484	Nov 2020	-		-		-		-	0.000	7.484	-
Survability Enhancements - Underbelly Armor	SS/ Various	TBD : TBD	0.207	2.529	Sep 2020	-		-		-		-	0.000	2.736	-
Current Fleet Enhancements	SS/ Various	TBD : TBD	2.580	-		-		-		-		-	0.000	2.580	Continuing
		Subtotal	433.399	35.099		5.461		14.322		-		14.322	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PMO/PEO Support/OGA	MIPR	PMO/PEO : Bradley ECP Program	35.521	2.264	Dec 2020	0.594	Sep 2021	1.250	Dec 2022	-		1.250	Continuing	Continuing	Continuing
Government Engineering Support	MIPR	Various : Bradley ECP Program	50.980	1.209	Dec 2020	0.492	Dec 2020	1.250	Dec 2022	-		1.250	Continuing	Continuing	Continuing
FY 2019 Rescission	TBD	FY 2019 Pending Recission : TACOM	25.000	-		-		-		-		-	0.000	25.000	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) 371 / *Bradley Improve Prog*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	FY 2018 NDAA SEC 825 MDAP Cost Overrun : TACOM	0.056	-		-		-		-		-	0.000	0.056	-
		Subtotal	111.557	3.473		1.086		2.500		-		2.500	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Testing	MIPR	Various : Test Sites	49.552	7.241	Dec 2020	2.226	Jul 2021	4.449	Jul 2022	-		4.449	Continuing	Continuing	Continuing
		Subtotal	49.552	7.241		2.226		4.449		-		4.449	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	594.508	45.813		8.773		21.271		-		21.271	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 371 / *Bradley Improve Prog*

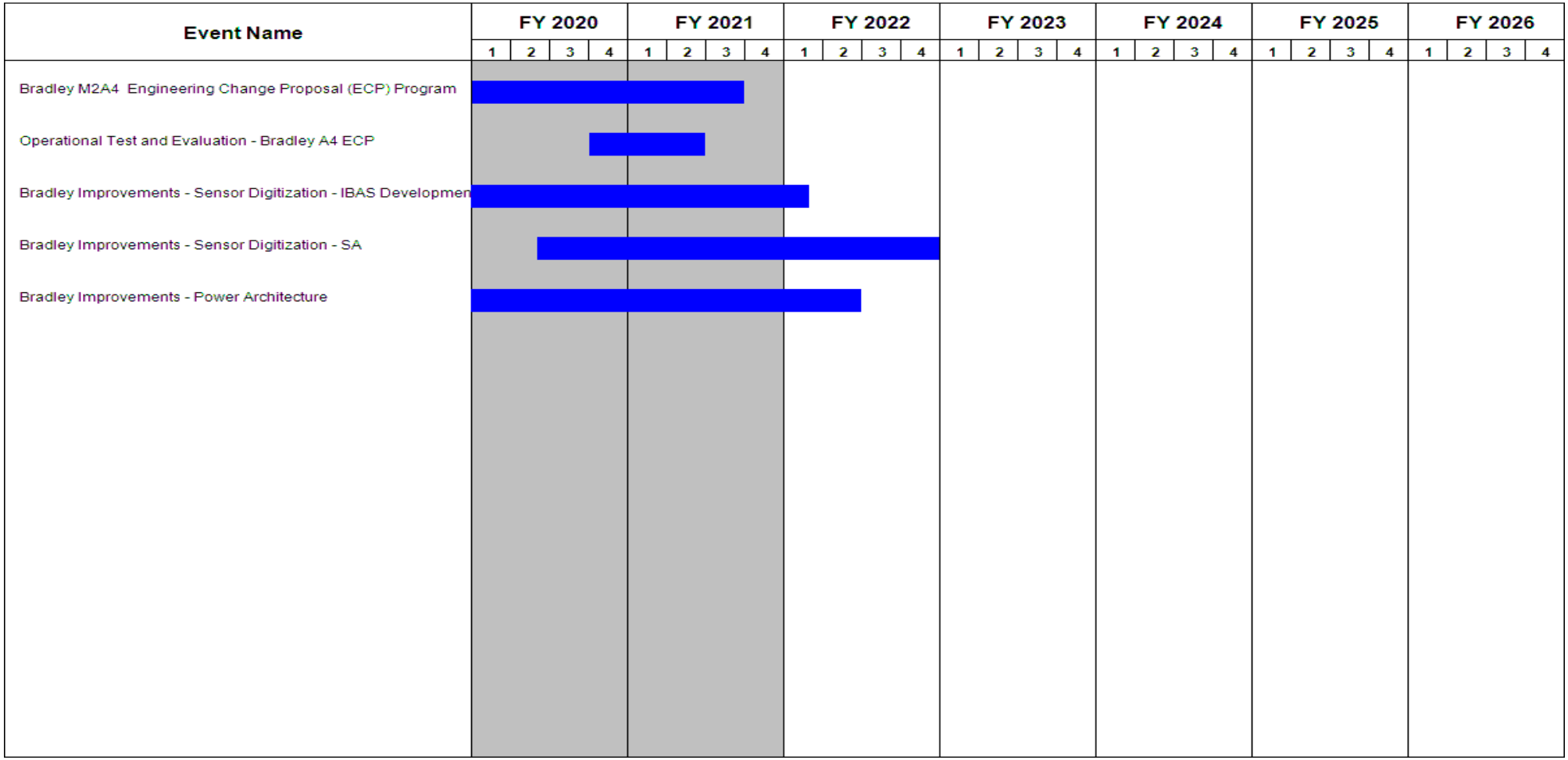


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** 371 / *Bradley Improve Prog*

Schedule Details

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

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / *Combat Vehicle Improvement Programs*	Project (Number/Name) EE2 / *Stryker Improvement*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EE2: *Stryker Improvement*	-	41.655	22.105	30.967	-	30.967	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Stryker DVH A1 ECP Development (Engineering/Prototypes)	1.023	-	1.836
Description: The Stryker DVH A1 ECP is a fleet-wide initiative that mitigates mobility degradation caused by survivability improvements. Addresses vehicle space, weight, power, cooling and computing challenges. Returns the performance of the DVH nearly back to the original design capacity and provides approximately 20% growth potential in gross vehicle weight and power generation capacity posturing these vehicles for efficient upgrades in the future.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 Plans: Complete DVH A1 ECP verification and logistics products. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase for DVH A1 ECP verification and logistics products.			
Title: Stryker DVH A1 ECP Testing ***Description:*** Government and Contractor Support for developmental, operational and live fire testing in support of DVH A1 ECP. ***FY 2021 Plans:*** Continue Government and Contractor Support for developmental, operational and live fire testing in support of DVH A1 ECP. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Completion of developmental testing activities.	1.902	0.092	-
Title: Stryker DVH A1 ECP Contractor Support to Test ***Description:*** Contractor support for test activities.	0.212	-	-
Title: Stryker Lethality ECPs Development (Engineering/Protoypes) ***Description:*** Lethality ECPs encompass the integration of a 30 millimeter (mm) Medium Caliber Weapon System (MCWS), under armor Javelin fire capability, improved optics and targeting systems, and other capabilities into the Stryker fleet. These improvements will provide for increased under armor fire capability, target identification range, provide over-match against peer threats and supporting infantry assault, and address obsolescence within the targeting and reconnaissance systems utilized on the Stryker FoV. ***FY 2021 Plans:*** Stryker Lethality ECPs development to include completion of CROWS-J ECP developmental testing and operational assessment, as well as continuing the ATGM ECP logistic products and Medium Caliber Weapon System Bid Sample Assessment to execute testing and operational assessment. ***FY 2022 Plans:*** Continuing Stryker Lethality ECPs development to include completion of CROWS-J ECP and ATGM ECP logistic products. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	0.620	6.097	2.573

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Decrease is due to the completion of developmental efforts and testing for ATGM ECP and CROWS-J ECP in Fiscal Year (FY) 2021, with logistical product development remaining for CROWS-J ECP and AGTM ECP in FY 2022.			
Title: Stryker Lethality ECPs Testing ***Description:*** Government and Contractor Support for developmental, operational and live fire testing in support of Lethality ECPs. ***FY 2021 Plans:*** Construction of the Medium Caliber Weapon System bid sample test report. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease is due to the completion of test report for Medium Caliber Weapon System bid sample in FY 2021.	20.678	2.690	-
Title: Stryker Lethality ECPs Training Devices Updates	0.473	-	-
Title: Stryker Lethality ECPs Contractor Support to Test	3.185	-	-
Title: Government Systems Engineering and Project Management ***Description:*** Government Systems Engineering and Program Management includes salaries, travel and other support costs required to effectively manage all Research, Development, Test, & Evaluation (RDT&E) efforts. ***FY 2021 Plans:*** Continue Government Systems Engineering and Program Management support (labor, travel, training, supplies, and equipment) for Stryker DVH A1 ECP, Survivability Enhancement and Lethality ECPs (CROWS-J, ATGM, and 30mm Medium Caliber Weapon System). Completion of the Medium Caliber Weapon System Source Selection and Evaluation Board (SSEB). ***FY 2022 Plans:*** Continuing Government Systems Engineering and Program Management support (labor, travel, training, supplies, and equipment) for Stryker DVH A1 ECP, Survivability Enhancement, Lethality ECPs (CROWS-J, ATGM, and 30mm Medium Caliber Weapon System) and Fire Direction Center development efforts. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to inflationary adjustments for salaries, travel, training, supplies, and equipment.	10.999	5.387	5.495
Title: Stryker Power System ***Description:*** Development and testing of a non-primary power solution for the Stryker platform. The non-primary power enhancement incorporates multiple components and capabilities, which include, but are not limited to, the battery box container, Auxiliary Power Unit (APU) and interface kits.	1.373	4.168	4.250

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: Continuation of testing and logistics products development for the non-primary solution. ***FY 2022 Plans:*** Continuation of testing and logistics products development for the non-primary solution. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to continuation of developmental testing efforts for the non-primary solution.			
Title: Stryker Platform Mission Equipment Packages Integration ***Description:*** Development engineering of Mission Equipment Packages (MEP) onto the Stryker platforms. Integration of the Fire Direction Center MEP onto the DVH A1 platform. ***FY 2022 Plans:*** Initiate developmental acquisition and MEP scope for the Fire Direction Center MEP onto a DVH A1 platform. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Begin the Fire Direction Center MEP developmental efforts onto a DVH A1 platform.	-	-	3.221
Title: Stryker Survivability Enhancements ***Description:*** The Stryker Survivability Enhancements will develop strategies, through technical and engineering analyses, for the integration of emerging technologies onto the Stryker Platforms. The Stryker Survivability Enhancements will include, but are not limited to, the Integrated Visual Augmentation System (IVAS), the fleet wide 360 degree Situational Awareness and the integration of the Stryker Reactive Armor Tiles (SRAT) onto the DVH A1 platform. ***FY 2021 Plans:*** Continuation of 360 degree Situational Awareness through DVE Wide enhancements, IVAS efforts, and other emerging technologies onto the DVH A1 platform. ***FY 2022 Plans:*** Continuation of 360 degree Situational Awareness through DVE Wide enhancements and IVAS efforts. Begin development of Stryker Reactive Armor Tiles (SRAT) kit for integration on the DVH A1 platform and other emerging technologies onto the DVH A1 platform. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	1.190	3.671	13.592

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Increase due to the continuation of 360 degree Situational Awareness through DVE Wide enhancements and IVAS efforts, along with beginning development of Stryker Reactive Armor Tiles kit for DVH A1 platforms and other emerging technologies onto the DVH A1 platform.			
Accomplishments/Planned Programs Subtotals	41.655	22.105	30.967

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• GM0100: *Stryker (Mod)*	397.687	-	-	-	-	-	-	-	-	-	-
• G85200: *Stryker Upgrade*	513.858	1,164.152	1,005.028	-	1,005.028	-	-	-	-	-	-

Remarks

23 March 2018 Army Requirements Oversight Council (AROC) decision to exchange all remaining flat-bottom brigades results in continuing exchange production beginning in FY 2018 funded in Stryker Upgrade (G85200). Stryker MOD (GM0100) supports Stryker Fleet modifications and Lethality ECP retrofits in FY 2019-2020.

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

In FY 2022, funding in the amount of $0.183 million for manpower was realigned to Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.

D. Acquisition Strategy

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

On July 2, 2015, Army Systems Acquisitions and Review Council (ASARC) authorization was granted to execute the Stryker 30mm ICVD ONS effort. 30mm ICVD Engineering, Manufacturing, and Development (EMD) contracts for Non-Recurring Engineering (NRE) and Logistics Products Development/Test Support were awarded

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

in January 2016 and May 2016, respectively (Cost Plus Incentive-Fee basis). The 30mm ICVD ONS Production/Retrofit contract was awarded in May 2016 through an Undefinitized Contract Action (UCA). Definitization of the Fixed Price Incentive Fee (FPIF) Production contract occurred in March 2017.

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

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Stryker 30mm ICVD ONS LethalityProject Management	MIPR	PEO GCS/TACOM : Sterling Heights, MI	9.602	-		-		-		-		-	0.000	9.602	-
Survivability Enhancement Government Engineering and Project Management	MIPR	PEO GCS/TACOM : Various	0.534	-		-		-		-		-	0.000	0.534	-
Project Management Office (PMO)	MIPR	PEO GCS/TACOM : Various	56.811	10.999	Jan 2020	5.387	Jan 2021	5.495	Jan 2022	-		5.495	23.959	102.651	-
FY2018 NDAA SEC 825 MDAP Cost Overrun	Allot	ASAALT : Huntsville, Alabama	0.029	-		-		-		-		-	0.000	0.029	-
		Subtotal	66.976	10.999		5.387		5.495		-		5.495	23.959	112.816	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Stryker DVH A1 ECP Development	SS/CPIF	GDLS, MI : Various	173.629	1.023	Jan 2020	-		1.836	Jan 2022	-		1.836	0.000	176.488	-
Stryker DVH A1 ECP Training Device Updates	MIPR	PEO STRI, FL : Various	0.020	-		-		-		-		-	0.000	0.020	-
Stryker 30mm ICVD ONS Development	SS/CPIF	GDLS, MI : Various	75.412	-		-		-		-		-	0.000	75.412	-
Stryker Lethality ECPs Development	C/Various	PM CSW; PM CCWS : Various	50.429	0.620		6.097	Jan 2021	2.573	Jan 2022	-		2.573	0.652	60.371	-
Stryker Lethaliy ECPs Training Device Updates	MIPR	PEO STRI, FL : Various	0.335	0.473		-		-		-		-	0.000	0.808	-
Stryker Survivability Enhancement	Various	US Army TARDEC, Various : Sterling Heights, MI	2.066	0.978	Jan 2020	0.100	Jan 2021	12.286	Jan 2022	-		12.286	9.401	24.831	-
Stryker Power System Development	MIPR	US Army TARDEC, Various : US Army TARDEC	7.269	0.115	Jan 2020	1.289	Jan 2021	2.375	Feb 2022	-		2.375	0.375	11.423	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Stryker Wireless Intercom Development	C/CPFF	Ricardo Defense : Washington DC	4.934	-		-		-		-		-	0.000	4.934	-
Stryker Fire Direction Center Variant Development	TBD	TBD : TBD	-	-		-		3.221	Jun 2022	-		3.221	13.546	16.767	-
		Subtotal	314.094	3.209		7.486		22.291		-		22.291	23.974	371.054	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Stryker DVH A1 ECP Testing	MIPR	Army Test Centers : Various	41.645	1.902	Jun 2020	0.092	Jan 2021	-		-		-	0.000	43.639	-
Stryker DVH A1 ECP Contractor Support to Test	SS/CPFF	GDLS, MI : Various	39.982	0.212	Jun 2020	-		-		-		-	0.000	40.194	-
Stryker 30mm ICVD ONS Test	MIPR	Army Test Centers : Various	20.335	-		-		-		-		-	0.000	20.335	-
Stryker 30mm ICVD ONS Contractor Support to Test	SS/CPFF	GDLS, MI : Various	25.631	-		-		-		-		-	0.000	25.631	-
Stryker Lethality ECPs Testing	MIPR	Army Test Centers : Various	8.388	20.678	Jun 2020	2.690	Dec 2020	-		-		-	0.000	31.756	-
Stryker Lethality ECPs Contractor Support to Test	MIPR	Various : Various	7.820	3.185	Jun 2020	-		-		-		-	0.000	11.005	-
Stryker Survivability Enhancement	MIPR	Army Test Centers : Various	-	0.212	Jun 2020	3.571	Dec 2020	1.306	Dec 2021	-		1.306	2.400	7.489	-
Stryker Power System Testing	MIPR	Army Test Centers : Various	1.721	1.258	Feb 2020	2.879	Dec 2020	1.875	Dec 2021	-		1.875	1.125	8.858	-
Stryker Wireless Intercom Testing	MIPR	Army Test Centers : Various	0.005	-		-		-		-		-	0.000	0.005	-
		Subtotal	145.527	27.447		9.232		3.181		-		3.181	3.525	188.912	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	526.597	41.655		22.105		30.967		-		30.967	51.458	672.782	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

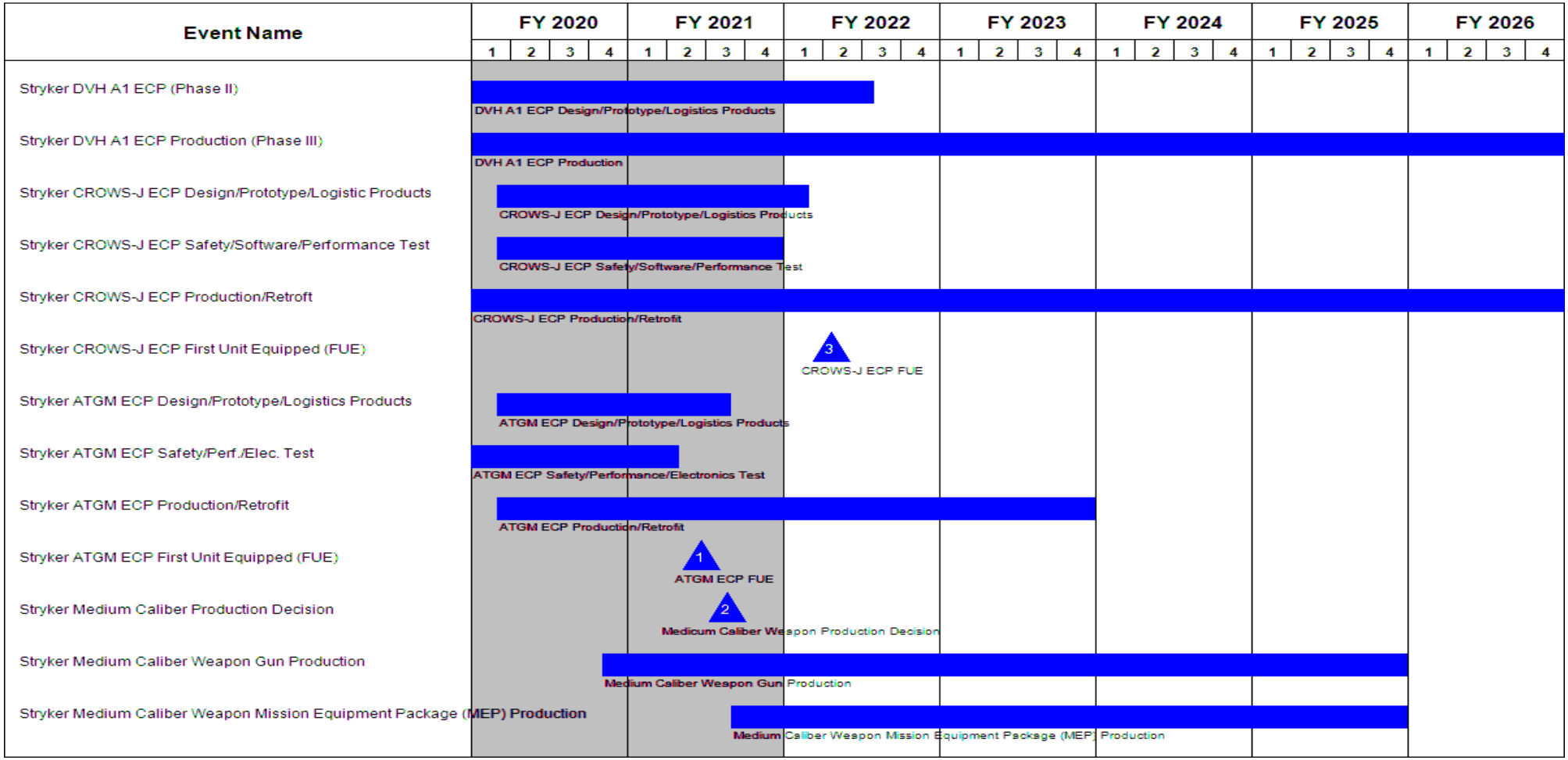

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
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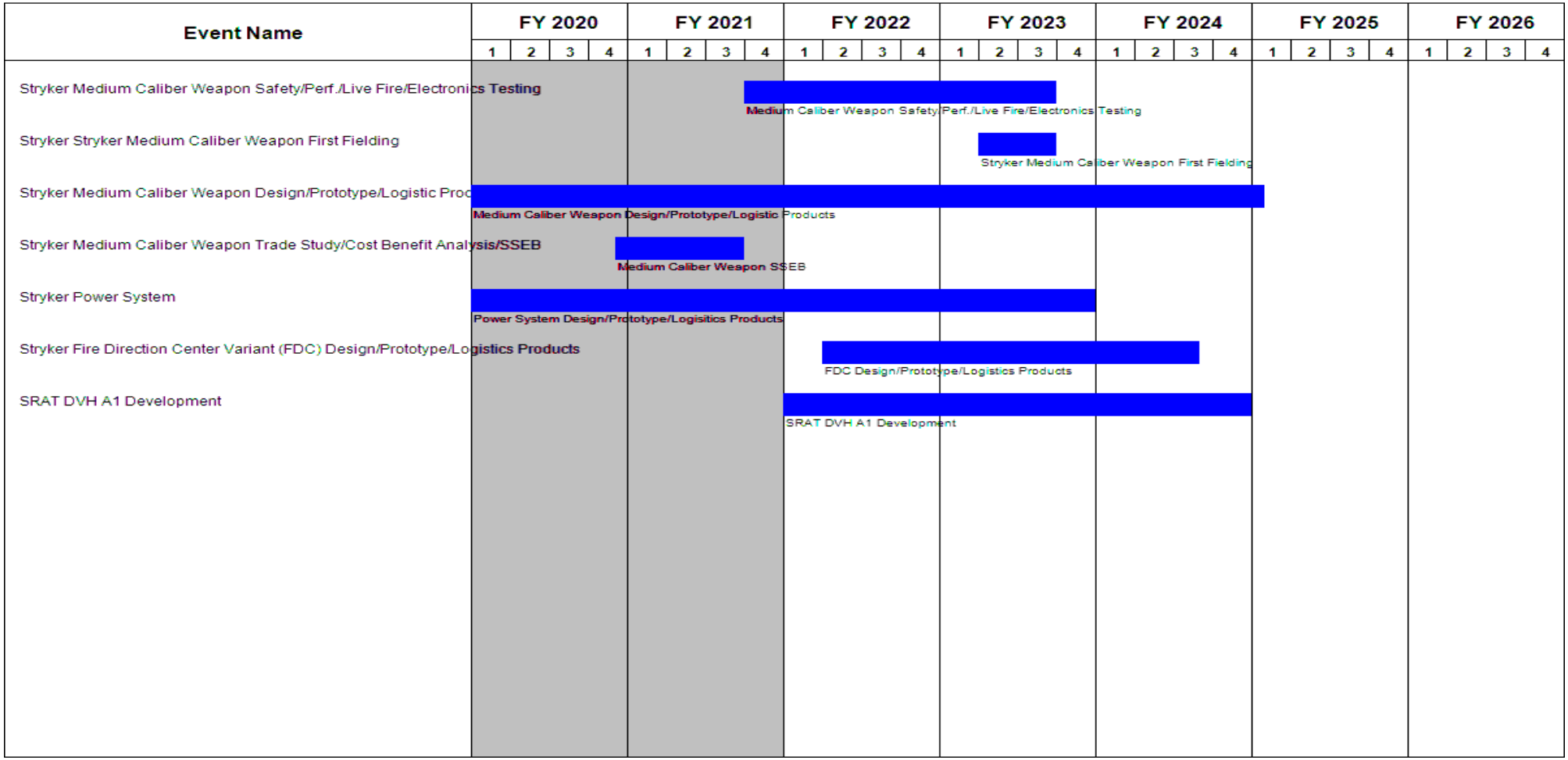


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203735A / *Combat Vehicle Improvement Programs*	**Project (Number/Name)** EE2 / *Stryker Improvement*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Stryker DVH A1 ECP (Phase II)	1	2014	3	2022
Stryker DVH A1 ECP Production (Phase III)	1	2017	4	2030
Stryker CROWS-J ECP Design/Prototype/Logistic Products	1	2019	1	2022
Stryker CROWS-J ECP Safety/Software/Performance Test	1	2019	4	2021
Stryker CROWS-J ECP Production/Retroft	3	2019	4	2029
Stryker CROWS-J ECP First Unit Equipped (FUE)	2	2022	2	2022
Stryker ATGM ECP Design/Prototype/Logistics Products	1	2018	3	2021
Stryker ATGM ECP Safety/Perf./Elec. Test	4	2019	2	2021
Stryker ATGM ECP Production/Retrofit	1	2020	4	2023
Stryker ATGM ECP First Unit Equipped (FUE)	2	2021	2	2021
Stryker Medium Caliber Production Decision	3	2021	3	2021
Stryker Medium Caliber Weapon Gun Production	4	2020	4	2025
Stryker Medium Caliber Weapon Mission Equipment Package (MEP) Production	3	2021	4	2025
Stryker Medium Caliber Weapon Safety/Perf./Live Fire/Electronics Testing	4	2021	3	2023
Stryker Stryker Medium Caliber Weapon First Fielding	2	2023	3	2023
Stryker Medium Caliber Weapon Design/Prototype/Logistic Products	2	2019	1	2025
Stryker Medium Caliber Weapon Trade Study/Cost Benefit Analysis/SSEB	4	2020	3	2021
Stryker Power System	2	2019	4	2023
Stryker Fire Direction Center Variant (FDC) Design/Prototype/Logistics Products	2	2022	3	2024
SRAT DVH A1 Development	1	2022	4	2024

Note

Schedule includes the major Stryker RDTE and Procurement (WTCV) funded activities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0203743A / *155mm Self-Propelled Howitzer Improvements*

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	191.076	217.959	213.281	-	213.281	-	-	-	-	-	-
FF9: *PIM Improvement Program*	-	191.076	217.959	213.281	-	213.281	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Extended Range Cannon Artillery (ERCA) modernization effort integrates emerging technologies to include: a new cannon, gun mount, gun drive systems, fire control systems, rate of fire system improvements, and optionally-manned capability onto the M109A7 Howitzer platform. ERCA improves lethality through increased range and increased rate of fire while also using mature technology to improve mobility, survivability, reliability, supportability, and lethality. This effort will analyze and evaluate the impact of the new cannon technology and modifications to the cab, mobility and electronic architecture required to support ammunition automation, remote firing, and remote movement on the platform. This effort will also develop, evaluate, build, and test prototypes.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	199.274	427.254	301.244	-	301.244
Current President's Budget	191.076	217.959	213.281	-	213.281
Total Adjustments	-8.198	-209.295	-87.963	-	-87.963
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-193.700			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-8.198	-15.595			
• Adjustments to Budget Years	-	-	-87.963	-	-87.963

Change Summary Explanation

Rate of Fire schedule shifted to the right due programmatic changes.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203743A / *155mm Self-Propelled Howitzer Improvements*	Project (Number/Name) FF9 / *PIM Improvement Program*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FF9: *PIM Improvement Program*	-	191.076	217.959	213.281	-	213.281	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Extended Range Cannon Artillery (ERCA) modernization effort integrates emerging technologies to include: a new cannon, gun mount, gun drive systems, fire control systems, rate of fire system improvements, and optionally-manned capability onto the M109A7 Howitzer platform. ERCA improves lethality through increased range and increased rate of fire while also using mature technology to improve mobility, survivability, reliability, supportability, and lethality. This effort will analyze and evaluate the impact of the new cannon technology and modifications to the cab, mobility and electronic architecture required to support ammunition automation, remote firing, and remote movement on the platform. This effort will also develop, evaluate, build, and test prototypes.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: ERCA Prototype Development and Build	159.639	149.459	145.817
Description: Funds support the ERCA range and ERCA Rate of Fire development costs which include continuously improving drawings and the developing and building of the ERCA prototypes for testing. ***FY 2021 Plans:*** Conduct developmental engineering efforts, conduct vehicle integration design, build ERCA prototypes, support testing, and develop level 3 Technical Data Package (TDP). ***FY 2022 Plans:*** Conduct developmental engineering efforts, conduct vehicle integration design, and build ERCA prototypes for First Unit Issued battalion. Design and integrate increased range and rate of fire capabilities. Conduct system level integration and engineering efforts to upgrade and design mobility, survivability, reliability and lethality upgrades. Procure material and build ERCA prototype vehicles to support test and evaluation. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Slight decrease in Fiscal Year (FY) 2022 is due to reduction in planned Rate of Fire activities.			
Title: Program Management	5.128	12.689	12.700
Description: Funding is provided for all Program Management efforts on the Extended Range Cannon Artillery effort. ***FY 2021 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203743A / *155mm Self-Propelled Howitzer Improvements*	**Project (Number/Name)** FF9 / *PIM Improvement Program*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Continue the development and production for all required documents, office staff and engineering Integrated Product Team (IPT) development. Use non traditional contractors Other Transaction Authorities (OTAs) to reduce risk. ***FY 2022 Plans:*** Continue the development and production for all required documents, office staff and engineering IPT development. Use non-traditional contractors OTAs to reduce risk. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Slight increase due to expected cost inflation.			
Title: Test and Evaluation ***Description:*** This funding supports all Testing and Evaluation the Extended Range Cannon Artillery effort. ***FY 2021 Plans:*** Conduct Developmental Testing and ammunition qualification. These events include all test execution, data collection, contractor and logistic support for mobility, reliability and firings tests. ***FY 2022 Plans:*** Conduct Developmental Testing and ammunition qualification. These events include all test execution, data collection, contractor and logistics support for mobility, reliability and firings tests. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Slight decrease from FY 2021 to FY 2022 due to ramp down of Developmental testing and Operational Assessment.	26.309	55.811	54.764
Accomplishments/Planned Programs Subtotals	191.076	217.959	213.281

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Extended Range Cannon (ERCA) uses the approved National Defense Authorization Act (NDAA) Section 804 middle tier acquisition program for development, rapid prototyping, rapid fielding, integration, test, and sustainment actions as the program moves forward and transitions to a program of record to field the ERCA system.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203743A / *155mm Self-Propelled Howitzer Improvements*	Project (Number/Name) FF9 / *PIM Improvement Program*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PIM Improvement Program	MIPR	Various - OGAs : PEO	22.161	-		-		-		-		-	Continuing	Continuing	Continuing
ERCA Range - Developmental Eng	Various	Various : Various Locations	36.222	64.442	Jan 2020	77.830	Jan 2021	62.862	Jan 2022	-		62.862	Continuing	Continuing	Continuing
ERCA Range - Prototype Build	Various	Various : Various Locations	9.342	87.742		36.180	Jan 2021	17.238	Jan 2022	-		17.238	Continuing	Continuing	Continuing
ERCA Rate of Fire - Developmental Eng	Various	Various : Various Locations	-	7.455	Feb 2020	12.740	Feb 2021	27.591	Feb 2022	-		27.591	Continuing	Continuing	Continuing
ERCA Rate of Fire - Prototype Build	Various	Various : Various Locations	-	-		22.709	Oct 2020	38.126	Oct 2021	-		38.126	Continuing	Continuing	Continuing
		Subtotal	67.725	159.639		149.459		145.817		-		145.817	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PMO/PEO Support	MIPR	PM/PEO PIM : Various	6.350	5.128	Dec 2019	12.689	Oct 2020	12.700	Oct 2021	-		12.700	Continuing	Continuing	Continuing
		Subtotal	6.350	5.128		12.689		12.700		-		12.700	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	MIPR	Various - OGAs : Various	0.760	26.309	Apr 2020	55.811	Oct 2020	54.764	Oct 2021	-		54.764	Continuing	Continuing	Continuing
		Subtotal	0.760	26.309		55.811		54.764		-		54.764	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	74.835	191.076		217.959		213.281		-		213.281	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203743A / *155mm Self-Propelled Howitzer Improvements*	Project (Number/Name) FF9 / *PIM Improvement Program*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203743A / *155mm Self-Propelled Howitzer Improvements*	**Project (Number/Name)** FF9 / *PIM Improvement Program*

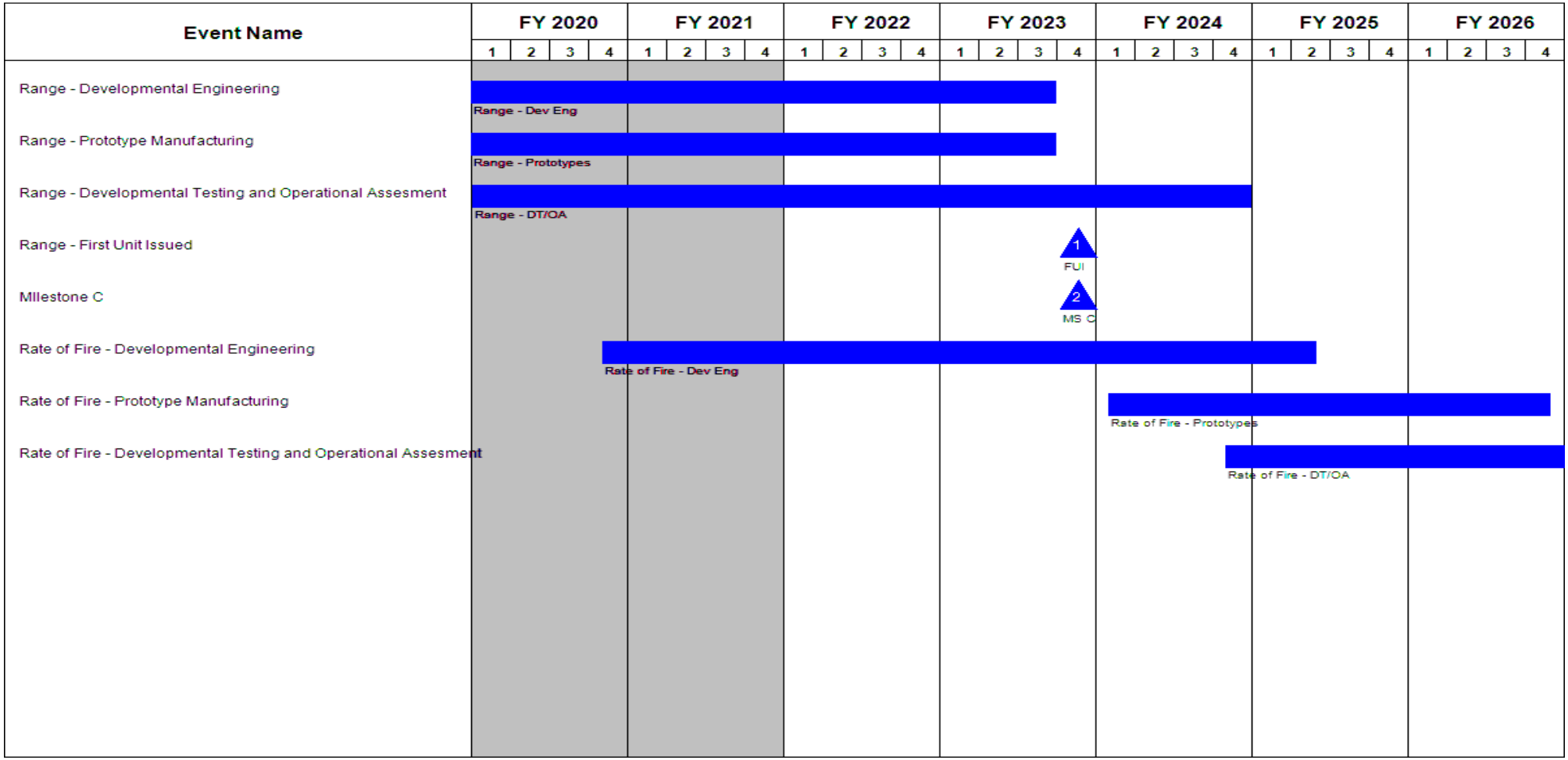


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203743A / *155mm Self-Propelled Howitzer Improvements*	**Project (Number/Name)** FF9 / *PIM Improvement Program*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Range - Developmental Engineering	2	2018	3	2023
Range - Integration OTA Award	4	2019	4	2019
Range - Prototype Manufacturing	4	2018	3	2023
Range - Developmental Testing and Operational Assesment	1	2019	4	2024
Range - First Unit Issued	4	2023	4	2023
MIlestone C	4	2023	4	2023
Rate of Fire - Developmental Engineering	4	2020	2	2025
Rate of Fire - Prototype Manufacturing	1	2024	4	2026
Rate of Fire - Developmental Testing and Operational Assesment	4	2024	2	2028

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203744A / *Aircraft Modifications/Product Improvement Programs*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	8.896	11.261	-	-	-	-	-	-	-	-	-
EB6: *MQ-1C Gray Eagle MODS*	-	8.896	11.261	-	-	-	-	-	-	-	-	-

Note

Based on the fielding of the Gray Eagle ER ending in FY23 initial transition to sustainment will begin in FY23. Unfunded request is in place for FY22 for GPS - Denied Threat Response, Beamforming, Anti-Jam, M-Code navigators and alternate payload integration efforts on Gray Eagle MODS. There is no RDTE funding for RDTE requirements beyond FY21.

A. Mission Description and Budget Item Justification

The MQ-1C Gray Eagle provides the Army with an extended range, multi-purpose (ERMP) Unmanned Aircraft System (UAS); capable of executing reconnaissance, security, attack, and intelligence collection missions in the range of military operations (ROMO). Sensors/payloads include an Electro-Optical/Infrared/Laser Designator (EO/IR/LD), Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI), Signals Intelligence (SIGINT), and HELLFIRE missiles; providing a near all-weather mission capability. MQ-1C Gray Eagle is a dedicated, assured, multi-mission UAS fielded to all Army Divisions, Intelligence and Security Command and Army Special Operations Command in support of the commander's warfighting priorities within multi-domain battle operations.

Currently MQ-1C Gray Eagle high fuel efficiency engines are undergoing a propulsion reliability effort which will reduce MQ-1C Gray Eagle Return to Base events and decrease the likelihood of engine related aircraft mishaps. This modernization effort will increase operational readiness and posture Gray Eagle to support multi-domain.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	9.278	11.688	0.000	-	0.000
Current President's Budget	8.896	11.261	0.000	-	0.000
Total Adjustments	-0.382	-0.427	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.382	-0.427			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203744A / *Aircraft Modifications/Product Improvement Programs*	Project (Number/Name) EB6 / *MQ-1C Gray Eagle MODS*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EB6: *MQ-1C Gray Eagle MODS*	-	8.896	11.261	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Based on the fielding of the Gray Eagle ER ending in FY23 initial transition to sustainment will begin in FY23. Unfunded request is in place for FY22 for GPS - Denied Threat Response, Beamforming, Anti-Jam, M-Code navigators and alternate payload integration efforts on Gray Eagle MODS. FY21 funds will be used for Heavy Fuel Engine (HFE) 2.0 development efforts. HFE 2.0 is an engine development effort to replace our current engine that is obsolete and going out of production.

A. Mission Description and Budget Item Justification

The MQ-1C Gray Eagle provides the Army with an extended range, multi-purpose (ERMP) Unmanned Aircraft System (UAS); capable of executing reconnaissance, security, attack, and intelligence collection missions in the range of military operations (ROMO). Sensors/payloads include an Electro-Optical/Infrared/Laser Designator (EO/IR/LD), Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI), Signals Intelligence (SIGINT), and HELLFIRE missiles; providing a near all-weather mission capability. MQ-1C Gray Eagle is a dedicated, assured, multi-mission UAS fielded to all Army Divisions, Intelligence and Security Command and Army Special Operations Command in support of the commander's warfighting priorities within multi-domain battle operations.

Currently the MQ-1C Gray Eagle high fuel efficiency engine is undergoing a propulsion reliability effort, which will reduce MQ-1C Gray Eagle Return to Base events and decrease the likelihood of engine related aircraft mishaps. Additionally, this effort will increase operational readiness for the Operational Commander.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Global Positioning System (GPS) Denied ***Description:*** GPS Denied	1.307	-	-
Title: Alternate Munitions Integration ***Description:*** Alternate Munitions Integration	0.211	-	-
Title: Propulsion Reliability ***Description:*** Propulsion Reliability improvements address material failures and Return to Base (RTBs) events experienced with the existing fielded MQ-1C engine. Contract efforts will address current engine component obsolescence and supply concerns. The initial contract supports engine qualification planning and execution of component, subsystem and system level testing/ analyses, critical to ensure development of a reliable replacement engine. ***FY 2021 Plans:***	6.492	11.261	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203744A / *Aircraft Modifications/Product Improvement Programs*	**Project (Number/Name)** EB6 / *MQ-1C Gray Eagle MODS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
This funding supports engine development efforts and qualification testing to mitigate engine obsolescence and to increase operational readiness. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Fund development of the upgrade of current Gray Eagle (GE) Heavy Fuel Engine (HFE), (current engine OEM no longer manufacturing engine core), designed for High Reliability and Long Life (1800 to 2500 hours) with improvements over existing engine (gear drive vs. belt drive, gearbox, turbocharger, etc.). Drop-in replacement for GE and GE-Extended Range. The decrease in resources from FY2021 to FY2022 are a result of FY22 funds no longer required due to receiving the necessary support in FY21 to support Heavy Fuel Engine (HFE) 2.0 development efforts. Assuming there are no rework or additional upgrade requirements, development efforts are expected to be completed by the end of FY22.			
Title: GETS Program Management Support	0.886	-	-
Accomplishments/Planned Programs Subtotals	8.896	11.261	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A00005: *MQ-1 UAV*	144.000	110.000	-	-	-	-	-	-	-	-	-
• AA6601: *Gray Eagle Mods2*	14.699	30.280	3.143	-	3.143	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

An ERMP Operational Requirement Document (ORD) was approved by the Joint Requirement Oversight Council (JROC) 6 Apr 2005. Milestone B occurred on 20 Apr 2005, and the System Development and Demonstration contract was awarded 8 Aug 2005, as a result of a competitive solicitation which included a vendor system capabilities demonstration. A Capabilities Production Document (CPD) was approved 14 Mar 2009. MQ-1C Gray Eagle completed Follow-On Test and Evaluation (FOTE) on 12 Jun 2015.

This RDTE element funds a propulsion reliability improvement with the development of the Heavy Fuel Engine (HFE) 2.0 engine system. The current MQ-1C aircraft engine has experienced material failures that have resulted in aircraft mishaps (loss of aircraft) and a high number lost flight hours due to Return to Base (RTB) events. HFE 2.0 implements aviation grade components and focused reliability improvements that will address previous material failures and RTB drivers. Additionally, the Army was notified by the original equipment manufacturer (OEM) that the current engine core is obsolete and the current manufacture will no longer supply the engine core. HFE 2.0 also resolves this obsolescence/supply issue. In 2018, the Army issued an RFI to industry to assess the state of engine technology and availability of a COTS/NDI engine solution that could meet MQ-1C capability needs and requirements. The primary goal of the RFI was to establish an alternative engine for MQ-1C that is reliable and could be integrated and qualified in a two year timeframe to resolve critical reliability and supply issues with the current engine. Upon completion of the RFI

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203744A / *Aircraft Modifications/Product Improvement Programs*	**Project (Number/Name)** EB6 / *MQ-1C Gray Eagle MODS*

evaluations, HFE 2.0 engine systems will be procured under the PBL contract and fielded through attrition. As a result of the Army's RFI and Industry day event, it was determined that the HFE 2.0 was the only engine to meet requirements for an alternative MQ-1C engine. Funded RDTE elements will support completion of integration, test, and qualification of the HFE 2.0 engine system on the MQ-1C aircraft. This effort will secure engine supply and result in greater propulsion system reliability and increased operational readiness to the commander in the field. Funds are planned for award on the Gray Eagle Technical Services contract as a Technical Services Memorandum (TSM) task order, and as a Military Interdepartmental Purchase Requisitions (MIPRs) to various other Government agencies. Upon completion of qualification, HFE 2.0 engine systems will be procured under the PBL contract and fielded through attrition.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203744A / *Aircraft Modifications/Product Improvement Programs*	Project (Number/Name) EB6 / *MQ-1C Gray Eagle MODS*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY2019 Reprogramming Action	TBD	PEO M&S : Redstone Arsenal	3.000	-		-		-		-		-	0.000	3.000	-
		Subtotal	3.000	-		-		-		-		-	0.000	3.000	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Global Positioning System (GPS) Denied	SS/CPFF	General Atomics/ ASI : San Diego, CA	10.461	1.307	Jan 2020	-		-		-		-	Continuing	Continuing	-
Universal Ground Control Station (UGCS) Improvements	SS/CPFF	General Atomics/ ASI : San Diego, CA	15.279	-		-		-		-		-	Continuing	Continuing	-
Alternate Munitions Integration	SS/CPFF	General Atomics- ASI : Poway, CA	19.088	0.211	Jan 2020	-		-		-		-	0.000	19.299	-
Ground Base Sense and Avoid Block II	SS/CPFF	Various : Various	25.362	-		-		-		-		-	0.000	25.362	-
Survivability	MIPR	Various : Various	0.148	-		-		-		-		-	Continuing	Continuing	-
Propulsion Reliability	SS/CPFF	General Atomics/ ASI : San Diego, CA	-	6.492	Mar 2020	8.773	Mar 2021	-		-		-	Continuing	Continuing	-
GETS Program Management	TBD	General Atomics/ ASI : San Diego, CA	-	0.886	Nov 2019	-		-		-		-	Continuing	Continuing	-
		Subtotal	70.338	8.896		8.773		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support - GBSAA	MIPR	Various : Various	2.163	-		-		-		-		-	0.000	2.163	-
		Subtotal	2.163	-		-		-		-		-	0.000	2.163	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203744A / *Aircraft Modifications/Product Improvement Programs*	Project (Number/Name) EB6 / *MQ-1C Gray Eagle MODS*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Development Testing and Software Testing Block II - GBSAA	MIPR	Various : Various	0.403	-		-		-		-		-	0.000	0.403	-
Flight Test and Analysis	SS/ Various	Dugway Proving Grounds : Dugway Proving Grounds	4.350	-		2.488	Mar 2021	-		-		-	0.000	6.838	-
		Subtotal	4.753	-		2.488		-		-		-	0.000	7.241	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	80.254	8.896		11.261		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203744A / *Aircraft Modifications/Product Improvement Programs*	**Project (Number/Name)** EB6 / *MQ-1C Gray Eagle MODS*

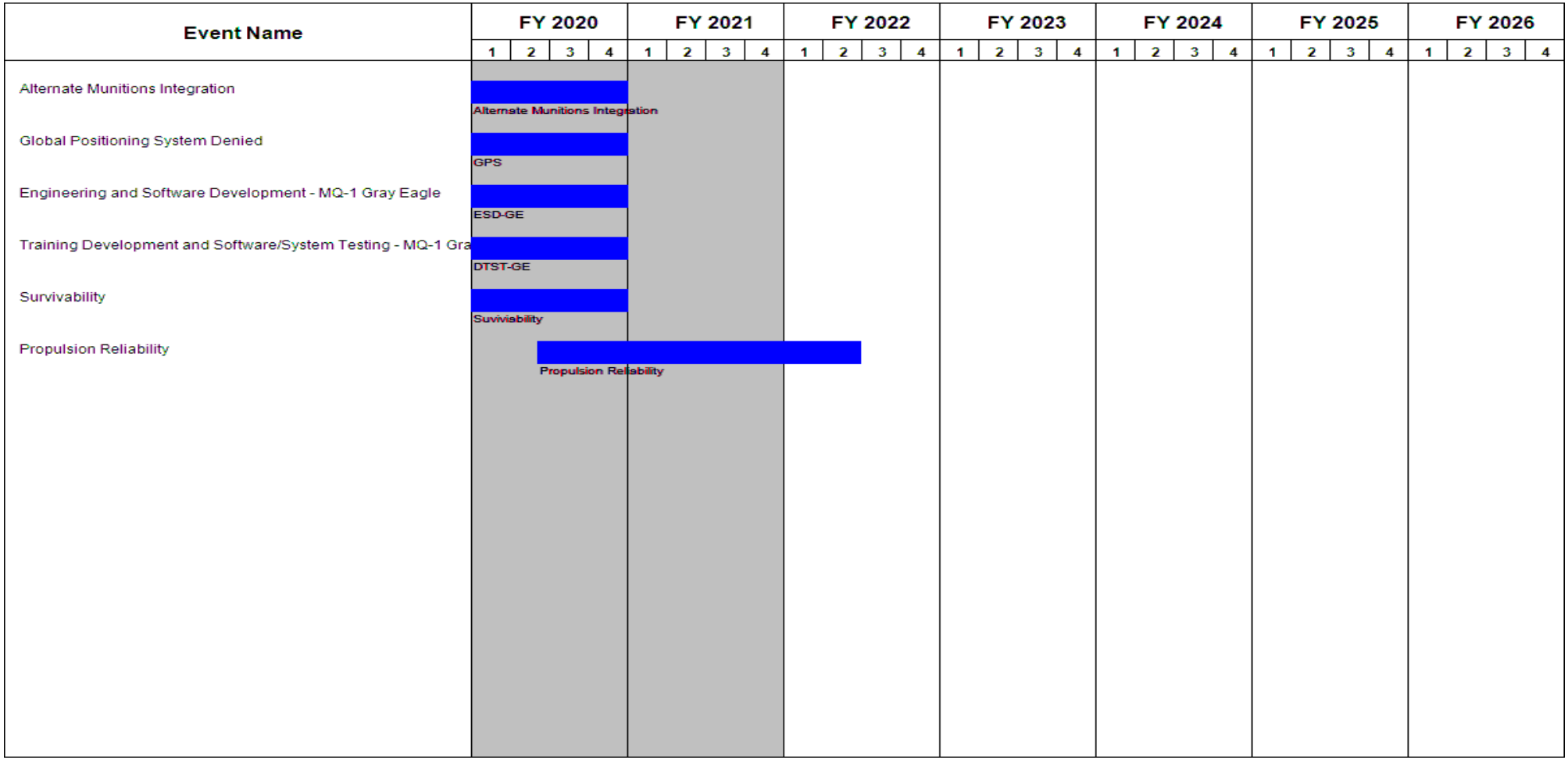


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203744A / *Aircraft Modifications/Product Improvement Programs*	**Project (Number/Name)** EB6 / *MQ-1C Gray Eagle MODS*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Alternate Munitions Integration	2	2017	4	2020
Global Positioning System Denied	2	2017	4	2020
Engineering and Software Development - MQ-1 Gray Eagle	2	2017	4	2020
Training Development and Software/System Testing - MQ-1 Gray Eagle	3	2017	4	2020
Survivability	2	2018	4	2020
Propulsion Reliability	2	2020	2	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203752A *I Aircraft Engine Component Improvement Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.138	0.080	0.132	-	0.132	-	-	-	-	-	-
106: *A/C Compon Improv Prog*	-	0.138	0.080	0.132	-	0.132	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Aircraft Engine Component Improvement Program (CIP) develops, tests, and qualifies improvements to aircraft engine components to correct service-revealed deficiencies, improve flight safety, enhance readiness and reduce operating and support (O&S) costs. In addition, CIP provides the test vehicles for the testing and qualification efforts required as a part of the Army's Critical Safety Item (CSI) program. Non-program specific Auxiliary Power Unit (APU) as well as Unmanned Aerial Vehicle (UAV) safety and readiness issues are also addressed under this Program Element.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.144	0.080	0.145	-	0.145
Current President's Budget	0.138	0.080	0.132	-	0.132
Total Adjustments	-0.006	0.000	-0.013	-	-0.013
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.006	-			
• Adjustments to Budget Years	-	-	-0.013	-	-0.013

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203752A / *Aircraft Engine Component Improvement Program*	Project (Number/Name) 106 / *A/C Compon Improv Prog*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
106: *A/C Compon Improv Prog*	-	0.138	0.080	0.132	-	0.132	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Aircraft Engine Component Improvement Program (CIP) develops, tests, and qualifies improvements to aircraft engine components to correct service-revealed deficiencies, improve flight safety, enhance readiness and reduce operating and support (O&S) costs. In addition, CIP provides the test vehicles for the testing and qualification efforts required as a part of the Army's Critical Safety Item (CSI) program. Non-program specific Auxiliary Power Unit (APU) as well as Unmanned Aerial Vehicle (UAV) safety and readiness issues are also addressed under this Program Element (PE).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Gray Eagle UAS Turbocharger Compressor Blow-off Valve	0.078	0.037	-
Description: UAV Gray Eagle turbocharger investigation at the United States (US) Army Vehicle Technology Directorate (VTD) at Army Research Laboratory (ARL) Aberdeen Proving Grounds. Provide research to support airworthiness, reliability and performance improvements of the UAV Gray Eagle Turbocharger. Investigate and research the technology challenges of incorporating a turbocharger compressor blow-off valve. The current wastegate configuration was found to be highly sensitive at altitude, resulting in combustion instability. Analysis has been reviewed showing that turbochargers configured with compressor blow-off valves are more reliable and robust than the currently used wastegate configuration.			
FY 2021 Plans: Research improvements to address service related deficiencies to improve safety and reduce O&S Costs.			
FY 2021 to FY 2022 Increase/Decrease Statement: FY22 funding being realigned to the UAS Fuel System Component Evaluation effort within Project 106 to enable application of the identification of failure root causes to improve readiness and reliability across multiple UAS platforms.			
Title: In-House Support	0.060	0.005	0.054
Description: In-house support for the CIP engineers. Contracting support for CIP contracts.			
FY 2021 Plans: Continue to provide in-house engineering support for UAV engine CIP programs.			
FY 2022 Plans: Will continue to provide in-house engineering support for UAV engine CIP programs.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203752A / *Aircraft Engine Component Improvement Program*	**Project (Number/Name)** 106 / *A/C Compon Improv Prog*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Increase in in-house engineering efforts to support CIP programs.			
Title: Hunter UAS Turbocharger Life Management ***Description:*** UAV Hunter fuel injector investigation at the US Army VTD at ARL Aberdeen Proving Grounds. Instrument the Hunter turbochargers and exhaust manifolds, and provide support for in-flight testing to acquire data for turbocharger lifing analysis to support of airworthiness, readiness, reliability, and safety of the Hunter aircraft. UAV Hunter turbocharger investigation at the U.S. ARL VTD at Aberdeen Proving Ground, MD. Also provides research to support airworthiness, reliability and performance improvements of Hunter UAV turbocharger. An alternate turbocharger is required to support airworthiness, reliability and performance of Hunter UAS engine. The Hunter UAS has experienced "Soft Rotation" due to the aircraft's inability to achieve an engine speed sufficient for take-off (i.e. insufficient thrust). The increased frequency in soft rotations during take-off increases the risk of potential damage to equipment or injury to personnel due to the potential for the aircraft to depart the runway after rotation rather than taking flight. Testing has demonstrated that the current turbocharger is operating very close to the surge limit. The engine calibration limits turbocharger speed. However, there is no potential for an increase in performance with the currently installed turbocharger. ***FY 2021 Plans:*** Research improvements to address service related deficiencies to improve safety and reduce O&S Costs. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** This effort is ending in FY 2021.	-	0.038	-
Title: UAS Fuel System Component Evaluation ***Description:*** This program is to improve aircraft readiness and reliability by mitigating the root cause of common component failures. ***FY 2022 Plans:*** UAS Component investigations will support airworthiness, reliability and performance improvements of the critical Unmanned Aerial Vehicle (UAV) components (e.g.. FADECs, fuel injectors, and high pressure fuel pumps) to determine root cause of occurrences which result in performance anomalies during aircraft operation ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funds realigned internally within Project 106 from the Gray Eagle UAS Turbocharger Compressor Blow-off Valve effort. FY22 funds will be used to identify/evaluate failure root causes to improve readiness and reliability across multiple UAS platforms.	-	-	0.078
Accomplishments/Planned Programs Subtotals	0.138	0.080	0.132

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203752A / *Aircraft Engine Component Improvement Program*	**Project (Number/Name)** 106 / *A/C Compon Improv Prog*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Improved designs will be implemented via Engineering Change Proposal (ECP) and follow-on procurement or modification to a production contract to introduce the improved hardware.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203752A / *Aircraft Engine Component Improvement Program*	Project (Number/Name) 106 / *A/C Compon Improv Prog*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
In-house Engineering	Allot	US Army AMRDEC : Redstone Arsenal, AL	3.020	0.060	Oct 2019	0.005	Oct 2020	0.054	Oct 2021	-		0.054	Continuing	Continuing	Continuing
		Subtotal	3.020	0.060		0.005		0.054		-		0.054	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
T700 Engine	SS/IDIQ	GE-Air : Lynn, MA	61.729	-		-		-		-		-	Continuing	Continuing	Continuing
T55 Engine	SS/IDIQ	Honeywell : Phoenix, AZ	30.161	-		-		-		-		-	Continuing	Continuing	Continuing
T62 Auxiliary Power Unit (APU)	C/IDIQ	Redstone Technical Center Redstone Arsenal, AL : ATEC	0.050	-		-		-		-		-	Continuing	Continuing	Continuing
APU's	SS/IDIQ	Air Force : Kelly AFB, TX	13.647	-		-		-		-		-	Continuing	Continuing	Continuing
Gray Eargle UAS Turbocrarhger Compressor Blow-Off Valve	Various	ARL-Vehicle Technology Directorate : TBD	1.012	0.078	Sep 2020	0.037	Sep 2021	0.034	Oct 2021	-		0.034	Continuing	Continuing	Continuing
APU's	SS/IDIQ	Air Force : Hill AFB, UT	2.319	-		-		-		-		-	Continuing	Continuing	Continuing
T-62T-2B Vibration Test	Various	Redstone Technical Text Center : Redstone Arsenal, AL	0.050	-		-		-		-		-	Continuing	Continuing	-
Hunter UAS Fuel Injector Evaluation	TBD	To Be Determined : To Be Determined	0.033	-		-		-		-		-	0.000	0.033	-
Hunter UAS Turbocharger Life Management	TBD	To Be Determined : To Be Determined	0.023	-		0.038	Sep 2021	-		-		-	0.000	0.061	-
Hunter UAS Lower Propeller Shafts	TBD	To Be Determined : To Be Determined	0.020	-		-		-		-		-	0.000	0.020	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203752A / *Aircraft Engine Component Improvement Program*	Project (Number/Name) 106 / *A/C Compon Improv Prog*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UAS Fuel System Component Evaluation	TBD	Army Research Lab : Aberdeen Proving Ground	-	-		-		0.044	Oct 2021	-		0.044	0.000	0.044	-
		Subtotal	109.044	0.078		0.075		0.078		-		0.078	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	112.064	0.138		0.080		0.132		-		0.132	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203752A / *Aircraft Engine Component Improvement Program*	**Project (Number/Name)** 106 / *A/C Compon Improv Prog*

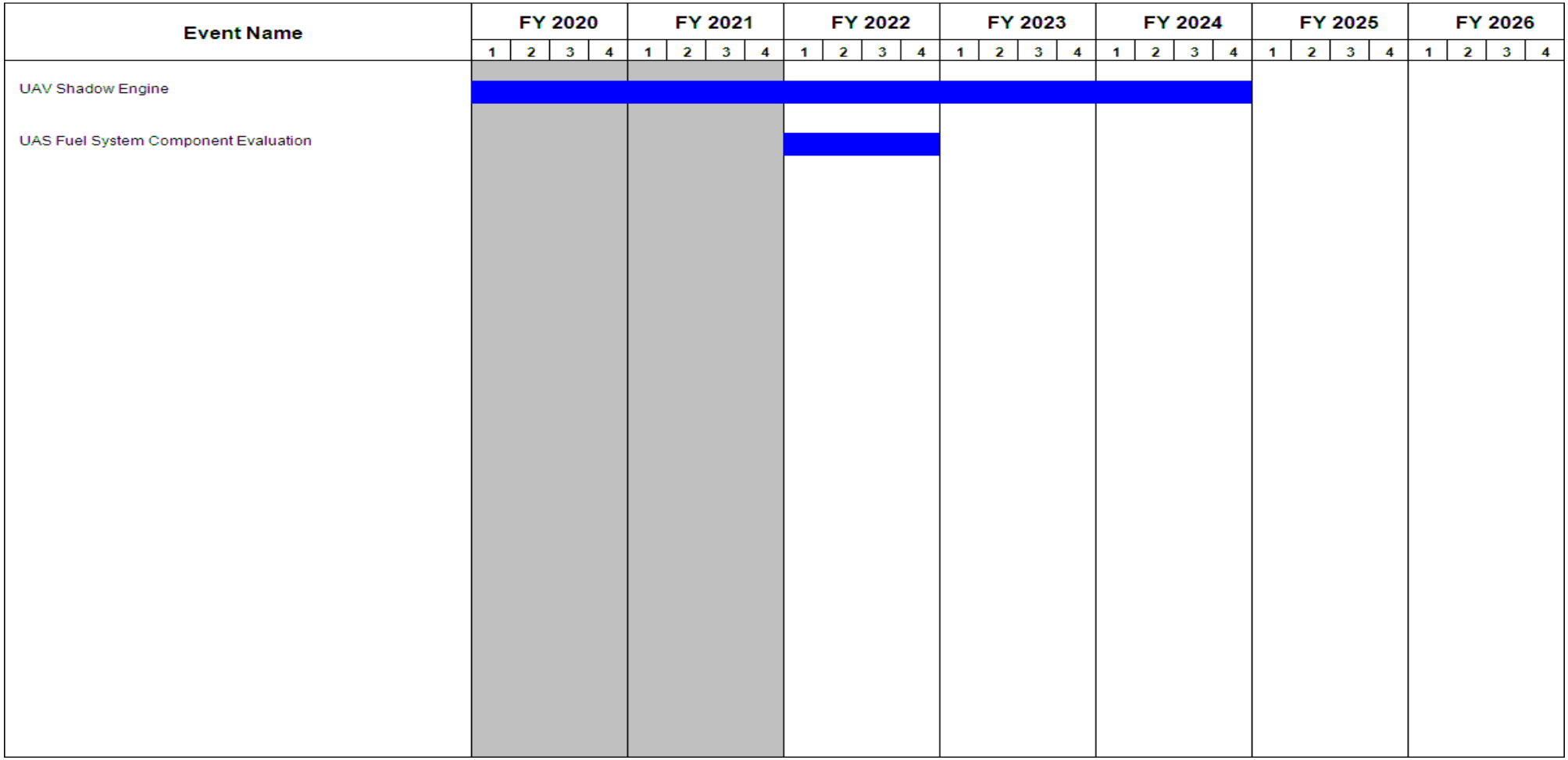


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203752A / *Aircraft Engine Component Improvement Program*	**Project (Number/Name)** 106 / *A/C Compon Improv Prog*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
T700 Engine Spit Pit Testing	1	2011	4	2012
T700 Engine Temperature Survey	2	2014	4	2015
T55 Engine 1553 Engine Control Unit (ECU)	2	2012	1	2013
T55 Engine N1 Drive Line Redesign	1	2010	4	2012
T55 Engine ECU Block Upgrade	2	2013	4	2015
Auxiliary Power Units (APUs)	1	2014	4	2015
UAV Shadow Engine	2	2014	4	2024
T700 CSI Update	1	2017	4	2017
UAS Fuel System Component Evaluation	1	2022	4	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203758A *I Digitization*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	4.043	4.351	3.936	-	3.936	-	-	-	-	-	-
374: *HOR Battlefld Digitizn*	-	4.043	4.351	3.936	-	3.936	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

As the Army Equipping methodology transitions to the Army Modernization Enterprise or AME the information technology used to support Army Equipping must grow and change. The development of an upgraded Army Equipping Enterprise System (AE2S) will integrate and share programming data (dollars and quantities) with information from IT systems that support the Army Futures Command (AFC), ASA(ALT), ASA(FM&C) and Army G3/5/7. This data sharing will allow the AME to provide Army Senior Leaders with a complete picture of how well programs are executing, the impacts of programming decisions on Army current and future readiness and modernization, and help develop a road map needed to transition the current force to a fully modernize Army. The AE2S next generation capability requirements include a flexible data and software architectures that allows the user to integrate disparate data from differing architectures in order to develop new information that can be turned into actionable knowledge by senior leaders. The software architecture must have data visualization capabilities that allow the user to display data in ways that can articulate how AME decisions made impact warfighting effectiveness and plans.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.270	4.516	4.196	-	4.196
Current President's Budget	4.043	4.351	3.936	-	3.936
Total Adjustments	-1.227	-0.165	-0.260	-	-0.260
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.011	-			
• SBIR/STTR Transfer	-0.216	-0.165			
• Adjustments to Budget Years	-	-	-0.260	-	-0.260

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / *Digitization*	Project (Number/Name) 374 / *HOR Battlefld Digitizn*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
374: *HOR Battlefld Digitizn*	-	4.043	4.351	3.936	-	3.936	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

As the Army Equipping methodology transitions to the Army Modernization Enterprise or AME the information technology used to support Army Equipping must grow and change. The development of an upgraded Army Equipping Enterprise System (AE2S) will integrate and share programming data (dollars and quantities) with information from IT systems that support the Army Futures Command (AFC), ASA(ALT), ASA(FM&C) and Army G3/5/7. This data sharing will allow the AME to provide Army Senior Leaders with a complete picture of how well programs are executing, the impacts of programming decisions on Army current and future readiness and modernization, and help develop a road map needed to transition the current force to a fully modernize Army. The AE2S next generation capability requirements include a flexible data and software architectures that allows the user to integrate disparate data from differing architectures in order to develop new information that can be turned into actionable knowledge by senior leaders. The software architecture must have data visualization capabilities that allow the user to display data in ways that can articulate how AME decisions made impact warfighting effectiveness and plans.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Interoperability and Integration	0.554	1.047	0.937
Description: Funds are to be used for the following efforts ***FY 2021 Plans:*** Contractor will continue to conduct independent analyses of Army, joint, and multinational interfaces, adherence to standards, implementation profiles and interoperability baselines ***FY 2022 Plans:*** Contractor will continue to conduct independent analyses of Army, joint, and multinational interfaces, adherence to standards, implementation profiles and interoperability baselines. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease is due to providing increased requirements for independent analyses of Army, joint, and multinational interfaces.			
Title: Operational Capability Analysis and Evaluation	0.586	1.011	0.902
Description: Funds are to be used for the following efforts ***FY 2021 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203758A / *Digitization*	**Project (Number/Name)** 374 / *HOR Battlefld Digitizn*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Contractor will continue to conduct iterative capability analyses and assessments consistent with CJCSI 3170 (JCIDS) and 6212 (Net Readiness) to ensure Army and joint program technical and operational requirements are consistent. Efforts support Army and joint initiatives. ***FY 2022 Plans:*** Contractor will continue to conduct iterative capability analyses and assessments consistent with CJCSI 3170 (JCIDS) and 6212 (Net Readiness) to ensure Army and joint program technical and operational requirements are consistent. Efforts support Army and joint initiatives. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease is due to decreased requirements for iterative capability analyses and assessments.			
Title: Systems Architecture Development ***Description:*** Funds are to be used for the following efforts ***FY 2021 Plans:*** FFRDC contractor will continue to conduct broad concept studies with emphasis on interoperability and joint/coalition operations. ***FY 2022 Plans:*** FFRDC contractor will continue to conduct broad concept studies with emphasis on interoperability and joint/coalition joint/ coalition operations ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease is due to decreased requirements for system architecture development.	0.474	0.770	0.669
Title: AE2S Software ***Description:*** Procures AE2S software integration and enhancements for the single program language, single platform system that incorporates FDIIS, CEaVa, COP and AFM. ***FY 2021 Plans:*** Contractor will continue to incorporate the development of new applications to satisfy Strategic Portfolio Analysis Review (SPAR), Sustainment Program Evaluation Group (SS PEG), and Equipping PEG (EE PEG) Manpower. ***FY 2022 Plans:*** Contractor will continue to incorporate the development of new applications to satisfy Strategic Portfolio Analysis Review (SPAR), Sustainment Program Evaluation Group (SS PEG), and Equipping PEG (EE PEG) Manpower. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	1.814	0.558	0.566

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203758A / *Digitization*	**Project (Number/Name)** 374 / *HOR Battlefld Digitizn*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Increase is due to inflation.			
Title: Technical Reviews and Technical Performance Analysis ***Description:*** Funds are to be used for the following efforts ***FY 2021 Plans:*** Contractor will continue to provide technology maturity assessments and prepare technical recommendations in support of Army Transformation and specific technologies of interest to G8. Test and evaluate network systems and infrastructure modeling and simulations. ***FY 2022 Plans:*** Contractor will continue to provide technology maturity assessments and prepare technical recommendations in support of Army Transformation and specific technologies of interest to G8. Test and evaluate network systems and infrastructure modeling and simulations. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease is due to decreased requirements for Technical Review and Technical Performance Analysis.	0.475	0.825	0.722
Title: Academic Research ***Description:*** Apply university academic and research resources to the integration of Army complex modeling, simulation, and training in support of modernized forces. ***FY 2021 Plans:*** Will continue to apply university academic and research resources to the integration of Army complex modeling, simulation, and training in support of modernized forces. ***FY 2022 Plans:*** Will continue to apply university academic and research resources to the integration of Army complex modeling, simulation, and training in support of modernized forces.	0.140	0.140	0.140
Accomplishments/Planned Programs Subtotals	4.043	4.351	3.936

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203758A / *Digitization*	**Project (Number/Name)** 374 / *HOR Battlefld Digitizn*

D. Acquisition Strategy

The AE2S development will be done through either a competitive Cost Plus or Fixed Price Incentive contracts that will deliver capabilities in increments, recognizing up front the need for future improvements. The objective of the strategy is to develop and optimize system capabilities while reducing risk and streamlining business and engineering processes.

FFRDC requirements will be accomplished by competitive contract.

Other efforts will be accomplished by various contract methods and types.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / *Digitization*	Project (Number/Name) 374 / *HOR Battlefld Digitizn*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Digitization Technical Integration	Various	Various : Various	5.556	-		-		-		-		-	0.000	5.556	-
Joint & Coalition Interoperability	Various	Various : Various	5.091	-		-		-		-		-	0.000	5.091	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	FY 2018 NDAA SEC 825 MDAP Cost Overrun : FY 2018 NDAA SEC 825 MDAP Cost Overrun	0.028	-		-		-		-		-	0.000	0.028	-
		Subtotal	10.675	-		-		-		-		-	0.000	10.675	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Equipping Enterprise SYstem (AE2S) Software	C/CPFF	TBD : TBD	9.282	1.814		0.558		0.566		-		0.566	Continuing	Continuing	Continuing
Cross-Platform Development	Various	TBD : TBD	3.605	-		-		-		-		-	0.000	3.605	-
		Subtotal	12.887	1.814		0.558		0.566		-		0.566	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperability and Integration	Various	Various : Various	8.444	0.554		1.047		0.937		-		0.937	0.000	10.982	-
Operational Capability Analysis and Evaluation	Various	VAR : VAR	7.752	0.586		1.011		0.902		-		0.902	0.000	10.251	-
Academic Research	Various	Various : Various	3.231	0.140		0.140		0.140		-		0.140	0.000	3.651	-
Operational CapabilityAnalysis and Evaluation	Various	Various : Various	5.608	-		-		-		-		-	0.000	5.608	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / *Digitization*	Project (Number/Name) 374 / *HOR Battlefld Digitizn*	

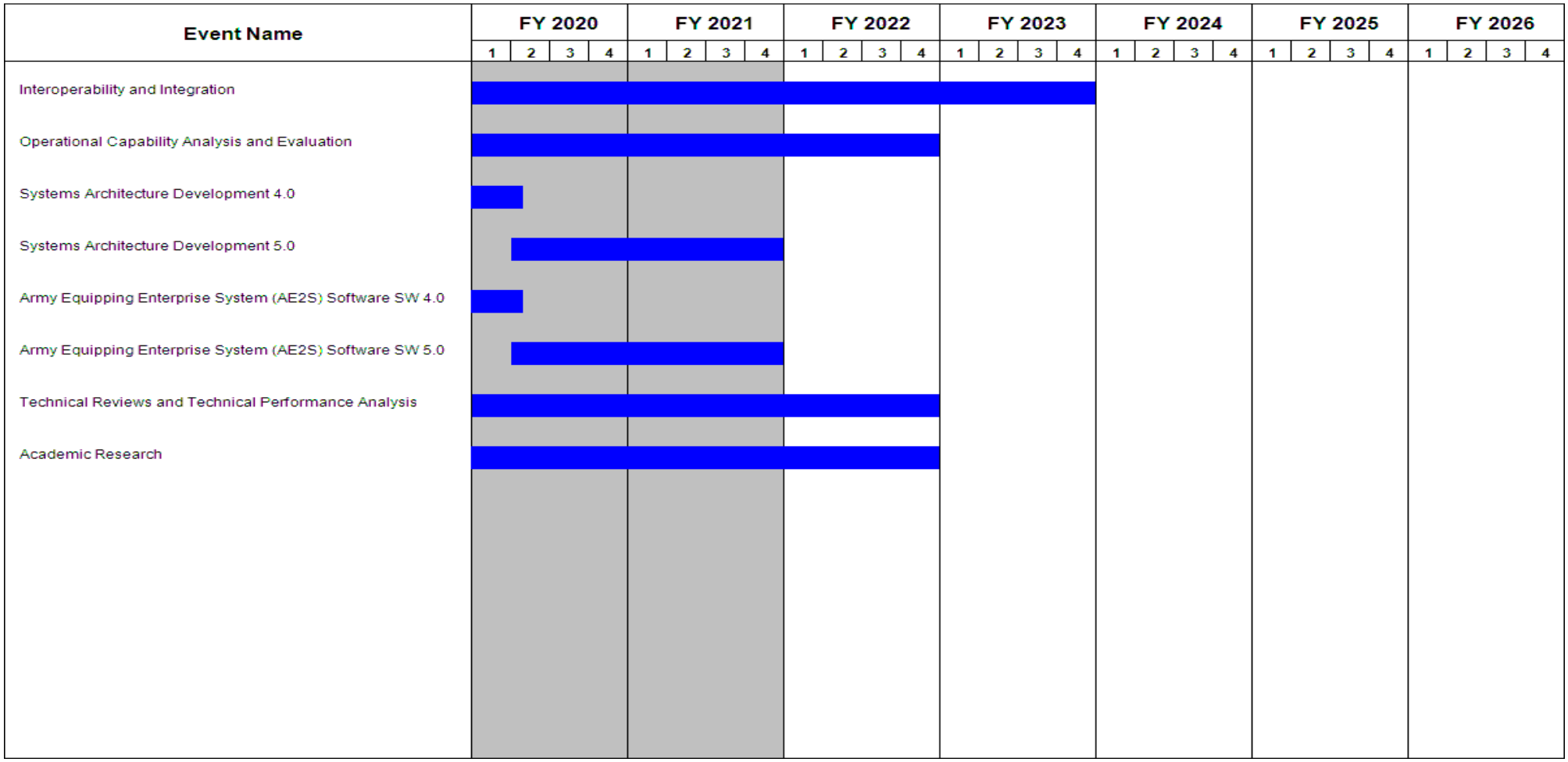
Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Architecture Development	Various	VAR : VAR	6.940	0.474		0.770		0.669		-		0.669	0.000	8.853	-
Technical Reviews and Technical Performance Analysis	Various	VAR : VAR	6.707	0.475		0.825		0.722		-		0.722	0.000	8.729	-
		Subtotal	38.682	2.229		3.793		3.370		-		3.370	0.000	48.074	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	62.244	4.043		4.351		3.936		-		3.936	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203758A / *Digitization*	**Project (Number/Name)** 374 / *HOR Battlefld Digitizn*



Note

None.

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203758A / *Digitization*	**Project (Number/Name)** 374 / *HOR Battlefld Digitizn*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Interoperability and Integration	1	2016	4	2023
Operational Capability Analysis and Evaluation	1	2016	4	2022
Systems Architecture Development 1.0	2	2015	2	2016
Systems Architecture Development 2.0	3	2016	3	2017
Systems Architecture Development 3.0	4	2017	4	2018
Systems Architecture Development 4.0	1	2019	1	2020
Systems Architecture Development 5.0	2	2020	4	2021
Army Equipping Enterprise System (AE2S) Software SW 1.0	2	2015	2	2016
Army Equipping Enterprise System (AE2S) Software SW 2.0	3	2016	3	2017
Army Equipping Enterprise System (AE2S) Software SW 3.0	4	2017	4	2018
Army Equipping Enterprise System (AE2S) Software SW 4.0	1	2019	1	2020
Army Equipping Enterprise System (AE2S) Software SW 5.0	2	2020	4	2021
Technical Reviews and Technical Performance Analysis	1	2015	4	2022
Academic Research	3	2015	4	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203801A *I Missile/Air Defense Product Improvement Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	1.235	1.241	0.127	-	0.127	-	-	-	-	-	-
038: *Avenger PIP*	-	1.235	1.241	0.127	-	0.127	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Avenger is a lightweight, ground-to-air missile and gun weapon system mounted on a High Mobility Multi-purpose Wheeled Vehicle. The system protects against unmanned aircraft systems, cruise missiles, and fixed and rotary wing threats. Avenger provides day/night adverse weather operations, shoot on the move capability, rapid target engagement, and remote firing capability. It can be air dropped, lifted by helicopter and is air transportable. The system employs up to eight Stinger missiles to counter aerial threats and a .50 Caliber Machine Gun (M3P) for close-in ground and air threats. An Identification Friend or Foe (IFF) system aids in the identification of friendly aircraft in order to minimize the potential for fratricide. The Avenger fleet of 453 systems includes 169 systems that are equipped with a digital Slew-to-Cue (STC) capability to speed target detection and engagement.

The Avenger Modification - Service Life Extension Program (MOD-SLEP) consists of Project 038: Avenger Production Improvement Program (PIP) and Program Element CE8710: Avenger MODS. The ongoing MOD-SLEP addresses obsolescence of Avenger components to ensure Avenger maintains operational capability through Fiscal Year (FY) 2031. Five key MOD-SLEP components are: the Targeting Console (TC), the M3P, the Avenger Fire Control Computer (AFCC), the Mode 5 IFF and the Vehicle Internal Communications (VIC-5). Additional Obsolescence Mitigation Items include Avenger Organizational Maintenance Tool Kits, AN/PSM-95 Electronic Systems Test Set and the Avenger Remote Handheld Terminal Unit mounting kits.

The Avenger MOD-SLEP is fielded in two phases. Phase I fields the TC to 169 STC Avengers. The M3P is fielded as spares through the supply system. Phase II fields the AFCC to 169 STC Avengers and both the VIC-5 and the Mode 5 IFF to all 453 Avengers.

FY 2022 funding of $0.127 million ensures that several Avenger components are viable and sustainable through the end of program life. This includes continued investigation of technologies that will provide Assured Positioning Navigation and Timing capability, including the Anti-Jam Antenna and DAGR Distributed Device (D3), which will provide M-Code capability. Avenger MOD-SLEP maintains operational capability of Avenger until FY 2031.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0203801A *I Missile/Air Defense Product Improvement Program*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	1.287	1.288	0.128	-	0.128
Current President's Budget	1.235	1.241	0.127	-	0.127
Total Adjustments	-0.052	-0.047	-0.001	-	-0.001
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.052	-0.047			
• Adjustments to Budget Years	-	-	-0.001	-	-0.001

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / *Missile/Air Defense Product Improvement Program*	Project (Number/Name) 038 / *Avenger PIP*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
038: *Avenger PIP*	-	1.235	1.241	0.127	-	0.127	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Avenger is a lightweight, ground-to-air missile and gun weapon system mounted on a High Mobility Multi-purpose Wheeled Vehicle. The system protects against unmanned aircraft systems, cruise missiles, and fixed and rotary wing threats. Avenger provides day/night adverse weather operations, shoot on the move capability, rapid target engagement, and remote firing capability. It can be air dropped, lifted by helicopter and is air transportable. The system employs up to eight Stinger missiles to counter aerial threats and a .50 Caliber Machine Gun (M3P) for close-in ground and air threats. An Identification Friend or Foe (IFF) system aids in the identification of friendly aircraft in order to minimize the potential for fratricide. The Avenger fleet of 453 systems includes 169 systems that are equipped with a digital Slew-to-Cue (STC) capability to speed target detection and engagement.

The Avenger Modification - Service Life Extension Program (MOD-SLEP) consists of Project 038: Avenger Production Improvement Program (PIP) and Program Element CE8710: Avenger MODS. The ongoing MOD-SLEP addresses obsolescence of Avenger components to ensure Avenger maintains operational capability through Fiscal Year (FY) 2031. Five key MOD-SLEP components are: the Targeting Console (TC), the M3P, the Avenger Fire Control Computer (AFCC), the Mode 5 IFF and the Vehicle Internal Communications (VIC-5). Additional Obsolescence Mitigation Items include Avenger Organizational Maintenance Tool Kits, AN/PSM-95 Electronic Systems Test Set and the Avenger Remote Handheld Terminal Unit mounting kits.

The Avenger MOD-SLEP is fielded in two phases. Phase I fields the TC to 169 STC Avengers. The M3P is fielded as spares through the supply system. Phase II fields the AFCC to 169 STC Avengers and both the VIC-5 and the Mode 5 IFF to all 453 Avengers.

FY 2022 funding of $0.127 million ensures that several Avenger components are viable and sustainable through the end of program life. This includes the continued investigation of technologies that will provide Assured Positioning Navigation and Timing (A-PNT) capability, including the Anti-Jam Antenna and DAGR Distributed Device (D3), which will provide M-Code capability. Avenger MOD-SLEP maintains operational capability of Avenger until FY 2031.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Avenger MOD-SLEP	1.235	1.241	0.127
Description: The Avenger MOD-SLEP consists of development activities for platform integration, software upgrades, and capability enhancements. Develops and executes test requirements and conducts limited contractor and government testing. Performs technical assessments, concept studies, cost reduction, risk reduction and development documentation.			
FY 2021 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203801A / *Missile/Air Defense Product Improvement Program*	**Project (Number/Name)** 038 / *Avenger PIP*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Funding provides for the completion of the MOD-SLEP Phase II Materiel Release (MR). Funding provides for continuing mitigation of emerging obsolescence issues and maintains the viability of the Avenger system. This includes the initial investigation of technologies that will provide Assured Positioning Navigation and Timing (A-PNT) capability, including the Anti-Jam Antenna and DAGR D3, which will provide M-Code capability. ***FY 2022 Plans:*** Funding provides for continuing mitigation of emerging obsolescence issues and maintains the viability of the Avenger system. This includes the continuing investigation of technologies that will provide A-PNT capability, including the Anti-Jam Antenna and DAGR D3, which will provide M-Code capability. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The decrease from FY 2021 to FY 2022 is due to completion of MOD-SLEP Phase II MR and because of the level of effort required for the A-PNT capability.			
Accomplishments/Planned Programs Subtotals	1.235	1.241	0.127

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• CE8710: *AVENGER MODS*	14.107	13.942	11.227	-	11.227	-	-	-	-	-	-

Remarks

CE8710 Avenger MODS procures the MOD-SLEP components for the Avenger system. This ensures that Avenger is viable and sustainable through FY 2031. This program is an integral part of the Army Air and Missile Defense Modernization strategy.

D. Acquisition Strategy

The Avenger MOD-SLEP addresses obsolescence of key components and ensures that Avenger is viable and sustainable through FY 2031.

The MOD-SLEP Phase I component is the TC.

The MOD-SLEP Phase II components are the AFCC, the Mode 5 IFF, the VIC-5 and the M3P machine gun. The M3P machine gun will be fielded through attrition. The other MOD-SLEP Phase II components will be installed in the field as a single installation package.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / *Missile/Air Defense Product Improvement Program*	Project (Number/Name) 038 / *Avenger PIP*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Avenger Modification Management Services	Various	Various : Redstone Arsenal, AL	2.593	0.463	Oct 2019	0.178	Oct 2020	-		-		-	0.000	3.234	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	0.053	-		-		-		-		-	0.000	0.053	-
		Subtotal	2.646	0.463		0.178		-		-		-	0.000	3.287	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Avenger Modification Product Development	SS/ Various	Raytheon, The Boeing Company and others : Aberdeen Proving Grounds, MD and Huntsville, AL	9.625	0.224	Oct 2019	0.396	Oct 2020	0.127	Oct 2021	-		0.127	0.000	10.372	-
		Subtotal	9.625	0.224		0.396		0.127		-		0.127	0.000	10.372	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Avenger Modification Test Support	Various	The Boeing Company, Aviation and Missile Research Development and Engineering Center (AMRDEC) and others : Huntsville, AL and Redstone Arsenal, AL	6.803	0.548	Oct 2019	0.667	Oct 2020	-		-		-	0.000	8.018	-
		Subtotal	6.803	0.548		0.667		-		-		-	0.000	8.018	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / *Missile/Air Defense Product Improvement Program*	Project (Number/Name) 038 / *Avenger PIP*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	19.074	1.235		1.241		0.127		-		0.127	0.000	21.677	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203801A / *Missile/Air Defense Product Improvement Program*	**Project (Number/Name)** 038 / *Avenger PIP*

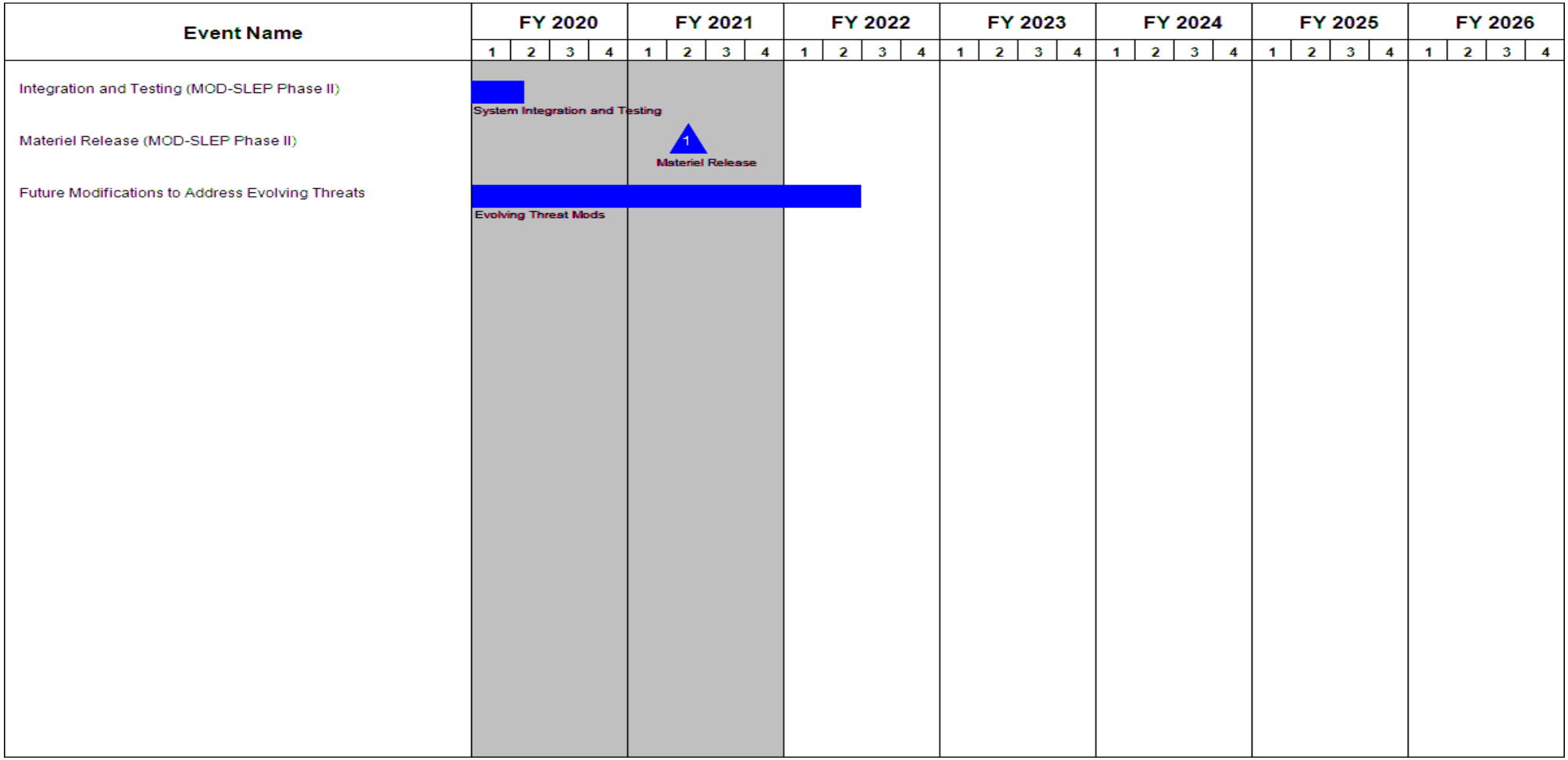


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203801A / *Missile/Air Defense Product Improvement Program*	**Project (Number/Name)** 038 / *Avenger PIP*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Integration and Testing (MOD-SLEP Phase II)	2	2018	2	2020
Live Fire Testing (MOD-SLEP Phase II)	4	2018	4	2018
Logistics Demo (MOD-SLEP Phase II)	2	2019	4	2019
Materiel Release (MOD-SLEP Phase II)	2	2021	2	2021
Future Modifications to Address Evolving Threats	1	2020	2	2022

Note

MOD-SLEP Phase II components are the AFCC, IFF, VIC-5 and M3P machine gun.
AFCC: Avenger Fire Control Computer
IFF: Identification Friend or Foe
MOD-SLEP: Modification - Service Life Extension Program
VIC: Vehicle Internal Communications

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0203802A / *Other Missile Product Improvement Programs*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	-	15.268	10.265	-	10.265	-	-	-	-	-	-
VT9: *Lethal Miniature Aerial Missile System (LMAMS)*	-	-	2.300	1.800	-	1.800	-	-	-	-	-	-
VV2: *TOW*	-	-	12.968	8.465	-	8.465	-	-	-	-	-	-
Program MDAP/MAIS Code: PRE												

A. Mission Description and Budget Item Justification

VT9: The Fiscal Year (FY) 2022 Direct War/Enduring Operations dollars in the amount of $1.800 million will continue to support the Lethal Miniature Aerial Missile System (LMAMS). LMAMS is a single man-portable/operable, light-weight organic, beyond line-of-sight, precision guided, loitering aerial missile system capable of locating and engaging obscured and/or fleeing enemy targets that otherwise cannot be engaged by typical direct fire weapon systems.

Funding supports engineering and integration of capability improvements identified by trained operators during an Assessment of Operational Utility (AOU) conducted in 2018. Once integrated into the current LMAMS, Production Verification Testing will be conducted to demonstrate successful incorporation of new technology.

VV2: TOW Weapon System includes the Improved Target Acquisition System (ITAS) and other TOW missile launchers, TOW missiles (BGM-71 series) and other missiles capable of being fired from TOW Missile launchers, and associated tactical training aids/devices. The TOW Weapon System provides long-range, lethal anti-armor and precision assault fires capability for Army Infantry Brigade Combat Teams (IBCT), Stryker Brigade Combat Teams (SBCT) and Armor Brigade Combat Teams (ABCT) within the Active, Reserve, and National Guard components. The United States Marine Corps (USMC) employs the TOW missile from its ITAS derived M41A7 Saber launchers and ATGM vehicles.

The TOW Weapon System improvement program integrates US Army missile and launcher modifications to improve missile safety and reliability, increase system survivability and lethality, and enhance system network capabilities. These capability improvements support Multi-Domain Operations (MDO) as a part of Joint All Domain Operations (JADO) and the Functional Concept for Movement and Maneuver by providing precise lethal capabilities in multiple domains against armored threat systems.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0203802A *I Other Missile Product Improvement Programs*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	0.000	81.724	54.548	-	54.548
Current President's Budget	0.000	15.268	10.265	-	10.265
Total Adjustments	0.000	-66.456	-44.283	-	-44.283
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-65.837			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-0.619			
• Adjustments to Budget Years	-	-	-44.283	-	-44.283

Change Summary Explanation

$44.283 million of the base funding adjustment in FY 2022 due to Army decision to not transition CD ATACMS, ATACMS Mods (Program Element (PE) 0203802A Other Missile Product Improvement Programs Project DZ9 ATACMS Mods).

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / *Other Missile Product Improvement Programs*	Project (Number/Name) VT9 / *Lethal Miniature Aerial Missile System (LMAMS)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
VT9: *Lethal Miniature Aerial Missile System (LMAMS)*	-	-	2.300	1.800	-	1.800	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

VT9: Lethal Miniature Aerial Missile System (LMAMS) is a single man-portable/operable, light-weight organic, beyond line-of-sight, precision guided, loitering aerial missile system capable of locating and engaging obscured and/or fleeing enemy targets that otherwise cannot be engaged by typical direct fire weapon systems.

Funding supports engineering and integration of capability improvements identified by trained operators during an Assessment of Operational Utility (AOU) conducted in 2018. Once integrated into the current LMAMS, Production Verification Testing will be conducted to demonstrate successful incorporation of new technology.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: LMAMS Capability Improvements	-	2.300	1.800
Description: Joint Urgent Operational Need (JUON) User Required Capability Improvements supporting CC-0556. ***FY 2021 Plans:*** Develop Improved Datalink to include waveform development and improving anti-jam performance. ***FY 2022 Plans:*** Complete development of an improved datalink capable of integration into an LMAMS solution. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY21 funding continues the development of the improved datalink efforts and FY22 funding completes the development and includes the integration into an LMAMS solution.			
Accomplishments/Planned Programs Subtotals	-	2.300	1.800

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C88001: *LETHAL MINIATURE AERIAL MISSILE SYSTEM (LMAMS)*	48.300	-	68.278	-	68.278	-	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203802A / *Other Missile Product Improvement Programs*	**Project (Number/Name)** VT9 / *Lethal Miniature Aerial Missile System (LMAMS)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost

Remarks

D. Acquisition Strategy

The Research, Development, Test and Evaluation (RDTE) funding will continue the development and integration of the improved datalink initiated by Combat Capabilities Development Center, Aviation and Missile Command (CCDC AvMC) and transitioned to the Tactical Aviation and Ground Munitions Project Office. LMAMS procurement acquisition will be competed using Other Transaction Authority (OTA) that will begin in FY21. The improved datalink will be incorporated into the LMAMS solution.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / *Other Missile Product Improvement Programs*	Project (Number/Name) VT9 / *Lethal Miniature Aerial Missile System (LMAMS)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering / Program Management	MIPR	CCDC AvMC : Redstone Arsenal, AL	-	-		0.193	Apr 2021	0.163	Jan 2022	-		0.163	0.000	0.356	-
		Subtotal	-	-		0.193		0.163		-		0.163	0.000	0.356	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	MIPR	CCDC AvMC : Redstone Arsenal, AL	-	-		2.061	May 2021	0.986	Jun 2022	-		0.986	0.000	3.047	-
Technology Integration	SS/CPFF	TBD : TBD	-	-		-		0.500	Jun 2022	-		0.500	0.000	0.500	-
		Subtotal	-	-		2.061		1.486		-		1.486	0.000	3.547	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Component Level Product Verification Testing	MIPR	Dugway Proving Grounds : Dugway, UT	-	-		0.046	Nov 2021	-		-		-	0.000	0.046	-
System Level Product Verification Testing	MIPR	Dugway Proving Grounds : Dugway, UT	-	-		-		0.151	Sep 2022	-		0.151	0.000	0.151	-
		Subtotal	-	-		0.046		0.151		-		0.151	0.000	0.197	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		2.300		1.800		-		1.800	0.000	4.100	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / *Other Missile Product Improvement Programs*	Project (Number/Name) VT9 / *Lethal Miniature Aerial Missile System (LMAMS)*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203802A / *Other Missile Product Improvement Programs*	**Project (Number/Name)** VT9 / *Lethal Miniature Aerial Missile System (LMAMS)*

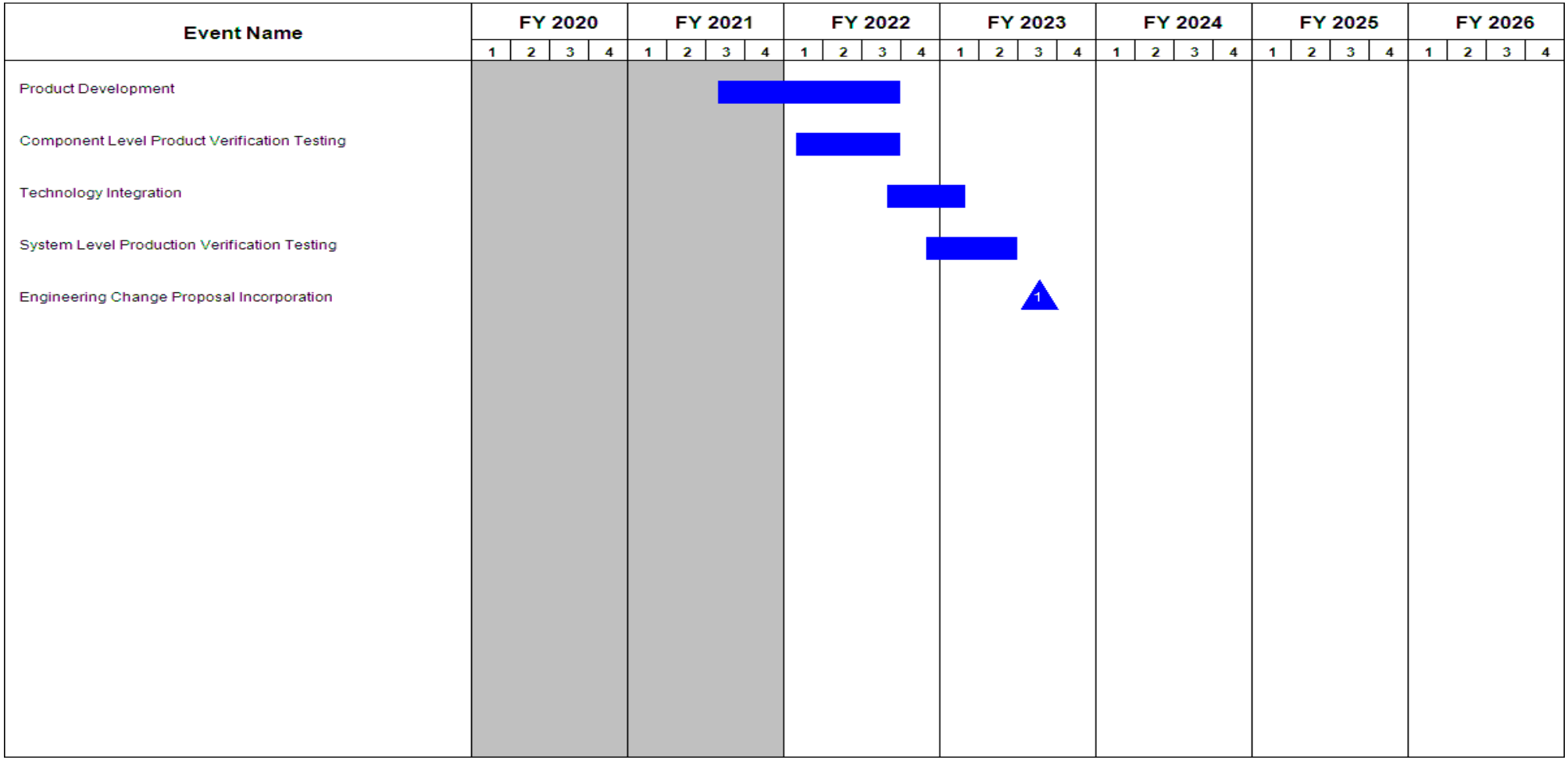


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203802A / *Other Missile Product Improvement Programs*	**Project (Number/Name)** VT9 / *Lethal Miniature Aerial Missile System (LMAMS)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Product Development	3	2021	3	2022
Component Level Product Verification Testing	1	2022	3	2022
Technology Integration	3	2022	1	2023
System Level Production Verification Testing	4	2022	2	2023
Engineering Change Proposal Incorporation	3	2023	3	2023

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / *Other Missile Product Improvement Programs*	Project (Number/Name) VV2 / *TOW*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
VV2: *TOW*	-	-	12.968	8.465	-	8.465	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

VV2: TOW Weapon System includes the Improved Target Acquisition System (ITAS) and other TOW missile launchers, TOW missiles (BGM-71 series) and other missiles capable of being fired from TOW Missile launchers, and associated tactical training aids/devices. The TOW Weapon System provides long-range, lethal anti-armor and precision assault fires capability for Army Infantry Brigade Combat Teams (IBCT), Stryker Brigade Combat Teams (SBCT) and Armor Brigade Combat Teams (ABCT) within the Active, Reserve, and National Guard components. The United States Marine Corps (USMC) employs the TOW missile from its ITAS derived M41A7 Saber launchers and ATGM vehicles.

The TOW Weapon System improvement program integrates US Army missile and launcher modifications to improve missile safety and reliability, increase system survivability and lethality, and enhance system network capabilities. These capability improvements support Multi-Domain Operations (MDO) as a part of Joint All Domain Operations (JADO) and the Functional Concept for Movement and Maneuver by providing precise lethal capabilities in multiple domains against armored threat systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: TOW Missile Obsolescence Mitigation and System Improvements	-	12.968	7.693
Description: These funds will be used for development and qualification of new components, parts, and sub-systems to replace technology and production obsolete components, parts, and sub-systems. These components will be cut into production via Engineering Change Proposal upon qualification.			
FY 2021 Plans: Initiate TOW Missile Obsolescence Mitigation for critical components required to maintain TOW Missile Production. Initiate Radio Frequency (RF) Data Link (DL) receiver and transmitter development and optimization, component design engineering for the Missile Computer (MC) and Short Wave Infra-Red (SWIR) beacon, missile system specification development, missile system integration engineering, and initiate missile system level technical data package.			
FY 2022 Plans: Implement the design engineering of the RF DL, MC, and SWIR beacon, and required software to facilitate integration into a tactical system. Build and test components at the component and sub-system level. FY22 engineering efforts culminate in the completion of Design Engineering and a Component Critical Design Review in 1QFY23.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203802A / *Other Missile Product Improvement Programs*	**Project (Number/Name)** VV2 / *TOW*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
The decrease in funds from FY2021 to FY2022 is due to change in plans for system level integration of components required for TOW Missile obsolescence mitigation.			
Title: Integration and Counter Measure/Threat management ***Description:*** These funds will be used to prepare and perform technical assessments, threat analysis, concept studies, demonstrations, tests and risk mitigation efforts to address current and emerging threats. ***FY 2022 Plans:*** Perform technical assessments, analysis and testing of TOW Missiles against various targets to demonstrate current and required capabilities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding increase from FY21 to FY22 due to requirements for concept studies and government testing.	-	-	0.772
Accomplishments/Planned Programs Subtotals	-	12.968	8.465

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C59300: *TOW 2 System Summary*	118.458	112.974	104.412	-	104.412	-	-	-	-	-	-
• C61700: *ITAS/TOW Mods*	3.469	5.666	4.561	-	4.561	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

TOW Missile obsolescence mitigation design engineering, component hardware build, and component systems integration will be conducted via sole source contracts to Raytheon Missiles and Defense (RMD) as the current TOW Missile Prime contractor and only source that is both facilitized and qualified to produce all TOW Missile configurations.

The Acquisition Strategy uses in-house expertise, Other Government Agencies (OGA), defense industry capabilities, and when appropriate Other Transactional Agreements. The strategy allows the Government the ability to support urgent operational needs and unanticipated requirements, which require immediate and expert attention. This strategy will allow the Government to maintain the TOW Weapon System, and posture for emerging requirements while leveraging new authorities and bringing along as many technologies as funding allows.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / *Other Missile Product Improvement Programs*	Project (Number/Name) VV2 / *TOW*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engr/Program Management, Govt	MIPR	Multiple : Redstone Arsenal, AL	-	-		1.359	Apr 2021	1.223	Mar 2022	-		1.223	0.000	2.582	-
		Subtotal	-	-		1.359		1.223		-		1.223	0.000	2.582	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Component Design Engineering	SS/CPFF	Raytheon : Tucson, AZ	-	-		11.609	Apr 2021	1.933	Mar 2022	-		1.933	0.000	13.542	-
Component Hardware Build	SS/CPFF	Raytheon : Tucson, AZ	-	-		-		3.129	Jan 2022	-		3.129	0.000	3.129	-
Integration and Counter Measure/Threat management	Various	Various : Various	-	-		-		0.653	Jan 2022	-		0.653	0.000	0.653	-
		Subtotal	-	-		11.609		5.715		-		5.715	0.000	17.324	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Component/System Test and Evaluation	SS/CPFF	Raytheon : Tucson, AZ	-	-		-		1.527	Mar 2022	-		1.527	0.000	1.527	-
		Subtotal	-	-		-		1.527		-		1.527	0.000	1.527	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		12.968		8.465		-		8.465	0.000	21.433	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203802A / *Other Missile Product Improvement Programs*	**Project (Number/Name)** VV2 / *TOW*

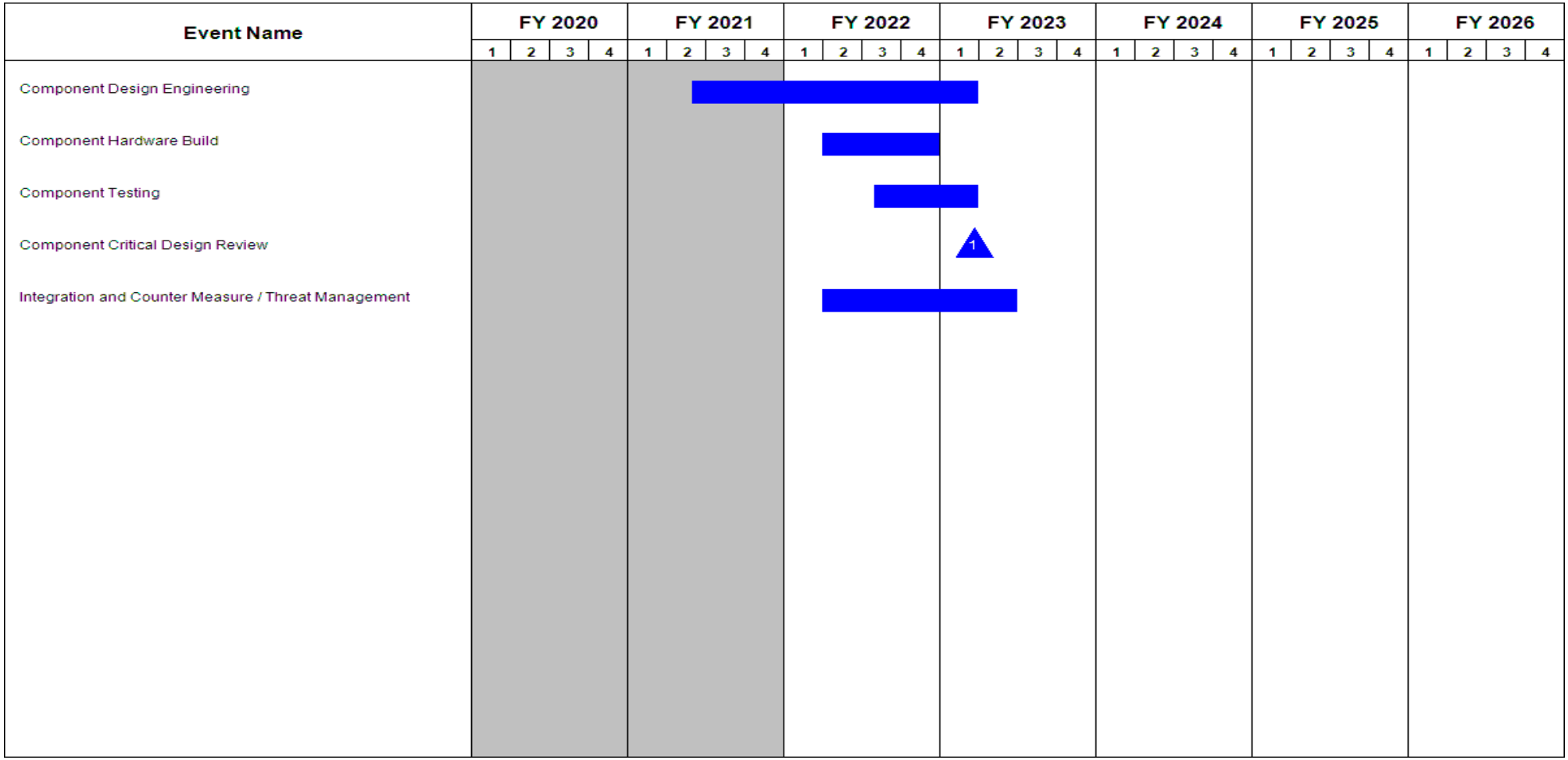


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0203802A / *Other Missile Product Improvement Programs*	**Project (Number/Name)** VV2 / *TOW*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Component Design Engineering	2	2021	1	2023
Component Hardware Build	2	2022	4	2022
Component Testing	3	2022	1	2023
Component Critical Design Review	1	2023	1	2023
Integration and Counter Measure / Threat Management	2	2022	2	2023

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0205412A *I Environmental Quality Technology - Operational System Dev*

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	10.000	0.250	0.262	-	0.262	-	-	-	-	-	-
EE6: *Environmental Information Tech Modernization*	-	10.000	0.250	0.262	-	0.262	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Environmental Information Technology Management (EITM) program includes support for the Defense Environment, Safety & Occupational Health Network Information Exchange (DENIX) defense business system, as well as its database and reporting application, the Knowledge Based Corporate Reporting System (KBCRS). This request for research, development, test and evaluation (RDTE) is to implement necessary enhancements to facilitate DENIX's Platform-as-a-Service capabilities, with additional modernizations that will improve the DoD's ESOH system of record and reporting tool set. This also includes upgrades to incorporate ongoing cybersecurity, cloud computing, and other information technology requirements.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	10.000	0.259	0.265	-	0.265
Current President's Budget	10.000	0.250	0.262	-	0.262
Total Adjustments	0.000	-0.009	-0.003	-	-0.003
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-0.009			
• Adjustments to Budget Years	-	-	-0.003	-	-0.003

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: EE6: *Environmental Information Tech Modernization*		
Congressional Add: *Securing the availability of green, enhanced coatings*	10.000	-
Congressional Add Subtotals for Project: EE6	10.000	-
Congressional Add Totals for all Projects	10.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205412A / *Environmental Quality Technology - Operational System Dev*	Project (Number/Name) EE6 / *Environmental Information Tech Modernization*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EE6: *Environmental Information Tech Modernization*	-	10.000	0.250	0.262	-	0.262	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Adjustment in accordance with FY22 PB.

A. Mission Description and Budget Item Justification

The Environmental Information Technology Management (EITM) program includes support for the Defense Environment, Safety & Occupational Health Network and Information Exchange (DENIX) defense business system, as well as its database and reporting application, the Knowledge Based Corporate Reporting System (KBCRS). This request for research, development, test, and evaluation (RDTE) is to implement necessary enhancements to facilitate DENIX's Platform-as-a-Service (PaaS) capabilities, with additional modernizations that will improve the DoD's ESOH system of record and reporting tool set. This also includes upgrades to incorporate ongoing cybersecurity, cloud computing, and other information technology requirements.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Environmental Information Technology Modernization	-	0.250	0.262
Description: Prototype, develop, and implement platform enhancements as required to meet data management requirements for the Defense Environment, Safety & Occupational Health Network and Information Exchange (DENIX) and its reporting application, the Knowledge Based Corporate Reporting System (KBCRS).			
FY 2021 Plans: The DENIX platform will continue to use machine learning algorithms to ?learn? the business processes and rules used by OSD for the environmental data calls (Defense Environmental Programs Annual Report to Congress and the Environmental Management Review). ?Learning? this information will pave the way for the prototyping of a tool that will allow KBCRS to predict anomalies and trends in data input, improving data quality.			
FY 2022 Plans: The DENIX platform will continue to use machine learning algorithms to ?learn? the business processes and rules used by OSD for the environmental data calls (Defense Environmental Programs Annual Report to Congress and the Environmental Management Review). ?Learning? this information will pave the way for the prototyping of a tool that will allow KBCRS to predict anomalies and trends in data input, improving data quality.			
FY 2021 to FY 2022 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205412A / *Environmental Quality Technology - Operational System Dev*	**Project (Number/Name)** EE6 / *Environmental Information Tech Modernization*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Inflation adjustment			
Accomplishments/Planned Programs Subtotals	-	0.250	0.262

	FY 2020	FY 2021
Congressional Add: Securing the availability of green, enhanced coatings	10.000	-
FY 2020 Accomplishments: Program Increase - Securing the availability of green, enhanced coatings		
Congressional Adds Subtotals	10.000	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• OMA - 432612000: *Information Mgmt - Automation*	-	-	-	-	-	-	-	-	-		

Remarks

Information Mgmt - Automation 43261200 - This is the associated OMA line that provides daily support for the DoD Environment, Safety & Occupational Health Network Information Exchange and associated applications. EITM is managed as a Defense Business System #3180.

D. Acquisition Strategy

The Deputy Assistant Secretary of the Army for Environment, Safety & Occupational Health is the designated Executive Agent for the Environmental Information Technology Management (EITM) program. Defined by the DoD Directive 4715.1E, the EITM mission is to ensure efficient use of enterprise environment, safety, and occupational health (ESOH) corporate information management processes by providing and sustaining requirement-driven ESOH corporate data management, Congressional-reporting, and public outreach tools to the DoD, and other DoD stakeholders. Funding provided for this program will allow EITM to continue to develop and modernize the platform to meet Army and DoD policy-driven cloud computing and cybersecurity requirements. Prior to funding being committed, DoD ESOH stakeholders and authoritative information technology organizations were consulted to determine necessary system interface upgrades to be incorporated. Expanding DENIX's architecture to create a Level 2 container separate from the current Level 4 container will not only provide a more secure, cybersecurity risk-adverse environment, but it will also optimize performance, capabilities, and mandatory reporting for ESOH stakeholders using a PaaS delivery model. This phased solution begins in FY 2018 by prototyping of system architecture optimization that improves user experience, enabling web conferencing in FY 2019 and applying machine learning concepts to improve data quality in FY 2020-2022.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205412A / *Environmental Quality Technology - Operational System Dev*	Project (Number/Name) EE6 / *Environmental Information Tech Modernization*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System enhancements for required network interfaces to support EITM mission.	C/FFP	Delta Resources : Alexandria, VA	0.706	-		0.250		0.262		-		0.262	0.000	1.218	-
Congressinal Add - securing the availability of green, enhanced coatings	TBD	TBD : TBD	-	10.000		-		-		-		-	0.000	10.000	-
		Subtotal	0.706	10.000		0.250		0.262		-		0.262	0.000	11.218	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.706	10.000		0.250		0.262		-		0.262	0.000	11.218	N/A

Remarks

The $10,000 from FY20 is a congressional addition. The $10,000 is misaligned into this PE/PROJ.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205412A / *Environmental Quality Technology - Operational System Dev*	**Project (Number/Name)** EE6 / *Environmental Information Tech Modernization*

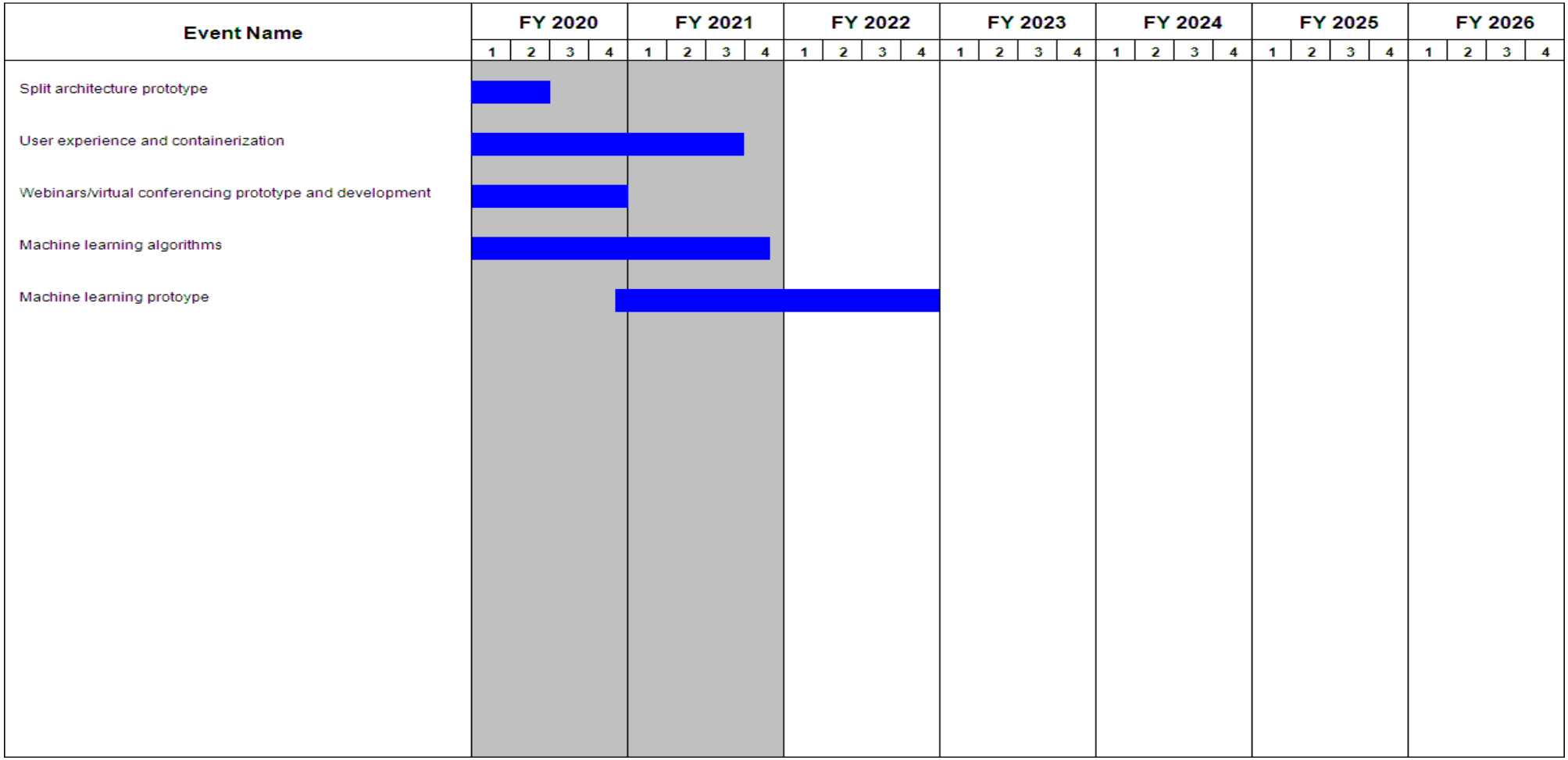


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205412A / *Environmental Quality Technology - Operational System Dev*	**Project (Number/Name)** EE6 / *Environmental Information Tech Modernization*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Split architecture prototype	2	2019	2	2020
User experience and containerization	3	2019	3	2021
Webinars/virtual conferencing prototype and development	1	2020	4	2020
Machine learning algorithms	1	2020	4	2021
Machine learning protoype	4	2020	4	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205456A / *Lower Tier Air and Missile Defense (AMD) System*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	93.743	-	0.182	-	0.182	-	-	-	-	-	-
EF9: *System Integration and Test*	-	93.743	-	0.182	-	0.182	-	-	-	-	-	-
Program MDAP/MAIS Code: 505												

A. Mission Description and Budget Item Justification

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against all threats that would not be possible in flight tests due to cost, target and range constraints. Flight testing is periodically required for validation of the modeling and simulation as well as satisfying Army Test and Evaluation Command/Director, Operational Test and Evaluation (ATEC/DOTE) requirements of segment improvements. The Lower Tier AMD System line also supports identification, analysis, design, and test materiel solutions to counter cyber security and electronic warfare shortcomings to all elements of the Lower Tier Battle Space.

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

Program Element (PE) 0205456A Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement beginning of Fiscal Year (FY) 2021, to PE 0607865A Patriot Product Improvement and C12101000 Lower Tier Air and Missile Defense Sensor beginning of FY 2022.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	97.746	0.166	0.169	-	0.169
Current President's Budget	93.743	0.000	0.182	-	0.182
Total Adjustments	-4.003	-0.166	0.013	-	0.013
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-0.166			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.003	-			
• Adjustments to Budget Years	-	-	0.013	-	0.013

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205456A / *Lower Tier Air and Missile Defense (AMD) System*	Project (Number/Name) EF9 / *System Integration and Test*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EF9: *System Integration and Test*	-	93.743	-	0.182	-	0.182	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against all threats that would not be possible in flight tests due to cost, target and range constraints. Flight testing is periodically required for validation of the modeling and simulation as well as satisfying Army Test and Evaluation Command/Director, Operational Test and Evaluation (ATEC/DOTE) requirements of segment improvements. The Lower Tier AMD System line also supports identification, analysis, design, and test materiel solutions to counter cyber security and electronic warfare shortcomings to all elements of the Lower Tier Battle Space.

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

Program Element (PE) 0205456A Lower Tier Air and Missile Defense (AMD) System funding was realigned to PE 0607865A Patriot Product Improvement beginning of Fiscal Year (FY) 2021, to PE 0607865A Patriot Product Improvement.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Program Development, Integration, and Support	31.256	-	0.182
Description: Funding provides program development, integration, and support for the Lower Tier Air and Missile Defense System. ***FY 2022 Plans:*** Beginning FY 2021, PE 0205456A / Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement. The FY 2022 funds totaling $182 thousand will be used for SMDC support. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Beginning FY 2021, PE 0205456A / Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement; change from FY21 to FY22 is increase in funding for SMDC support.			
Title: Testing, Targets, Modeling and Simulation	62.487	-	-
Accomplishments/Planned Programs Subtotals	93.743	-	0.182

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205456A / *Lower Tier Air and Missile Defense (AMD) System*	**Project (Number/Name)** EF9 / *System Integration and Test*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C53101: *MSE Missile*	702.437	678.148	776.696	-	776.696	-	-	-	-	-	-
• C50016: *System Integration and Test Procurement*	107.157	-	-	-	-	-	-	-	-	-	-
• S40: *Army Integrated Air and Missile Defense*	211.634	206.850	157.873	-	157.873	-	-	-	-	-	-
• BZ5075: *IAMD Battle Command System*	29.629	198.587	301.872	-	301.872	-	-	-	-	-	-
• 0604741A: *Air Defense Command, Control and Intelligence - Eng Dev*	70.279	62.058	59.518	-	59.518	-	-	-	-	-	-
• AD5070: *AIR & MSL Defense Planning & Control Sys*	39.061	62.517	67.193	-	67.193	-	-	-	-	-	-
• EX2: *Lower Tier Air Missile Defense (LTAMD) Capability*	364.154	308.805	327.690	-	327.690	-	-	-	-	-	-
• C62002: *IFPC INC 2-I BLOCK 1 SYSTEM*	9.337	62.461	25.253	-	25.253	-	-	-	-	-	-
• EY7: *IFPC Increment 2 - Block 1*	186.369	153.362	233.512	-	233.512	-	-	-	-	-	-

Remarks

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

D. Acquisition Strategy

The ongoing design and developmental activities enable modeling and simulation infrastructure maintenance and upgrades coupled with end to end testing of the Lower Tier architecture against the evolving threat as an element of an integrated Air and Missile Defense system. This strategy minimizes technological risks and provides a means of enhancing system capability through planned upgrades of deployed systems. Lower Tier system development efforts enable further improvement of system capabilities against emerging and reactive threats. Developing, fabricating and testing hit to kill surface to air missile and associated ground support equipment provides essential increases in battle space, accuracy, lethality and firepower to counter and destroy evolving air defense threats. These state-of-the-art capabilities and enhancements require ongoing demonstration through a series of flight tests and modeling and simulation activities.

Beginning in FY 2021, these efforts will be funded through PE 0607865A Patriot Product Improvement.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205456A / *Lower Tier Air and Missile Defense (AMD) System*	Project (Number/Name) EF9 / *System Integration and Test*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	MIPR	Various : Huntsville, Alabama	5.551	1.890	Dec 2019	-		-		-		-	0.000	7.441	-
PAC-3 Product Office	RO	Project Office : Huntsville, AL	5.167	1.331	Oct 2019	-		-		-		-	0.000	6.498	-
SMDC DA Civilian Labor	IA	SMDC : SMDC	-	-		-		0.182		-		0.182	0.000	0.182	-
		Subtotal	10.718	3.221		-		0.182		-		0.182	0.000	14.121	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Integration MSE LMMFC	Various	Lockheed Martin Missiles and Fire Control (LMMFC) : Dallas, Texas	55.420	16.032	Feb 2020	-		-		-		-	0.000	71.452	-
MSE/PAC-3 Raytheon	Various	Raytheon : Waltham, Massachusetts	25.347	7.332	Feb 2020	-		-		-		-	0.000	32.679	-
SETA Contracts	Various	Multiple : Multiple	7.987	2.377	Feb 2020	-		-		-		-	0.000	10.364	-
U.S. Other Government Agencies (OGAs)	MIPR	Various : Huntsville, Alabama	34.489	6.252	Dec 2019	-		-		-		-	0.000	40.741	-
		Subtotal	123.243	31.993		-		-		-		-	0.000	155.236	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Targets/Threats Simulators	MIPR	Various : Huntsville, Alabama	107.271	25.192	Feb 2020	-		-		-		-	0.000	132.463	-
Modeling and Simulation	MIPR	Various : Huntsville, Alabama	17.253	3.132	Jan 2020	-		-		-		-	0.000	20.385	-
Contractor T&E	Various	Multiple : Multiple	18.958	9.362	Feb 2020	-		-		-		-	0.000	28.320	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205456A / *Lower Tier Air and Missile Defense (AMD) System*	Project (Number/Name) EF9 / *System Integration and Test*	

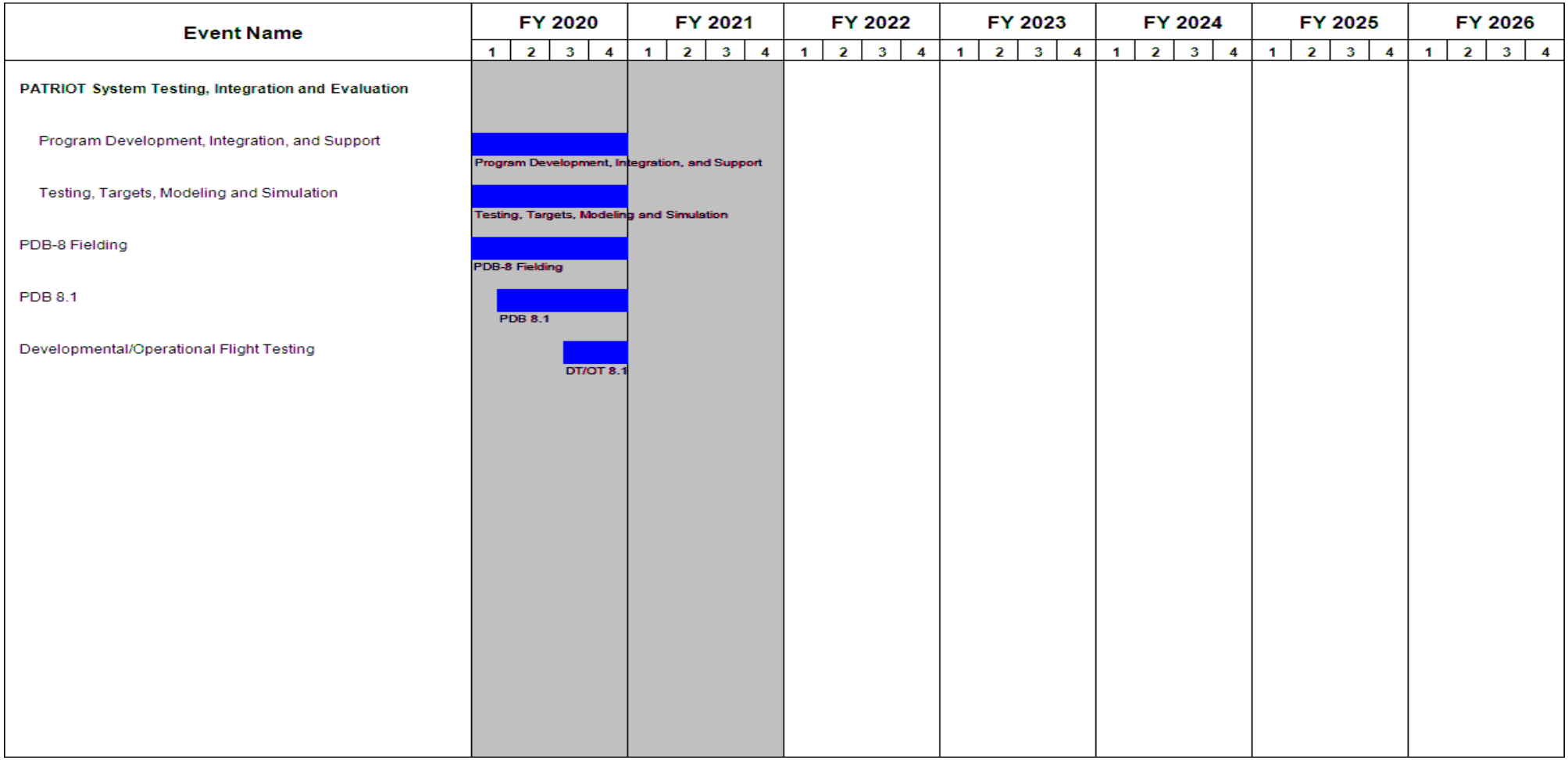
Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Other T&E funding	MIPR	Various : WSMR, NM	15.393	3.516	Feb 2020	-		-		-		-	0.000	18.909	-
Mobile Flight Mission Simulator (MFMS)	SS/ FFPLOE	Raytheon : Massachusetts	13.154	0.632	Jan 2020	-		-		-		-	0.000	13.786	-
PDB-8	MIPR	Various : WSMR, NM	24.798	16.695	Feb 2020	-		-		-		-	0.000	41.493	-
PDB-8 DT/OT	MIPR	Various : WSMR, NM	14.887	-		-		-		-		-	0.000	14.887	-
		Subtotal	211.714	58.529		-		-		-		-	0.000	270.243	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	345.675	93.743		0.000		0.182		-		0.182	0.000	439.600	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205456A / *Lower Tier Air and Missile Defense (AMD) System*	**Project (Number/Name)** EF9 / *System Integration and Test*



Note

Please note, beginning in FY21 these activities will be funded through 0607865A / Patriot Product Improvement.

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205456A / *Lower Tier Air and Missile Defense (AMD) System*	**Project (Number/Name)** EF9 / *System Integration and Test*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
PATRIOT System Testing, Integration and Evaluation	1	2015	4	2020
Program Development, Integration, and Support	1	2015	4	2020
Testing, Targets, Modeling and Simulation	1	2015	4	2020
PDB-8.0.5 Agile Build	1	2017	4	2018
PDB-8 Fielding	2	2018	4	2020
PDB-8 IOC	3	2018	3	2018
PDB 8.1	1	2018	4	2020
Developmental/Operational Flight Testing	3	2020	4	2020

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	112.468	72.817	63.937	-	63.937	-	-	-	-	-	-
EG2: *GMLRS Alternative Warheads*	-	11.090	13.986	24.088	-	24.088	-	-	-	-	-	-
EG3: *Guided MLRS*	-	101.378	58.831	39.849	-	39.849	-	-	-	-	-	-
Program MDAP/MAIS Code: 260												

A. Mission Description and Budget Item Justification

Guided Multiple-Launch Rocket System (GMLRS) rockets are surface-to-surface artillery rockets fired from the Multiple Launch Rocket System (MLRS) and High Mobility Artillery Rocket System (HIMARS) launchers. GMLRS rockets provide 24/7, all-weather precision fires to engage both area and point targets at short, medium, and long ranges. The GMLRS Program currently consists of multiple variants: GMLRS Unitary utilizes a 200 pound high explosive warhead to engage point targets with limited collateral damage; GMLRS Dual Purpose Improved Conventional Munition (DPICM) cluster munition to engage area or imprecisely located targets and GMLRS Alternative Warhead (AW) which has been developed as a non-cluster munition to engage the same target set as GMLRS DPICM. GMLRS DPICM Production was terminated in response to the June 2008 Department of Defense (DoD) Cluster Munitions Policy. GMLRS Unitary and AW are currently in full rate production.

The 26 October 2016 Deputy Secretary's Management Action Group (DMAG) directed the Army to define and execute an effort for GMLRS modifications that would extend the maximum range (Extended Range (ER) GMLRS) and integrate sensors and seekers into the rocket to engage complex targets with greater precision at greater ranges. These modifications to GMLRS were designated by the Army Acquisition Executive as an engineering change proposal (ECP) and not as a new program. During the FY23-27 POM review, the Army withdrew their support for a seeker spiral in favor of integrating an Enhanced Area Warhead.

The GMLRS program will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.

The GMLRS program will continue to leverage ongoing Government and Industry research and development efforts to extend range, increase survivability, and enhance lethality. The EG2 funding line will qualify and integrate an enhanced area warhead that will improve lethality. The EG3 funding line enables GMLRS enhancements, including ER GMLRS modification, statutorily required upgrades such as development of Assured Positioning, Navigation, and Timing (A-PNT), and aging technology mitigation and upgrades.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	117.294	75.575	64.728	-	64.728
Current President's Budget	112.468	72.817	63.937	-	63.937
Total Adjustments	-4.826	-2.758	-0.791	-	-0.791
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.826	-2.758			
• Adjustments to Budget Years	-	-	-0.791	-	-0.791

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	Project (Number/Name) EG2 / *GMLRS Alternative Warheads*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EG2: *GMLRS Alternative Warheads*	-	11.090	13.986	24.088	-	24.088	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The United States (U.S.) Army initially funded the development of the Guided Multiple Launch Rocket System (GMLRS) Alternative Warhead (AW) increment under the EG2 - GMLRS Alternative Warheads project code. GMLRS AW entered full rate production in 2015. The 26 October 2016 Deputy Secretary's Management Action Group (DMAG) directed the Army to define and execute an effort for a GMLRS modification that would integrate a seeker into the rocket.

The Fiscal Year (FY) 2022 dollars in the amount of $24.088 million supports the development, qualification, and integration of a side mounted proximity sensor (developed under ER GMLRS (EG3)), a more robust warhead fuze, and an enhanced area warhead to improve area effects lethality. The warhead development effort leverages previous work that assessed payload options; that work was funded with Guided MLRS (EG3) funding in prior years. The warhead development effort will continue to leverage EG3 funding as necessary to further this effort.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Enhanced Warhead ***Description:*** Modify the AW warhead, proximity sensor, and warhead fuze for increased lethality against light armored targets. ***FY 2021 Plans:*** FY 2021 plans include funding for component level test support for the Enhanced AW warhead. ***FY 2022 Plans:*** Build prototype warheads and Side Mounted Proximity Sensor (SMPS). Complete rocket operational flight software and launcher software update/modification. Conduct component level qualification and begin system qualification flight testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Enhanced warhead development was originally initiated and funded under GMLRS enhancements (EG3). Funding increase is due to the transition of this effort from warhead and SMPS component development to system/rocket level qualification testing in FY 2022.	10.367	8.840	24.088
Title: Assured Position, Navigation, and Timing ***Description:*** Address issues related to maintaining accuracy in a contested environment, improving accuracy over longer ranges, and compliance with statutory GPS requirements.	0.723	5.146	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	**Project (Number/Name)** EG2 / *GMLRS Alternative Warheads*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: Supports APNT development effort through analysis, modeling and simulations. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Assured Position, Navigation, and Timing (APNT) is an effort that has been shared between the EG2 and EG3 lines. The decrease in FY 2022, represent this effort is being addressed under the EG3 funding line.			
Accomplishments/Planned Programs Subtotals	11.090	13.986	24.088

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C64400: *Guided MLRS Rocket (GMLRS)*	1,136.794	912.997	935.917	-	935.917	-	-	-	-	-	-
• EG3: *Guided MLRS*	101.378	58.831	39.849	-	39.849	-	-	-	-	-	-
• C57701: *GMLRS MOD*	5.094	-	-	-	-	-	-	-	-	-	-

Remarks

GMLRS missile Army procurement funding (MiPA) includes C65404 and C65406.

D. Acquisition Strategy

GMLRS AW is currently in Full Rate Production. The enhanced lethality warhead will be fully qualified at the system/rocket level. Once the warhead completes Type Classification/Materiel Release it will replace the current AW warhead in production. All GMLRS variants are procured under C64400.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	Project (Number/Name) EG2 / *GMLRS Alternative Warheads*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	MIPR	STORM Project Office : RSA	4.948	2.467		2.255		3.097		-		3.097	0.000	12.767	-
		Subtotal	4.948	2.467		2.255		3.097		-		3.097	0.000	12.767	N/A

Remarks

STORM-Strategic and Operational Rockets and Missiles; RSA-Redstone Arsenal

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AWP Contracts (Multiple)	Various	NGDS (Plymouth, MN) LMMFC (Dallas, TX) : Systems Integrator	9.955	-		-		-		-		-	0.000	9.955	-
Other Government Agencies	MIPR	CCDC/AvMC : RSA	3.557	2.435	Feb 2020	6.673	Jan 2021	3.491	Jan 2022	-		3.491	0.000	16.156	-
Enhanced Warhead	C/CPFF	Kord : Huntsville, AL	-	5.688	Mar 2020	-		17.500	Mar 2022	-		17.500	0.000	23.188	-
		Subtotal	13.512	8.123		6.673		20.991		-		20.991	0.000	49.299	N/A

Remarks

AWP-Alternative Warhead Program; Various-Competitive/Firm Fixed Price/Sole Source/Cost Plus Fixed Fee; CCDC-Combat Capabilities Development Command; AvMC-Aviation and Missile Center; RSA-Redstone Arsenal; NGDS-Northrop Grumman Defense Systems; MN-Minnesota; LMMFC-Lockheed Martin Missile and Fire Control; TX-Texas; AL-Alabama

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support for Seeker	MIPR	WSMR, : NM	14.363	-		-		-		-		-	0.000	14.363	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	Project (Number/Name) EG2 / *GMLRS Alternative Warheads*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support for Warhead	MIPR	WSMR, RTC, AVMC : NM, Redstone Arsenal	-	0.500		5.058		-		-		-	0.000	5.558	-
		Subtotal	14.363	0.500		5.058		-		-		-	0.000	19.921	N/A

Remarks

WSMR-White Sands Missile Range; NM-New Mexico
RTC- Redstone Test Center; Redstone Arsenal, AL
AVMC- Aviation and Missiles Center; Redstone Arsenal, AL
Cost for Prior Years Test Support is for efforts prior to Seeker Test Support

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	32.823	11.090		13.986		24.088		-		24.088	0.000	81.987	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	**Project (Number/Name)** EG2 / *GMLRS Alternative Warheads*

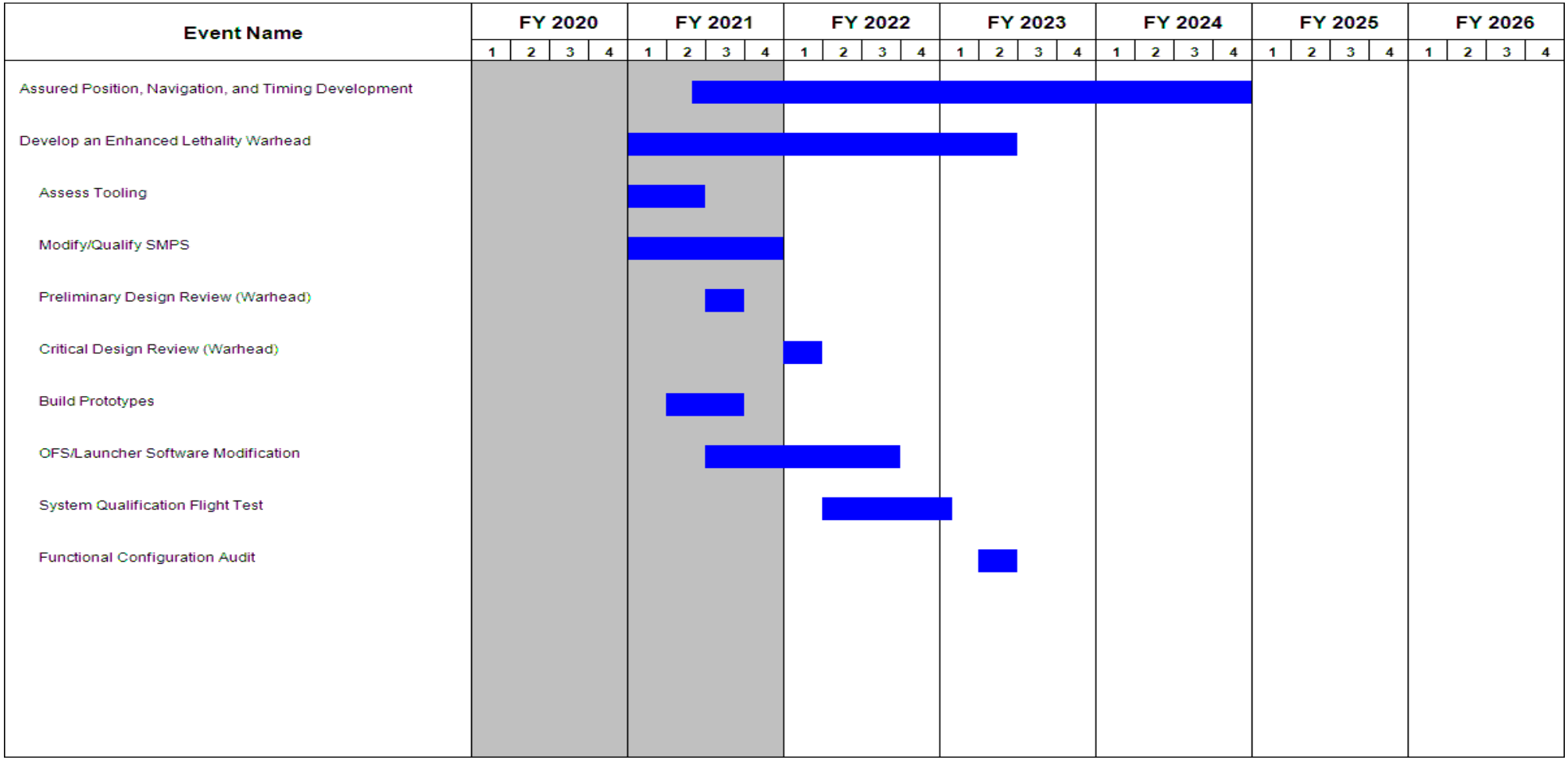


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	**Project (Number/Name)** EG2 / *GMLRS Alternative Warheads*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Assured Position, Navigation, and Timing Development	2	2021	4	2024
Develop an Enhanced Lethality Warhead	1	2021	2	2023
Assess Tooling	1	2021	2	2021
Modify/Qualify SMPS	1	2021	4	2021
Preliminary Design Review (Warhead)	3	2021	3	2021
Critical Design Review (Warhead)	1	2022	1	2022
Build Prototypes	2	2021	3	2021
OFS/Launcher Software Modification	3	2021	3	2022
System Qualification Flight Test	2	2022	1	2023
Functional Configuration Audit	2	2023	2	2023

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	Project (Number/Name) EG3 / *Guided MLRS*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EG3: *Guided MLRS*	-	101.378	58.831	39.849	-	39.849	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The United States (U.S.) Army continues to explore ways to enhance Guided Multiple Launch Rocket System (GMLRS) rockets and common components and to mitigate aging technology issues under Project EG3 Guided MLRS. The Army is requesting funding for the following GMLRS Research, Development, Test and Evaluation (RDT&E) activities: (1) evaluation of enhanced operational capabilities to provide more flexibility across the target set to include increased range, flight performance, and end-game optimization; (2) investigation of potential life cycle cost savings through mitigation of aging technology and second source qualification; (3) Preplanned Product Improvement (P3I); (4) evaluation and development of technologies to enhance overall product performance and survivability to include Positioning, Navigation and Timing (PNT); and (5) system test and evaluation.

The Fiscal Year (FY) 2022 dollars in the amount of $39.990 million will continue to investigate and develop Objective Additional Performance Attribute (APA) options including Extended Range GMLRS, Assured Position, Navigation, and Timing (A-PNT) solutions, and continue qualification of key rocket upgrades.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: GMLRS enhancements ***Description:*** Assess and improve GMLRS rockets ***FY 2022 Plans:*** Develop and assess methods to improve rocket effectiveness. Continue to assess payload, motor, and guidance/control options to meet Objective Additional Performance Attributes (APAs). ***FY 2021 to FY 2022 Increase/Decrease Statement:*** While funding for this effort in FY 2021 was diverted to the ER GMLRS effort, the need to assess opportunities to improve rocket effectiveness continues. The funding for this effort increases in FY 2022 because there is reduced need to reprioritize these funds towards ER GMLRS and increased need to assess opportunities to improve rocket effectiveness.	26.047	-	3.119
Title: GMLRS cost savings initiatives and obsolescence mitigation ***Description:*** Address issues related to aging technology, study cost reduction initiatives and opportunities for second source supplier efficiencies, and increase system survivability. Investigate potential for development of alternate extended range GMLRS rocket motor to reduce costs for this capability. ***FY 2022 Plans:***	21.409	-	5.715

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	**Project (Number/Name)** EG3 / *Guided MLRS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Conduct trade studies and perform cost benefit analyses on material changes to ER GMLRS components that are Cost Reduction Initiative (CRI) candidates. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** This effort was deferred in FY2021 due to funding constraints. The increase in funding for FY2022 represents the effort being reinitiated in FY2022 with a focus on ER GMLRS cost reduction.			
Title: GMLRS Assured Position Navigation and Timing (A-PNT) ***Description:*** Address issues related to maintaining accuracy in a contested environment, improving accuracy over longer ranges, and compliance with statutory GPS requirements. ***FY 2021 Plans:*** Execute funding obligated in FY 2020 to address development of a robust GPS solution and issues related to aging technology design. ***FY 2022 Plans:*** FY 2022 plans are to migrate from a NAVSTRIKE GPS receiver to a NAVSTORM + receiver to improve accuracy at longer ranges and maintain accuracy in a contested environment. FY 2022 funds the contractor?s efforts in component level design verification and qualification in preparation for system level integration and testing. Funds also support CCDC/AvMC analysis and simulations to validate component performance and qualification. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding increase from FY 2021 to FY 2022 is due to changing the focus from development to prototype hardware, test, and qualification.	16.089	0.225	18.811
Title: Extended Range (ER) GMLRS and complementary rocket pod development ***Description:*** Complete rocket pod development and conduct system level ground tests. ***FY 2021 Plans:*** Will complete ER GMLRS System Qualification ground testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding decreases due to the completion of this effort, remainder of Extended Range GMLRS effort captured separately.	7.872	4.697	-
Title: Extended Range (ER) GMLRS development ***Description:*** Qualification and integration of ER GMLRS.	29.961	53.909	12.204

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	**Project (Number/Name)** EG3 / *Guided MLRS*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: Fund remaining balance of the Extended Range GMLRS Firm Fixed Price contract that begins system level flight tests and resolves identified issues. ***FY 2022 Plans:*** OEM challenges and delays due to component hardware availability and qualification have extended the overall ER GMLRS development and qualification into FY22. FY22 plans include Functional Configuration Audit (FCA), and the completion of Qualification Flight Testing and Operational Flight Testing. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Continue system level qualification flight testing activity, and prepare for Operational testing.			
Accomplishments/Planned Programs Subtotals	101.378	58.831	39.849

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• C64400: *Guided MLRS Rocket (GMLRS)*	1,136.794	912.997	935.917	-	935.917	-	-	-	-	-	-
• EG2: *GMLRS Alternative Warheads*	11.090	13.986	24.088	-	24.088	-	-	-	-	-	-
• C57701: *GMLRS MOD*	5.094	-	-	-	-	-	-	-	-	-	-

Remarks

GMLRS Procurement funding includes C65404 and C65406.

D. Acquisition Strategy

Project EG3 Guided MLRS is supports, investigates, and develops alternative material changes to improve the GMLRS family of munitions as they are identified by the material developer or combat developer. This project also supports A-PNT activities to improve the overall system performance in a contested environment, and mitigates performance shortfalls or supply chain limitations. The ER GMLRS effort is pursuing a strategy of modifying the current GMLRS system through the Engineering Change Proposal (ECP) process in order to increase its range. Where possible the improvements and modifications are incrementally integrated into the current GMLRS and ER GMLRS systems through the Engineering Change Proposal (ECP) process.

Development, integration, and testing of GMLRS systems solutions, including test planning to support an annual PEO MS-led Multi-Domain Operations test/ demonstration event beginning in FY23, to include biennial Survivability Resiliency/Cyber-Electromagnetic Activities exercises with an event planned in FY22.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	Project (Number/Name) EG3 / *Guided MLRS*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	MIPR	Various : RSA	16.259	0.110	Feb 2020	0.017	Jan 2021	0.543	Jan 2022	-		0.543	Continuing	Continuing	Continuing
		Subtotal	16.259	0.110		0.017		0.543		-		0.543	Continuing	Continuing	N/A

Remarks

MIPR-Military Interdepartmental Purchase Request; RSA-Redstone Arsenal, Alabama; TBD-To Be Determined

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Unitary Contracts/Multiple	SS/FPIF	LMMFC : Dallas, TX	60.370	-		-		5.637	Jan 2022	-		5.637	Continuing	Continuing	Continuing
IM Development & Qualification Contracts/ Multiple	C/FPIF	Orbital ATK, Aerojet Rocketdyne : Rocket Center, WV; Bristow, VA	36.380	-		-		-		-		-	0.000	36.380	-
GMLRS Extended Range	SS/FFP	LMMFC : Dallas, TX	126.696	20.000	Jul 2020	48.261	May 2021	-		-		-	Continuing	Continuing	Continuing
APNT Development	C/CPFF	Kord : Huntsville, AL	-	13.980		-		11.500	Jan 2022	-		11.500	0.000	25.480	-
Alternative Extended Range Motor	TBD	AMS : TBD	-	19.972		-		-		-		-	0.000	19.972	-
Enhanced Alternative Warhead	C/FPIF	Kord : Huntsville, AL	-	24.964		-		-		-		-	0.000	24.964	-
Other Government Agencies	MIPR	Various : Various	-	13.712		5.856		15.006	Dec 2021	-		15.006	0.000	34.574	-
		Subtotal	223.446	92.628		54.117		32.143		-		32.143	Continuing	Continuing	N/A

Remarks

SS/FPIF-Sole Source/Fixed-Price Incentive Firm; LMMFC - Lockheed Martin Missile and Fire Control; TX - Texas; C/CPFF- Competitive/Cost Plus Fixed Fee; C/FPIF - Competitive/Fixed-Price Incentive Firm; WV - West Virginia; VA - Virginia; TBD - To Be Determ

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	Project (Number/Name) EG3 / *Guided MLRS*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support	MIPR	Various : Various	35.625	8.640	Feb 2020	4.697	Jan 2021	7.163	Jan 2022	-		7.163	Continuing	Continuing	Continuing
		Subtotal	35.625	8.640		4.697		7.163		-		7.163	Continuing	Continuing	N/A

Remarks

Performing Activities include Army Research, Development and Engineering Command (AMRDEC), Army Research Laboratory (ARL), and Redstone Test Center (RTC).

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	275.330	101.378		58.831		39.849		-		39.849	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	**Project (Number/Name)** EG3 / *Guided MLRS*

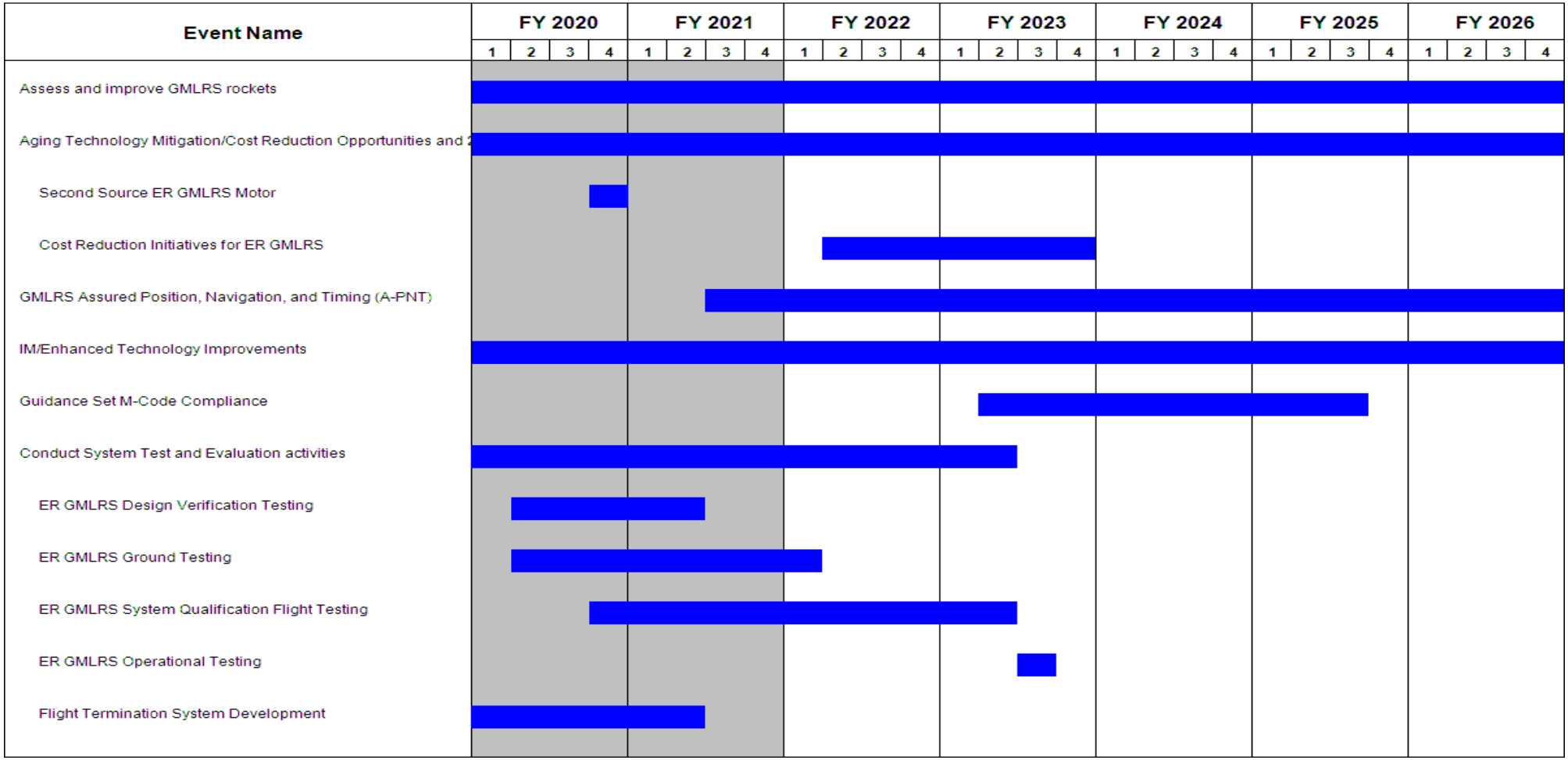


Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	**Project (Number/Name)** EG3 / *Guided MLRS*

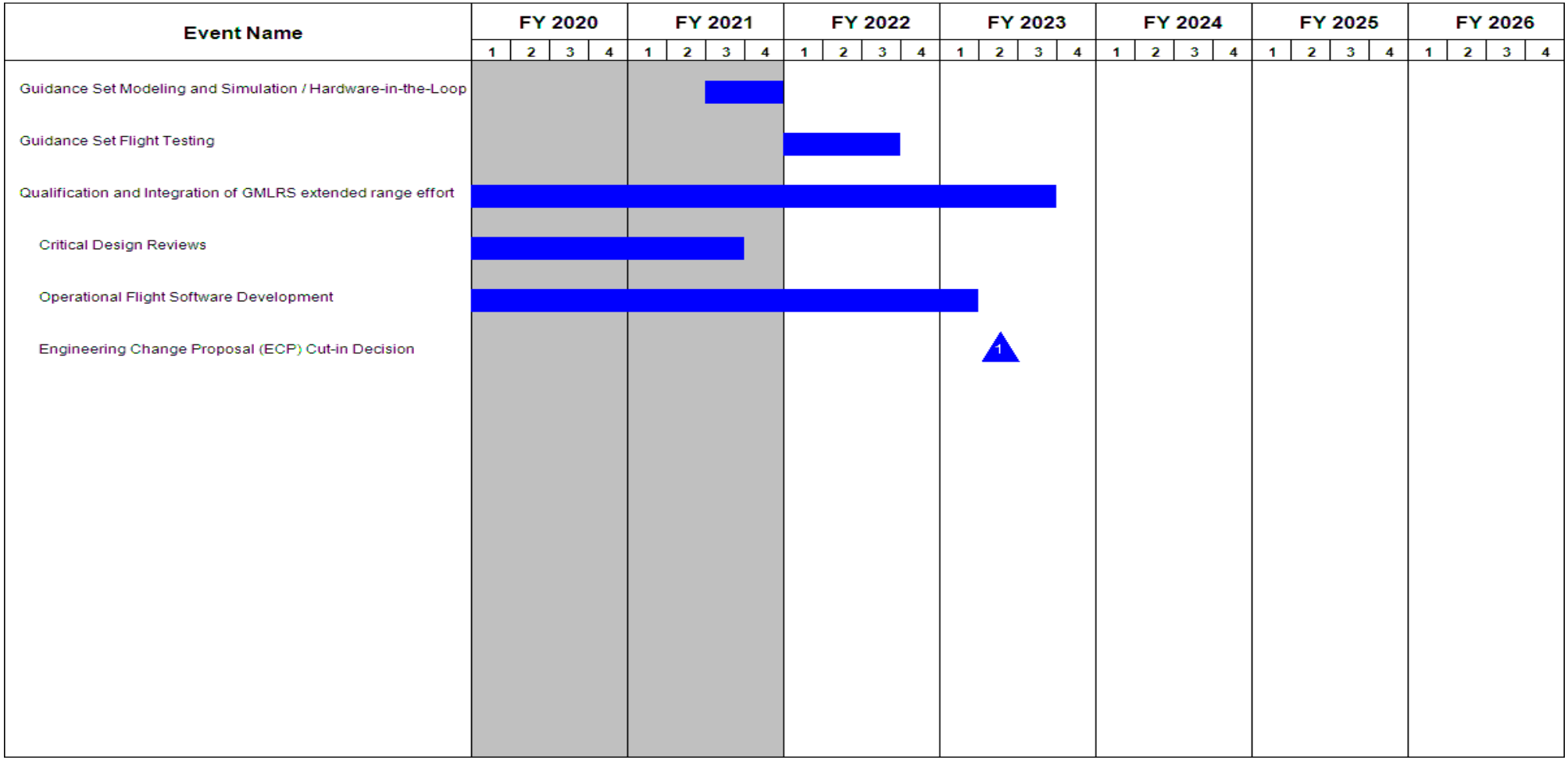


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0205778A / *Guided Multiple-Launch Rocket System (GMLRS)*	**Project (Number/Name)** EG3 / *Guided MLRS*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Assess and improve GMLRS rockets	1	2015	4	2026
Aging Technology Mitigation/Cost Reduction Opportunities and 2nd Source	1	2015	4	2026
Second Source ER GMLRS Motor	4	2020	4	2020
Cost Reduction Initiatives for ER GMLRS	2	2022	4	2023
GMLRS Assured Position, Navigation, and Timing (A-PNT)	3	2021	4	2026
IM/Enhanced Technology Improvements	1	2015	4	2026
Guidance Set M-Code Compliance	2	2023	3	2025
Conduct System Test and Evaluation activities	4	2015	2	2023
ER GMLRS Design Verification Testing	2	2020	2	2021
ER GMLRS Ground Testing	2	2020	1	2022
ER GMLRS System Qualification Flight Testing	4	2020	2	2023
ER GMLRS Operational Testing	3	2023	3	2023
Flight Termination System Development	3	2018	2	2021
Guidance Set Modeling and Simulation / Hardware-in-the-Loop	3	2021	4	2021
Guidance Set Flight Testing	1	2022	3	2022
Qualification and Integration of GMLRS extended range effort	3	2018	3	2023
Critical Design Reviews	3	2019	3	2021
Operational Flight Software Development	3	2018	1	2023
Engineering Change Proposal (ECP) Cut-in Decision	2	2023	2	2023

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0208053A *I Joint Tactical Ground System*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	-	9.510	13.379	-	13.379	-	-	-	-	-	-
635: *Joint Tact Grd Station-P3I*	-	-	9.510	13.379	-	13.379	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Joint Tactical Ground Station (JTAGS) is a post-production, Acquisition Category (ACAT) III program. JTAGS provides missile warning message data for the Air and Missile Defense (AMD) architecture and improves performance for Integrated Air and Missile Defense Fire Control Systems/Composite Army Air and Missile Defense Brigades.

JTAGS disseminates near real time warning, alerting, and cueing information on ballistic missile launches and other tactical events of interest throughout the theater using existing communication networks, providing critical support to Combatant Commanders in their Areas of Responsibility (AOR). Four OCONUS deployed JTAGS units, which are deployed in three theaters (United States Pacific Command (PACOM), United States Central Command (CENTCOM), United States European Command (EUCOM)), constitute DoD's only in-theater system providing space-based missile warning. The fifth CONUS system is used as an institutional trainer, but is available as a deployable asset. JTAGS is designated as the in-theater element of the United States Strategic Command's Theater Event System (TES), supporting all Theater Missile Defense pillars, affording the shortest sensor-to-shooter connectivity. On 14 January 2016, the Army Acquisition Executive designated the JTAGS Pre-Planned Product Improvement (JTAGS P3I) program as a separate ACAT III modification program.

The JTAGS Program Element (PE) supports development and testing of the JTAGS Block II Preplanned Product Improvements (P3I) program based on the JTAGS Operational Requirements Document (ORD), additive Joint Requirements Oversight Council - Memorandum (JROC-M) requirements, and the formal JTAGS Block II Capability Development Document (CDD) thresholds. P3I upgraded JTAGS to a Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improved warning tactical parameters and timeliness. The JTAGS Block II P3I program based on the 2009 JTAGS ORD is on contract as a two phase development effort. JTAGS Block II P3I Phase 1 is complete. The final developmental efforts of JTAGS Block II P3I Phase 2 to achieve 2009 ORD requirements will be complete in FY2021 with Follow-on Test and Evaluation (FOTE) and Materiel Release efforts to be conducted in FY2022. JTAGS Block II Phase 2 fielding is planned for FY 2023. The JTAGS Block II CDD addresses evolving User-driven needs such as emerging threats and interface efforts that were not known at the time the JTAGS ORD was validated. Developmental efforts to achieve JTAGS Block II CDD threshold requirements and implementation of M-Code GPS (IAW PL 111-383) continue through FY27.

Fiscal Year 2022 (FY22) requested funding of $13.379 million allows for the continued development of cyber compliance, defense against emerging threats, system materiel release, Assure Positioning Navigation and Timing (A-PNT) and M-code GPS compliance, addresses obsolescence mitigation with Commercial Off The Shelf (COTS) hardware/software upgrades, and NextGen Polar Geosynchronous satellite interface efforts.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0208053A *I Joint Tactical Ground System*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	0.000	9.510	9.665	-	9.665
Current President's Budget	0.000	9.510	13.379	-	13.379
Total Adjustments	0.000	0.000	3.714	-	3.714
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	3.714	-	3.714

Change Summary Explanation

Fiscal Year 2022 (FY22) increase of $3.714 million is the result of a realignment from Program Element (PE) 1208053A - allows Joint Tactical Ground System (JTAGS) continue development of cyber compliance, defense against emerging threats, system materiel release, Assure Positioning Navigation and Timing (A-PNT) and M-code GPS compliance, address obsolescence mitigation with Commercial Off The Shelf (COTS) hardware/software upgrades, and NextGen Polar Geosynchronous satellite interface efforts.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0208053A / *Joint Tactical Ground Syst em*	Project (Number/Name) 635 / *Joint Tact Grd Station-P3I*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
635: *Joint Tact Grd Station-P3I*	-	-	9.510	13.379	-	13.379	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Tactical Ground Station (JTAGS) is a post-production, Acquisition Category (ACAT) III program. JTAGS provides missile warning message data for the Air and Missile Defense (AMD) architecture and improves performance for Integrated Air and Missile Defense Fire Control Systems/Composite Army Air and Missile Defense Brigades.

JTAGS disseminates near real time warning, alerting, and cueing information on ballistic missile launches and other tactical events of interest throughout the theater using existing communication networks, providing critical support to Combatant Commanders in their Areas of Responsibility (AOR). Four OCONUS deployed JTAGS units, which are deployed in three theaters (United States Pacific Command (PACOM), United States Central Command (CENTCOM), United States European Command (EUCOM)), constitute DoD's only in-theater system providing space-based missile warning. The fifth CONUS system is used as an institutional trainer, but is available as a deployable asset. JTAGS is designated as the in-theater element of the United States Strategic Command's Theater Event System (TES), supporting all Theater Missile Defense pillars, affording the shortest sensor-to-shooter connectivity. On 14 January 2016, the Army Acquisition Executive designated the JTAGS Pre-Planned Product Improvement (JTAGS P3I) program as a separate ACAT III modification program.

The JTAGS Program Element (PE) supports development and testing of the JTAGS Block II Preplanned Product Improvements (P3I) program based on the JTAGS Operational Requirements Document (ORD), additive Joint Requirements Oversight Council - Memorandum (JROC-M) requirements, and the formal JTAGS Block II Capability Development Document (CDD) thresholds. P3I upgraded JTAGS to a Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improved warning tactical parameters and timeliness. The JTAGS Block II P3I program based on the 2009 JTAGS ORD is on contract as a two phase development effort. JTAGS Block II P3I Phase 1 is complete. The final developmental efforts of JTAGS Block II P3I Phase 2 to achieve 2009 ORD requirements will be complete in FY2021 with Follow-on Test and Evaluation (FOTE) and Materiel Release efforts to be conducted in FY2022. JTAGS Block II Phase 2 fielding is planned for FY 2023. The JTAGS Block II CDD addresses evolving User-driven needs such as emerging threats and interface efforts that were not known at the time the JTAGS ORD was validated. Developmental efforts to achieve JTAGS Block II CDD threshold requirements and implementation of M-Code GPS (IAW PL 111-383) continue through FY27.

Fiscal Year 2022 (FY22) requested funding of $13.379 million allows for the continued development of cyber compliance, defense against emerging threats, system materiel release, Assure Positioning Navigation and Timing (A-PNT) and M-code GPS compliance, addresses obsolescence mitigation with Commercial Off The Shelf (COTS) hardware/software upgrades, and NextGen Polar Geosynchronous satellite interface efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: JTAGS P3I Block II Phase 2	-	6.785	0.861

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0208053A / *Joint Tactical Ground System*	**Project (Number/Name)** 635 / *Joint Tact Grd Station-P3I*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: JTAGS Block II P3I Phase 2 activities seek to develop and test capabilities identified in the 2009 JTAGS Operational Requirements Document (ORD). Joint Requirements Oversight Council (JROC) Memos 197-12, 113-13, and 042-19 and PL 111-383 (Ike Skelton National Defense Authorization Act for Fiscal Year 2011) support the requirement to develop and field JTAGS Block II capabilities as soon as possible. ***FY 2021 Plans:*** Allows for the development and integration on evolving cyber hardening advances and emerging threats ***FY 2022 Plans:*** Funding required for efforts includes work on materiel release package for JTAGS Block II P3I system full materiel release ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 decreased from FY 2021 as Block II development efforts against the JTAGS Block II Operational Requirements Document (ORD) requirements were completed. Reduced funding completes material release for JTAGS Block II under this planned program.			
Title: Development and Test of Block II CDD requirements ***Description:*** JTAGS Block II program continues to focus on development/integration of evolving cyber hardening advances, defense against emerging threats, M-code GPS, and JTAGS Capability Development Document (CDD) threshold requirements. JROC-Memos 197-12, 113-13, and 042-19 and PL 111-383 (Ike Skelton National Defense Authorization Act for Fiscal Year 2011) require fielding of these capabilities as soon as possible. ***FY 2022 Plans:*** Funding required for efforts including continued development of cyber security tools to be achieve compliance with cyber requirements; continues development of new capabilities detailed in the JTAGS Block II Capability Development Document (CDD) defense against emerging threats, system materiel release, Assure Positioning Navigation and Timing (A-PNT) and M-code GPS compliance; addresses obsolescence mitigation with Commercial Off The Shelf (COTS) hardware/software upgrades; and addresses NextGen Polar Geosynchronous satellite interface efforts. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 increased from FY 2021 as development is focused on delivering capabilities detailed in the JTAGS Block II Capability Development Document (CDD), and M-Code GPS IAW Public Law 111-383 (Ike Shelton National Defense Authorization Act for Fiscal Year 2011) to achieve DoD Assured-Position, Navigation, and Timing objectives.	-	-	9.148
Title: JTAGS Test and Evaluation Support	-	2.725	3.370

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0208053A / *Joint Tactical Ground System*	**Project (Number/Name)** 635 / *Joint Tact Grd Station-P3I*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: Test and evaluation support for the JTAGS program. ***FY 2021 Plans:*** Provides test planning support of the JTAGS P3I Block II development program; plan an operational test for JTAGS P3I Block II. ***FY 2022 Plans:*** Conducts test planning/support for interoperability, cyber compliance confirmation, and new capabilities for the JTAGS Block II program as detailed in the JTAGS Block II Capability Development Document (CDD). Conducts a Follow-on Operational Test and Evaluation (FOTE) for JTAGS Block II P3I. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 increased from FY 2021 to conduct JTAGS Block II FOTE; testing of new capabilities detailed in the JTAGS Block II CDD, and continued confirmation of compliance with interoperability and cyber requirements.			
Accomplishments/Planned Programs Subtotals	-	9.510	13.379

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BZ8420: *JOINT TACTICAL GROUND STATION MODS (JTAGS)*	-	-	8.088	-	8.088	-	-	-	-	-	-
• FE7: *Joint Tact Grd Station-P3I*	7.676	-	-	-	-	-	-	-	-	-	-

Remarks

Beginning in FY21 Joint Tactical Ground System (JTAGS) requested funding has been realigned from PE 1208053A to PE 0208053A.

D. Acquisition Strategy

This program element develops critical software intensive improvements, while continuing to make maximum use of Non-Developmental Items (NDI)/Commercial Off-The-Shelf (COTS) components and Government Furnished Equipment (GFE). After design and integration, the system will be subject to thorough developmental and validation/verification testing to verify performance, operational effectiveness and suitability. The JTAGS Block II Pre-planned Product Improvement (P3I) program was initiated based on a 2009 JTAGS Operational Requirements Document (ORD) and upgrades JTAGS to a Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, improving warning tactical parameters and timeliness. The JTAGS Block II P3I contract was a full and open competition, but only the incumbent JTAGS contractor submitted a proposal, resulting in a sole-source contract on 26 Aug 2012. The contract's development options are Cost Plus Incentive Fee; its production options are Firm Fixed Price, and its Sustainment options are Cost Plus Fixed Fee. The JTAGS Block II contract's period of performance is from 1 October 2012 through 30 September 2021. As threats continue to evolve and change as well as new satellite sensors become available, the

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0208053A / *Joint Tactical Ground System*	**Project (Number/Name)** 635 / *Joint Tact Grd Station-P3I*

JTAGS Users in conjunction with the Army Capabilities Manager have developed a JTAGS Block II Capability Development Document (CDD), requiring JTAGS to address new/changing threats that were not addressed in the 2009 JTAGS ORD. The acquisition of the continued JTAGS Block II efforts based on the JTAGS Block II CDD will be performed under a sole source follow-on contract to be awarded 4QFY21 to the current JTAGS contractor.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0208053A / *Joint Tactical Ground System*	Project (Number/Name) 635 / *Joint Tact Grd Station-P3I*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Allot	Various (AMC, AMCOM, CCDC) : Redstone Arsenal, AL	-	-		1.184	Oct 2020	1.143	Oct 2021	-		1.143	0.000	2.327	Continuing
		Subtotal	-	-		1.184		1.143		-		1.143	0.000	2.327	N/A

Remarks

Provides Other Government Agency (OGA) support to the JTAGS acquisition program

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JTAGS P3I Block II Phase 2 Development	SS/CPIF	Northrop-Grumman : Colorado Springs, Co	-	-		4.401	Oct 2020	-		-		-	0.000	4.401	34.100
Development and Test Block II CDD requirements	SS/TBD	Northrop-Grumman : Colorado Springs, Co	-	-		-		7.407	Oct 2021	-		7.407	0.000	7.407	-
System Engineering Support	C/CPFF	COLSA : Huntsville, AL	-	-		0.450	Nov 2020	0.558	Jan 2022	-		0.558	0.000	1.008	Continuing
		Subtotal	-	-		4.851		7.965		-		7.965	0.000	12.816	N/A

Remarks

Continues development of the JTAGS Block II capabilities based on the JTAGS Block II Capability Development Document (CDD)

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering Techinal Assistance	C/CPFF	COLSA : Huntsville, AL	-	-		0.750	Nov 2020	0.739	Jan 2022	-		0.739	0.000	1.489	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0208053A / *Joint Tactical Ground System*	Project (Number/Name) 635 / *Joint Tact Grd Station-P3I*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		0.750		0.739		-		0.739	0.000	1.489	N/A

Remarks

Provides technical assistance in implementing the JTAGS Block II CDD

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JTAGS Test Support (ATEC/AIC/JITC)	Allot	Various (ATEC, AIC, JITC) : Various locations	-	-		2.725	Oct 2020	3.532	Oct 2021	-		3.532	0.000	6.257	Continuing
		Subtotal	-	-		2.725		3.532		-		3.532	0.000	6.257	N/A

Remarks

Conducts a JTAGS Block II Follow-on Test and Evaluation (FOTE) and supports testing of JTAGS Block II development efforts based on the JTAGS Block II CDD.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		9.510		13.379		-		13.379	0.000	22.889	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0208053A / *Joint Tactical Ground Syst em*	**Project (Number/Name)** 635 / *Joint Tact Grd Station-P3I*

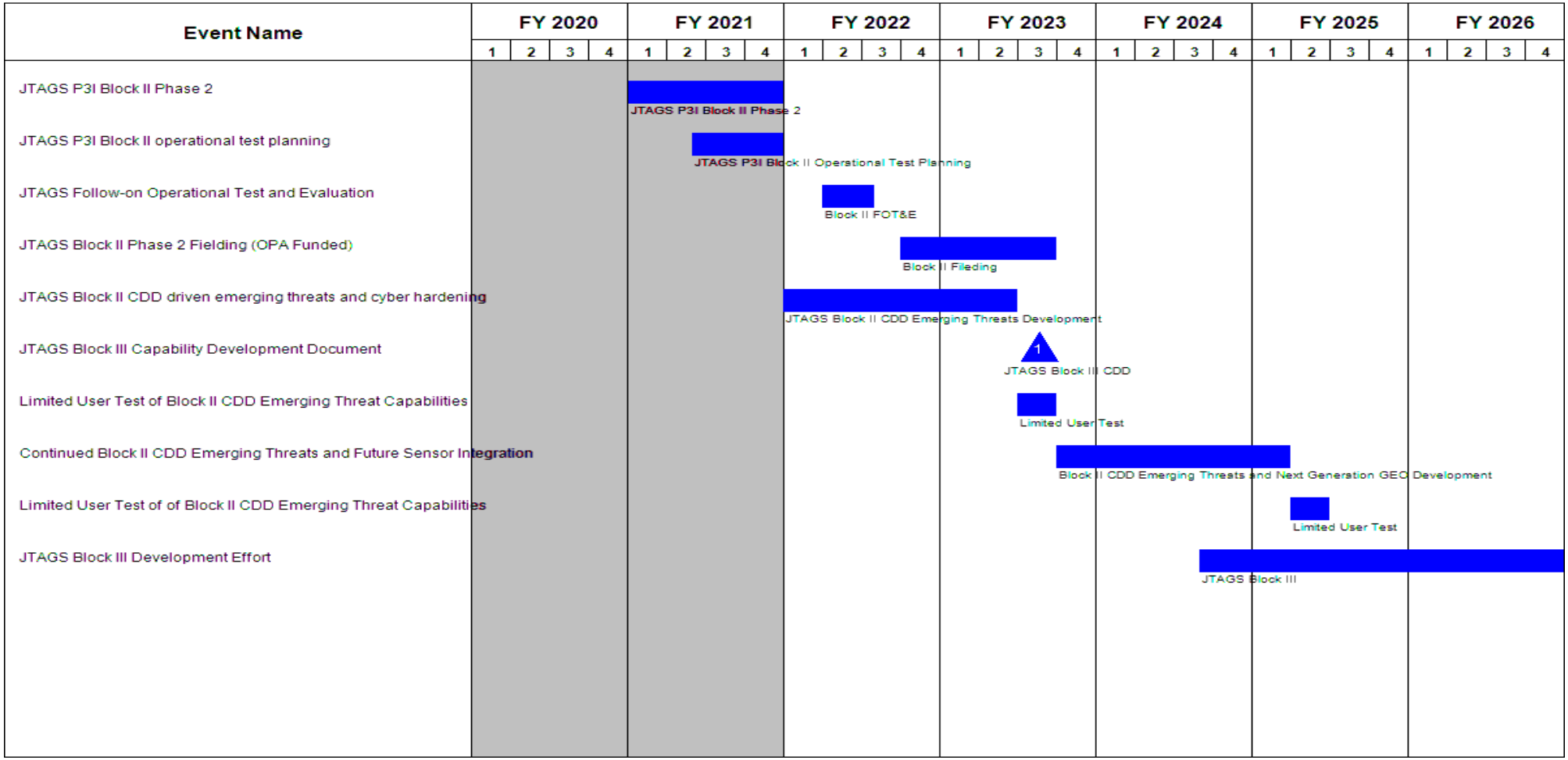


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0208053A / *Joint Tactical Ground System*	**Project (Number/Name)** 635 / *Joint Tact Grd Station-P3I*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
JTAGS P3I Block II Phase 2	1	2021	4	2021
JTAGS P3I Block II operational test planning	2	2021	4	2021
JTAGS Follow-on Operational Test and Evaluation	2	2022	3	2022
JTAGS Block II Phase 2 Fielding (OPA Funded)	4	2022	3	2023
JTAGS Block II CDD driven emerging threats and cyber hardening	1	2022	2	2023
JTAGS Block III Capability Development Document	3	2023	3	2023
Limited User Test of Block II CDD Emerging Threat Capabilities	3	2023	3	2023
Continued Block II CDD Emerging Threats and Future Sensor Integration	4	2023	1	2025
Limited User Test of of Block II CDD Emerging Threat Capabilities	2	2025	2	2025
JTAGS Block III Development Effort	3	2024	4	2026

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0303028A / *Security and Intelligence Activities*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	26.674	23.367	24.531	-	24.531	-	-	-	-	-	-
FG2: *Counterintelligence & Human Intel Modernization*	-	1.745	-	0.692	-	0.692	-	-	-	-	-	-
H13: *Information Dominance Center (IDC) - Tiara*	-	24.929	23.367	23.839	-	23.839	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Fiscal Year (FY) 2022 Direct War/Enduring Operations dollars in the amount of $23.839 million in Project H13 will continue to support the U.S. Army Intelligence and Security Command's (INSCOM) RDTE program, which provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, or destroy adversary Command, Control, Communications, Computers and Intelligence (C4I) and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.

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

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

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	26.749	23.367	0.000	-	0.000
Current President's Budget	26.674	23.367	24.531	-	24.531
Total Adjustments	-0.075	0.000	24.531	-	24.531
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.075	-			
• Adjustments to Budget Years	-	-	24.531	-	24.531

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303028A / *Security and Intelligence Activities*

Change Summary Explanation

Decrease due to realignment of resources to higher priorities

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / *Security and Intelligence Activities*	Project (Number/Name) FG2 / *Counterintelligence & Human Intel Modernization*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FG2: *Counterintelligence & Human Intel Modernization*	-	1.745	-	0.692	-	0.692	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

Funding supports personnel security-related capabilities for identifying, reporting and responding to potential personnel security information of concern. These tools are key enablers of the Army Insider Threat Program. These tools provide statistical models to assess risk, centralized analysis, reporting and response capabilities, and reporting mechanisms for relevant insider threat data.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Insider Threat CE Support	1.745	-	0.692
Description: HQDA G-2 and the Intelligence and Security Command (INSCOM) Security Operations Center (ISOC) are charged with integrating, informing, and leveraging security and counterintelligence authorities in support of the Department of the Army Insider Threat Program mission to continuously deter, detect, and mitigate insider threats to Army information, networks, facilities, and personnel. ***FY 2022 Plans:*** Continue personnel security-related capabilities for identifying, reporting and responding to potential personnel security information of concern. These tools are key enablers of the Army Insider Threat Program. These tools provide statistical models to assess risk, centralized analysis, reporting and response capabilities, and reporting mechanisms for relevant insider threat data. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease due to Army realignments to higher priorities			
Accomplishments/Planned Programs Subtotals	1.745	-	0.692

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303028A / *Security and Intelligence Activities*	**Project (Number/Name)** FG2 / *Counterintelligence & Human Intel Modernization*

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / *Security and Intelligence Activities*	Project (Number/Name) FG2 / *Counterintelligence & Human Intel Modernization*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Classified	Various	To Be Determined : To Be Determined	0.799	-		-		-		-		-	0.000	0.799	0.799
Insider Threat CE Support	TBD	To Be Determined : To Be Determined	1.722	1.745		-		0.692		-		0.692	0.000	4.159	4.167
Identity Intelligence	TBD	To Be Determined : To Be Determined	0.467	-		-		-		-		-	0.000	0.467	0.467
Counterintelligence Activities	TBD	To Be Determined : To Be Determined	1.825	-		-		-		-		-	0.000	1.825	1.825
		Subtotal	4.813	1.745		-		0.692		-		0.692	0.000	7.250	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	4.813	1.745		0.000		0.692		-		0.692	0.000	7.250	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303028A / *Security and Intelligence Activities*	**Project (Number/Name)** FG2 / *Counterintelligence & Human Intel Modernization*

	FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Classified																					[redacted]							

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Classified																												

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303028A / *Security and Intelligence Activities*	**Project (Number/Name)** FG2 / *Counterintelligence & Human Intel Modernization*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Classified	1	2018	1	2019

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / *Security and Intelligence Activities*	Project (Number/Name) H13 / *Information Dominance Center (IDC) - Tiara*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
H13: *Information Dominance Center (IDC) - Tiara*	-	24.929	23.367	23.839	-	23.839	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced multi-domain intelligence collection and cyberspace technologies (SIGINT, EW, Cyberspace) designed to collect, process, exploit and, when directed, degrade, deny, disrupt, destroy, or manipulate adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.

INSCOM conducts RDTE of multi-domain intelligence collection and cyberspace technologies (SIGINT, EW, Cyberspace) in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, NSPD-38, NSPD-54 and HSPD-23.

The Fiscal Year (FY) 2022 Direct War/Enduring Operations dollars in the amount of $23.839 million are for activities in support of Combatant Command Operations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Offensive Cyberspace Operations Capability Development	24.929	23.367	23.839
Description: Title: Multi-Domain Intelligence Collection and Cyberspace Operations Capability Development Description: INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced multi-domain intelligence collection and cyberspace technologies (SIGINT, EW, Cyberspace) designed to collect, process, exploit, and when directed, degrade, deny, disrupt, or destroy adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.			
FY 2021 Plans: Develop and support leading-edge Cyberspace technologies designed to exploit, degrade, deny, disrupt, or destroy threat command, control, communications, computers and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303028A / *Security and Intelligence Activities*	**Project (Number/Name)** H13 / *Information Dominance Center (IDC) - Tiara*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
INSCOM will address the operational force reports of increasing threat sophistication that requires matching pace in development of offensive capabilities to maintain critical advantage in cyberspace. Expand combatant command focal points in accordance with Secretary of the Army service component commander's emerging needs. The requirement to address NEER-PEER threat actors and army cyberspace operations that are expanding across the cyberspace domain drive the need to reduce development gaps in offensive cyberspace capabilities. ***FY 2022 Plans:*** FY2022 Base Plans has been realigned to Program Element (PE) 0607150A Intel Cyber Development. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The increase from 2021 to 2022 was due to inflation			
Accomplishments/Planned Programs Subtotals	24.929	23.367	23.839

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / *Security and Intelligence Activities*	Project (Number/Name) H13 / *Information Dominance Center (IDC) - Tiara*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mobile Objects/ PHAEDRUS	C/Various	Multiple : Multiple	4.100	-		-		-		-		-	0.000	4.100	-
		Subtotal	4.100	-		-		-		-		-	0.000	4.100	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MDI + Cyberspace Operations Capability Development	Various	TBD : TBD	142.619	24.929		23.367		23.839		-		23.839	Continuing	Continuing	Continuing
		Subtotal	142.619	24.929		23.367		23.839		-		23.839	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	146.719	24.929		23.367		23.839		-		23.839	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303028A / *Security and Intelligence Activities*	**Project (Number/Name)** H13 / *Information Dominance Center (IDC) - Tiara*

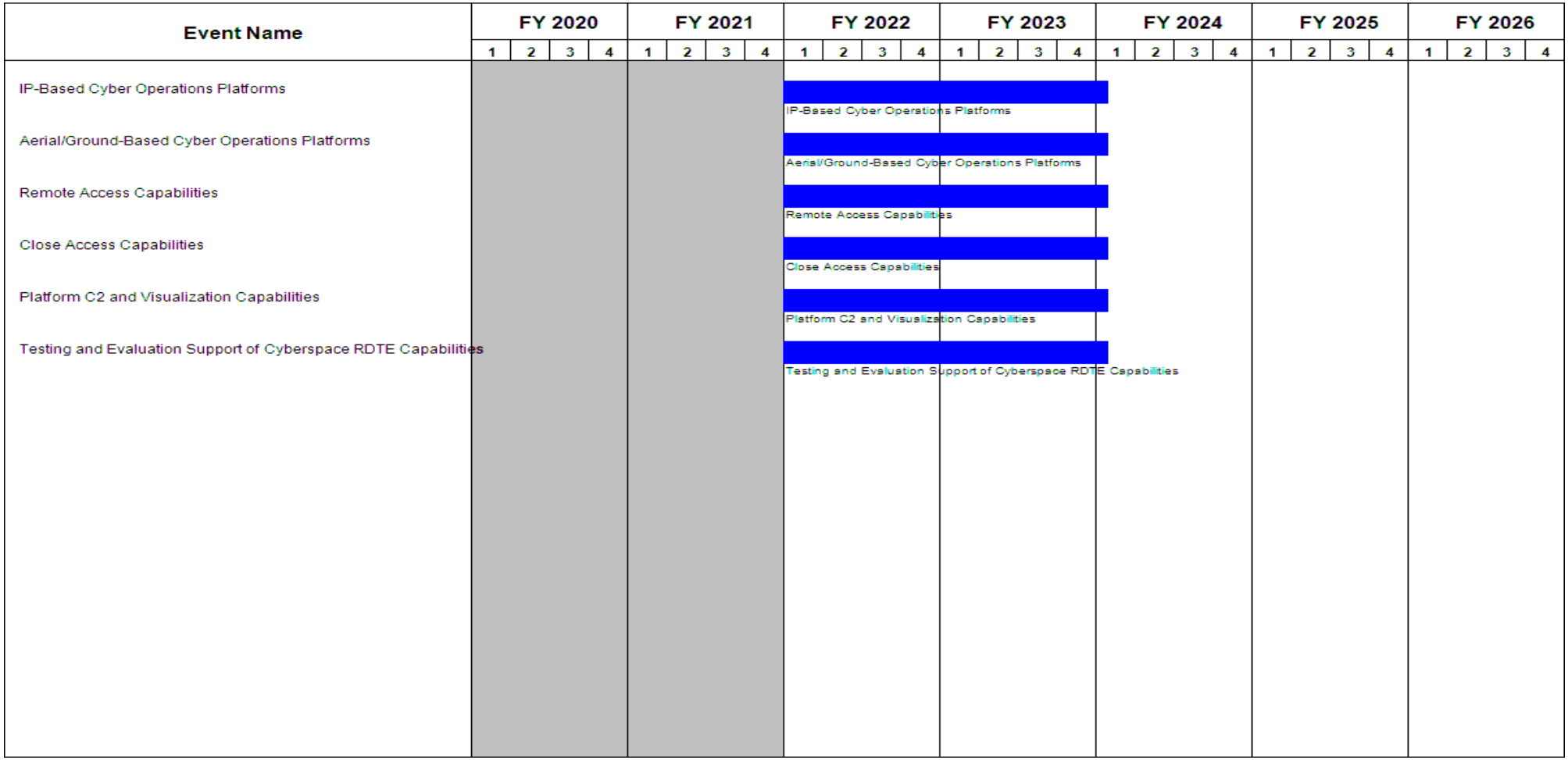


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303028A / *Security and Intelligence Activities*	**Project (Number/Name)** H13 / *Information Dominance Center (IDC) - Tiara*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
IP-Based Cyber Operations Platforms	1	2022	1	2024
Aerial/Ground-Based Cyber Operations Platforms	1	2022	1	2024
Remote Access Capabilities	1	2022	1	2024
Close Access Capabilities	1	2022	1	2024
Platform C2 and Visualization Capabilities	1	2022	1	2024
Testing and Evaluation Support of Cyberspace RDTE Capabilities	1	2022	1	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	25.710	28.270	15.720	-	15.720	-	-	-	-	-	-
491: *Information Assurance Development*	-	8.368	8.009	6.937	-	6.937	-	-	-	-	-	-
DV4: *Key Management Infrastructure (KMI)*	-	11.687	12.457	0.987	-	0.987	-	-	-	-	-	-
DV5: *Crypto Modernization (Crypto Mod)*	-	5.655	7.804	7.796	-	7.796	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Information Systems Security Program funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Project 491: Army CIO/G6 manages Project 491

Project 491: Information Assurance (IA) Development supports the implementation of the National Security Agency (NSA) developed Communications Security (COMSEC) Modernization and Key Management (KM) technologies within the Army. This including current and next generation encryption techniques, current and future Key Management Infrastructure (KMI) and technology migrations. This program provides oversight in developing policies, guidance, standard operating procedures and recommendations in integrating COMSEC and KM techniques into specific systems in support of securing the Army Tactical and Enterprise Networks. This entails architecture studies, system integration and testing, developing installation kits, and technological collaborations with NSA, DISA and other Services for enterprise and last mile implementations. The program assesses, develops and integrates Cyber Security (CS)/COMSEC tools (hardware and software) which provide protection for fixed infrastructure post, camp and station networks as well as tactical networks. The cited work is consistent with Strategic Planning Guidance (SPG) and the Army Modernization and Strategy Plan (AMSP).

IA Development funding implements and establishes functional and technical boundaries of cryptographic, key management and IA capabilities in coordination with the NSA, the DISA, and Joint Services, to secure National Security Systems (NSS), and National Security Information (NSI). Technical evaluations assess the security, operational effectiveness and network interoperability of advanced concept technologies to develop policies, standards, and fundamental building blocks for Army COMSEC capabilities that reduce the risk of future material solutions that could underperform and disrupt classified operations. Develop and publish the COMSEC Implementation Planning Guidance to identify, standardize, and govern the insertion of CS capabilities to bridge operational gaps and support the DoD and NSA mandated requirements to enhance network capacity while providing for secure information exchange of voice, video, and data in accordance with the Army Network Campaign Plan. This will be accomplished by interoperability evaluation, standards testing, and CS, System of System Network Vulnerability Assessments (SoS NVA) for Army Capability Sets for CS/COMSEC capabilities that provide protections for tactical and fixed infrastructure post, camp, and station networks.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303140A *I Information Systems Security Program*

Project 491 FY 2022 Justification: This funding enables the continuation of oversight for the executions of the Army's COMSEC Modernization initiatives including major Advanced Cryptographic Capabilities (ACC) updates and replacements of existing devices and systems to meet NSA mandates. Continue to support the evaluation and testing of new technologies to support DoD Cryptographic Moderation 2 (CM2) Army implementations including Transmission Security (TRANSEC), EKMS to KMI migration and S-ICAN/ITN architecture future Capability Set developments. Support efforts to provide updated end-to-end, tactical-to-strategic COMSEC standardization and implementation guidance to meet Army's operational requirements. Continuous funding will enable the evaluations and maturity assessment of new COMSEC and key management capabilities developed by DoD joint KMI program for Army fielding to protect and strengthen the Army Network posture, with reduced cryptographic interoperability issues for both embedded and standalone systems. This funding also supports the risk reduction testing to document operational value of commercial products prior to insertion for Army use. Provide timely test and evaluate results to enable the Army to make sound investment strategic decisions and to reduce or eliminate duplications. Also supports efforts to update and develop policies to posture Army's operations to implement innovative cryptographic and key management tools and services. Perform System of System Network Vulnerability Assessments (SoS NVA) to provide protections for the Army Integrated Tactical Networks.

The Defensive Cyberspace Operations (DCO) program provides initial capabilities that enable passive and active cyberspace defense operations to preserve friendly cyberspace capabilities and protect data, networks, net-centric capabilities, and other designated systems. Big Data Pilot provides an advanced analytics capability capable of ingesting structured, semi-structured, and unstructured data from multiple data sources (e.g., Joint Regional Security Stacks (JRSS), intrusion detection systems, intrusion prevention systems, network device log files, trouble tickets, firewalls, proxies, web and applications server log files, etc) and proves situational awareness of cyberspace battlefield. It provides the computer network defense provider with common analytic platform which informs and reduces risk associated with future material solutions and forms a blueprint for future Big Data Analytics. Big Data (analysis-of-all DoD Information Network sensor data) provides two optimized and accredited clusters deployed in support of JRSS and Defense Research and Engineering Network (DREN) with a tools suite accessible to Cyber Mission Forces via secure remote access. The Army's DCO activities are a construct of active cyberspace defenses which provide synchronized, real-time capability to discover, detect, analyze, and mitigate threats to and vulnerability of DoD networks and systems.

Project DV4 & DV5: COMSEC is governed by the Chairman of the Joint Chiefs of Staff Instruction (CJCSA) 6510. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army communications systems are required to support modern cryptographic capabilities by implementing modern algorithms. These efforts are consistent with Strategic Planning Guidance (SPG). These funding lines support the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Project DV4: The Army Key Management Infrastructure (AKMI) is the Army's implementation of the National Security Agency (NSA) KMI ACAT IAM program, automating the functions of COMSEC electronic key management, control, planning, and distribution. AKMI supports the Army's ability to communicate and distribute Cryptographic data on the Army's tactical and strategic networks by limiting adversarial access to and reducing the vulnerability of, Army Command, Control, Communications, Computers, Cyber, Intelligence (C5I) systems. AKMI devices receive, store, manage, and transfer electronic key through the network to be loaded into communication devices such as radios and satellites to secure the network. Without this technology Warfighters are required to manually receive their cryptographic products by traveling to COMSEC account locations (which may not be co-located) and manually fill their devices.

Project DV4 FY 2022 Justification: This funding line supports COMSEC technologies within the Army with allocations for the following: $0.987M, Reprogrammable Single Chip Universal Encryptor (RESCUE) to create a secure, reprogrammable cryptographic engine in providing Cryptographic Modernized Capabilities including future Over

the Network Keying (OTNK) to Fill Devices and End Cryptographic Units (ECU)s. The RESCUE is a potential solution for meeting the cryptographic requirements for the NGLD-M which is available as an option for integration by NGLD-M hardware developers. As of FY2022 NGLD-M development will transfer from PE 0303140A, Project DV4 to PE 0605144A, Project BY6 funding line starting FY2022. PE 0605144A, Project BY6 was established to clearly identify requirements for NGLD-M development and is not considered a new start effort.

Project DV5: Crypto Modernization (Crypto Mod) performs test, evaluation, development, and configuration management for cryptographic devices that receive key through fill devices and allow for secure communication through Army devices such as radios and satellite terminals. This program utilizes National Security Agency (NSA) developed Communications Security (COMSEC) technologies within the Army providing encryption, trusted software, or standard operating procedures, and integrating these mechanisms into specified systems in support of securing the Army Tactical and Enterprise Networks. The effort supports network operations from end-to-end throughout the force and the Common Operating Environment (COE) thus mitigating networked vulnerabilities to Army information security systems. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army communications systems are required be upgraded to modern algorithms to meet emerging threat developed by our adversaries. Crypto Modernization necessitates the utilization of the latest NSA cryptographic capabilities in order to defeat adversarial efforts to decrypt, disrupt, or exploit US Army networks. COMSEC is the Army's implementation of NSA protections to create a unified network that is protected, resilient, and survivable.

Project DV5 FY 2022 Justification: The program continues testing and evaluation of COMSEC devices to confirm capability and interoperability on Army networks and tactical systems as well as identifying risk areas for compliance with COMSEC regulations and procedures. The program will test and evaluate Crypto Systems compliant devices, Suite B IPSec devices built on commercial standards, Cryptographic High Value Product (CHVP), Commercial Solutions for Classified (CSfC) Guidance, and new software releases to High Assurance Internet Protocol Encryptor (HAIPE) 4.X devices in accordance with AR 700-142 Revision dated 8 June 2018. The program tests interoperability and provides ways to insert Data At Rest (DAR) and Data In Transit (DIT) technology within the existing and future network infrastructure. Additionally, this program evaluates performance of technologies and provides direction to ensure the lowest impact on performance while providing the greatest protection from loss of sensitive data.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	25.710	29.270	28.828	-	28.828
Current President's Budget	25.710	28.270	15.720	-	15.720
Total Adjustments	0.000	-1.000	-13.108	-	-13.108
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-13.108	-	-13.108

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303140A *I Information Systems Security Program*

Change Summary Explanation

FY 2022 decrease of $13.108 million based on establishment of the new funding line in support of NGLD-M development. Funding was realigned from PE 0303140A Project DV4 to 0605144A Project BY6 starting in FY 2022.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*	Project (Number/Name) 491 / *Information Assurance Development*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
491: *Information Assurance Development*	-	8.368	8.009	6.937	-	6.937	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

PE 0303140A, project 491 includes funding for the Army CIO/G6 and Project Lead (PL) Enterprise Services (ES).

A. Mission Description and Budget Item Justification

Project 491: Information Assurance (IA) Development supports the implementation of National Security Agency (NSA) developed Communications Security (COMSEC) technologies within the Army enterprise and tactical networks by ensuring COMSEC devices/systems are cryptographically interoperable and standard based. This entails architecture studies, technology assessments, secured devices testing, system integration and installation kits development to provide protections for fixed infrastructure post, camps and station networks as well as tactical networks. The cited work is consistent with Army's Mission Command Implementation Plan LOE 1, Network Enable Functions.

IA Development funding Implements, establishes functional and technical boundaries of cryptographic, key management and IA capabilities In Coordination With (ICW) the NSA, the Defense Information Systems Agency (DISA), and Joint Services, to secure National Security Systems (NSS), and National Security Information (NSI). Technical evaluations assess the security, operational effectiveness and network interoperability of advanced concepts/technologies to develop policies, standards, and fundamental building blocks for Army COMSEC capabilities that reduce the risk of future materiel solutions that could underperform and disrupt classified operations.

Develop and publish COMSEC and key management implementation planning guidance to identify, standardize, and govern the insertion of IA capabilities that will bridge operational gaps and support the DoD and NSA mandated requirements to enhance network capacity while providing secure information exchange of voice, video, and data IAW the Army Network Campaign Plan. This will be accomplished by interoperability test and evaluation, standards development, technology roadmap development and System of System Network Vulnerability Assessments (SoS NVA) to provide protections for the Army Integrated Tactical Networks.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Oversight and implementation guidance of emerging Cryptographic and CS capabilities to ensure interoperability to maintain compliance with DoD, NSA, and Army policies and regulations. (CIO/G6)	8.368	8.009	6.937
Description: The program provides oversight and guidance for technical research and evaluation of Cryptographic Modernization (CM) and Key Management (KM) capabilities to ensure IA compliance and interoperability. This effort improves operational effectiveness, ensures efficient implementation, and enhances network performance by deploying standardized COMSEC capabilities that are interoperable and supportable in Army, coalition and Joint operating environments. This program enables the Army to collaborate and participate in Joint and Army capability and technology evaluations efforts to define, improve, develop			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** 491 / *Information Assurance Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
and publish Cyber Security (CS) standards for new/modernized technology insertion to support the Army future networks and key management enterprise. This effort assesses and defines risk mitigation of CS network vulnerabilities in end-to-end Army network operations and Common Operating Environment. (CIO/G6) ***FY 2021 Plans:*** Will continue to provide oversight for the executions of the Army's COMSEC Modernization initiatives including major ACC updates and replacements of existing devices and systems. Continue to evaluate and test new technologies for Army implementation in support of CM2, KMI migration and S-ICAN/ITN architecture implementation. Continue to provide updated end-to-end, tactical-to-strategic COMSEC standardization and implementation guidance to meet Army?s operational requirements. Continue to assess new key management technologies developed by DoD joint KMI program to determine the maturity for Army fielding to protect and strengthen the Army Network posture. Continue to work with DoD CIO, NSA, DISA and other Services to resolve cryptographic interoperability issues for both embedded and standalone systems and performed risk reduction testing of commercial products prior to insertion into Army for use to increase operational availability with documented operational value and rapid integration. Provide timely test and evaluate results to enable the Army to make sound investment strategic decisions and to reduce or eliminate duplications. Participate in operational assessment of NSA, DoD, Joint Staff and Service led Joint Capability Technology Demonstrations to align new technologies to documented Army and Service capability gaps and requirements for protecting National Security Systems and National Security Information. Continue to update and develop policies to posture Army?s operations to implement innovative cryptographic and key management tools and services. Participated in DoD and Army working groups to develop plans for CM2 implementation. Perform System of System Network Vulnerability Assessments (SoS NVA) to provide protections for the Army Integrated Tactical Networks. ***FY 2022 Plans:*** Will continue to provide oversight for the executions of the Army's COMSEC Modernization initiatives including major ACC updates and replacements of existing devices and systems. Continue to evaluate and test new technologies for Army implementation in support of Cryptographic Modernization 2 (CM2) Transmission Security (TRANSEC) ICD, EKMS Tier 1 to KMI migration, Army last mile advanced key distribution concept development and ITN security architecture implementation. Continue to provide updated end-to-end, tactical-to-strategic COMSEC standardization and implementation guidance to meet Army?s operational requirements. Continue to assess new key management technologies developed by DoD joint KMI program to determine the maturity for Army fielding to protect and strengthen the Army Network posture. Continue to work with DoD CIO, NSA, DISA and other Services to resolve cryptographic interoperability issues for both embedded and standalone systems and performed risk reduction testing of commercial products prior to insertion into Army for use to increase operational availability with documented operational value and rapid integration. Provide timely test and evaluate results to enable the Army to make sound investment strategic decisions and to reduce or eliminate duplications. Participate in operational assessment of NSA, DoD, Joint Staff and Service led Joint Capability Technology Demonstrations to align new technologies to documented Army and			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** 491 / *Information Assurance Development*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Service capability gaps and requirements for protecting National Security Systems and National Security Information. Continue to update and develop policies to posture Army?s operations to implement innovative cryptographic and key management tools and services. Participated in DoD and Army working groups to develop plans for CM2 implementation. Perform System of System Network Vulnerability Assessments (SoS NVA) to provide protections for the Army Integrated Tactical Networks. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funds were reallocated toward other priorities resulting in FY2021 to FY2022 decrease.			
Accomplishments/Planned Programs Subtotals	8.368	8.009	6.937

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• DV5: *Crypto Modernization (Crypto Mod)*	5.655	7.804	7.796	-	7.796	-	-	-	-	-	-
• B96002: *CRYPTOGRAPHIC SYSTEMS (CRYPTO SYS)*	66.242	81.156	47.990	-	47.990	-	-	-	-	-	-
• BS9716: *NON PEO-SPARES*	3.857	3.896	3.596	-	3.596	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The objective of the Cryptographic Systems program is to provide adaptive, flexible, and programmable cryptographic solutions using best practices, lessons learned and programmatic management to meet the challenge of modernizing the Army's aging cryptographic systems. Associated documents include CDD, approved by CIO/G6, 15 Jul 2010; ICD, approved by JROC, 25 Mar 2011; AAO; approved by G3, 15 Dec 2011 and revised and approved, 19 Jun 2015.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*	Project (Number/Name) 491 / *Information Assurance Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering (PL Net E)	SS/LH	CECOM RDEC : CECOM RDEC APG, MD	81.783	-		-		-		-		-	0.000	81.783	-
Big Data Pilot (PL ES-CYBER)	TBD	TBD : FT BELVOIR, VA	9.725	-		-		-		-		-	0.000	9.725	-
Information Assurance System Engineering Support (PL Net E)	C/FFP	DSCI Consulting : APG, MD	7.106	-		-		-		-		-	0.000	7.106	-
Engineering Support (PL Net E)	C/CPFF	CACI : APG, MD	5.018	-		-		-		-		-	0.000	5.018	-
Engineering Support (PL Net E)	C/CPFF	Booz Allen Hamilton : APG, MD	3.408	-		-		-		-		-	0.000	3.408	-
Engineering Support (PL Net E)	C/FP	CSC : APG, MD	16.448	-		-		-		-		-	0.000	16.448	-
		Subtotal	123.488	-		-		-		-		-	0.000	123.488	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support (PL Net E)	C/CPFF	TBD : TBD	1.598	-		-		-		-		-	0.000	1.598	-
Engineering Support (CIO/G-6)	C/FP	CACI : APG, MD	12.363	6.957	Oct 2019	3.400	Oct 2020	5.020	Oct 2020	-		5.020	0.000	27.740	-
System Engineering (CIO/G-6)	SS/LH	AFC C5ISR : APG, MD	9.595	1.002	Oct 2019	2.189	Oct 2020	1.473	Oct 2020	-		1.473	0.000	14.259	-
Engineering Support (CIO/G-6)	C/CPFF	booz Allen Hamiton : APG, MD	10.765	-		1.350	Oct 2020	-		-		-	0.000	12.115	-
Engineering Support (CIO/G-6)	C/FFP	AASKI : Edgewood, MD	6.472	-		0.500		-		-		-	0.000	6.972	-
Service (CIO-G-6)	SS/LH	ARL/SLAD : White Sand Missile Range (WSMR)	7.051	0.409	Oct 2019	0.570	Oct 2020	0.444	Oct 2020	-		0.444	0.000	8.474	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*	Project (Number/Name) 491 / *Information Assurance Development*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	47.844	8.368		8.009		6.937		-		6.937	0.000	71.158	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	171.332	8.368		8.009		6.937		-		6.937	0.000	194.646	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** 491 / *Information Assurance Development*

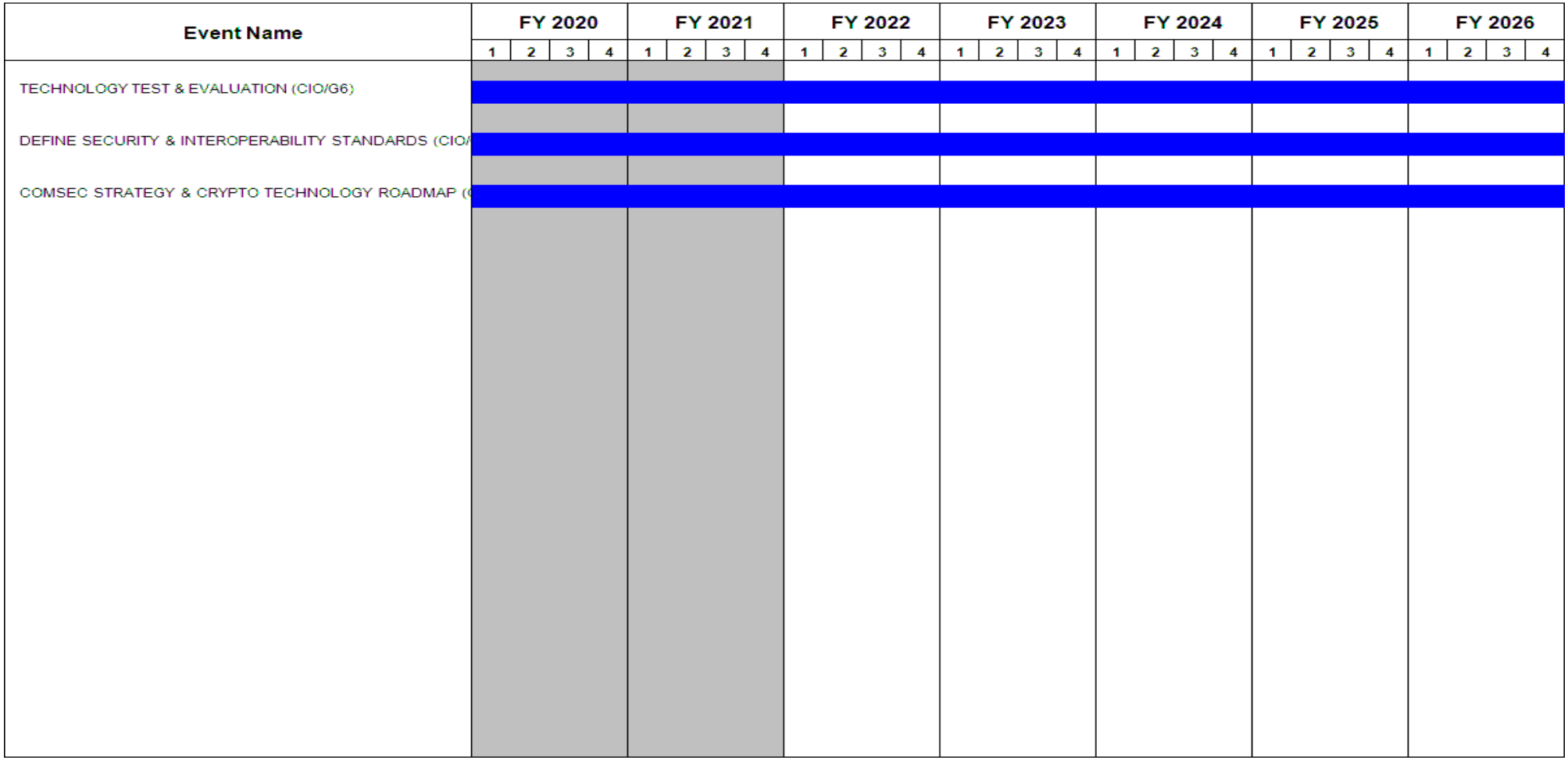


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** 491 / *Information Assurance Development*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
TEST & EVALUATION OF CRYPTOGRAPHIC SYSTEMS (PL Net E)	1	2014	4	2014
STUDY OF CURRENT AND EMERGING CRYPTO ALGORITHMS AND TECHNOLOGIES (PL Net E)	1	2015	2	2015
TEST OF INE AND WIRELESS SOLUTION (PL Net E)	1	2016	4	2018
BIG DATA PILOT (PD ES-CYBER)	1	2016	4	2016
TECHNOLOGY TEST & EVALUATION (CIO/G6)	1	2017	4	2027
DEFINE SECURITY & INTEROPERABILITY STANDARDS (CIO/G6)	1	2017	4	2027
COMSEC STRATEGY & CRYPTO TECHNOLOGY ROADMAP (CIO/G6)	1	2014	4	2027

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*				Project (Number/Name) DV4 / *Key Management Infrastructure (KMI)*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
DV4: *Key Management Infrastructure (KMI)*	-	11.687	12.457	0.987	-	0.987	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Communications Security (COMSEC) is governed by the Chairman of the Joint Chiefs of Staff Instruction (CJCSA) 6510. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army communications systems are required to support modern cryptographic capabilities by implementing modern algorithms.

As part of the Army's Key Management Infrastructure (KMI) implementation, the Next Generation Load Device - Medium (NGLD-M) is an Acquisition Category III (ACAT III) Program of Record (POR). The NGLD-M requires RDT&E investment to develop and test the hardware and software solutions to meet the operational requirements outlined in the NGLD Capability Production Document (CPD) to modernize fill devices with capability to transfer and receive cryptographic key over a network to reduce causalities and maintain mission OPTEMPO. Without this technology Warfighters are required to manually receive their cryptographic products by traveling to COMSEC account locations (which may not be co-located) and manually filling their devices.

The Reprogrammable Single Chip Universal Encryptor (RESCUE) is a government owned reprogrammable cryptographic chip that incorporates KMI functionality and modern algorithms to encrypt and decrypt messages for the embedding. This chip could be adapted for use within the NGLD-M or any other cryptographic communications system.

NGLD-M development will be realigned to 0605144A/BY6 funding line starting FY2022.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Reprogrammable Cryptographic Chip Development and Evaluation	1.000	1.000	0.987
Description: The Reprogrammable Single Chip Universal Encryptor (RESCUE) is a reprogrammable cryptographic chip that incorporates KMI functionality and modern algorithms to encrypt and decrypt messages for the embedding device. The RESCUE is built upon a modular architecture to enable tailoring of the chip to meet the specific requirements of the embedding device. This effort creates a government owned potential universal cryptographic chip enabling the Army to decrease costs for encryption devices.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV4 / *Key Management Infrastructure (KMI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: The RESCUE effort will consist of maintaining lab equipment, embedment planning to utilize the RESCUE chip with new capabilities, requirements analysis, tracking part's obsolescence, and software/firmware baseline development. ***FY 2022 Plans:*** The RESCUE effort will consist of maintaining lab equipment, embedment planning to utilize the RESCUE chip with new capabilities, requirements analysis, tracking part's obsolescence, and software/firmware baseline development. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Mission requirements changed.			
Title: NGLD Medium Development and NSA Certification ***Description:*** The Next Generation Load Device - Medium (NGLD-M) will conduct the Army's key fill mission by issuing, filling, and managing Cryptographic keys to both legacy and future KMI aware End-Cryptographic Units (ECUs). This technology requires RDT&E investment to meet the requirements outlined in the NGLD Capability Production Document (CPD). NGLD-M development will be realigned to 0605144A/BY6 funding line starting FY2022. ***FY 2021 Plans:*** Support NGLD-M system integration and the User Application Software (UAS) which is a graphical interface that will allow users to interact with the device. The NGLD-M development will establish configuration items and allocate system functions and performance requirements to the configurations items through a Preliminary Design Review. Further NGLD-M development will finalize the physical and functional characteristics of the NGLD-M configuration items and establish Government configuration control of the design at the Critical Design Review (CDR). At CDR, The Government will receive pre-production development models to support Highly Accelerated Life Testing for system reliability testing, End Cryptographic Unit interoperability testing, and the Risk Management Framework Security Control Assessment. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** This effort will be funded by a new NGLD-M BA 5 funding line.	10.578	11.346	-
Title: Program Management Support ***Description:*** PMO costs will be covered by OMA funding. This funds a matrixed Acquisition Program Manager (APM) from Combat Capabilities Development Command (CCDC) Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center to manage the NGLD-M development effort. ***FY 2021 Plans:***	0.109	0.111	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV4 / *Key Management Infrastructure (KMI)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 funds a matrixed Acquisition Program Manager (APM) from Combat Capabilities Development Command (CCDC) Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center to manage the NGLD-M development effort. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** This effort will be funded by a new NGLD-M BA 5 funding line.			
Accomplishments/Planned Programs Subtotals	11.687	12.457	0.987

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• B96004: *KEY MANAGEMENT INFRASTRUCTURE*	80.855	78.244	78.283	-	78.283	-	-	-	-	-	-
• OMA - 153140: *ISSP (TSEC-AKMS)*	-	-	-	-	-	-	-	-	-		

Remarks

Line Item & Title:
B96004: Key Management Infrastructure (OPA2)
153140: ISSP (TSEC-AKMS) (OMA)

D. Acquisition Strategy

Army Key Management Infrastructure (AKMI) acquisition strategy consists of Army, Air Force, and NSA Programs of Record (POR). AKMI is the Army's implementation of the National Security Agency (NSA) Key Management Infrastructure (KMI) ACAT IAM Program of Record. The AKMI will allow the Army to manage, control, plan, and distribute electronic key for the ~1.5 million End Cryptographic Units (ECU)s necessary to communicate and distribute data on the Army's tactical and strategic networks such as radios, secure phones, and satellite terminals.

The AKMI Program includes the Simple Key Loader (SKL) and Automated Communications Engineering Software (ACES) workstation contracts managed by the Army, Tactical Key Loader (TKL) contract by the US Air Force, and the Management Clients (MGC) nodes by NSA.

The AKMI program funded development of a KMI compliant cryptographic engine, the government owned
Reprogrammable Single Chip Universal Encryptor (RESCUE) that can be utilized by NGLD-M or other COMSEC devices. The NGLD-M will undergo full-and-open competition for development, production, and sustainment with a projected FY21 award.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV4 / *Key Management Infrastructure (KMI)*

The Milestone Decision Authority issued a Materiel Development Decision (MDD) Acquisition Decision Memorandum (ADM) on 14 March 2019 that designated the NGLD-M as an ACAT III Program of Record (PoR) and authorized execution of FY2019-FY2021 RDT&E funds for acquisition planning and risk mitigation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*	Project (Number/Name) DV4 / *Key Management Infrastructure (KMI)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2018 NDAA SEC 825 MDAP Cost Overrun	SS/CR	APG, MD : APG, MD	0.044	-		-		-		-		-	0.000	0.044	-
		Subtotal	0.044	-		-		-		-		-	0.000	0.044	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
KMI Awareness (RESCUE Development and NSA Certification	C/CPFF	Dynamics Research Corporation/Engility : APG, MD	14.445	1.000	Jul 2020	1.000	Jul 2021	0.987	Jul 2022	-		0.987	Continuing	Continuing	Continuing
KMI Awareness	C/CPFF	CCDC C5ISR, S&TCD : APG, MD	1.451	-		-		-		-		-	0.000	1.451	-
NGLD Development	C/CPFF	CCDC C5ISR S&TCD; NAVWARSYSCOM : APG, MD; San Diego, CA; TBD	1.250	10.578	Nov 2019	11.346	Nov 2020	-		-		-	Continuing	Continuing	Continuing
		Subtotal	17.146	11.578		12.346		0.987		-		0.987	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	CCDC C5ISR S&TCD : APG, MD	-	0.109	Nov 2019	0.111	Nov 2020	-		-		-	0.000	0.220	-
		Subtotal	-	0.109		0.111		-		-		-	0.000	0.220	N/A

	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	17.190	11.687		12.457		0.987		-		0.987	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*	Project (Number/Name) DV4 / *Key Management Infrastructure (KMI)*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV4 / *Key Management Infrastructure (KMI)*

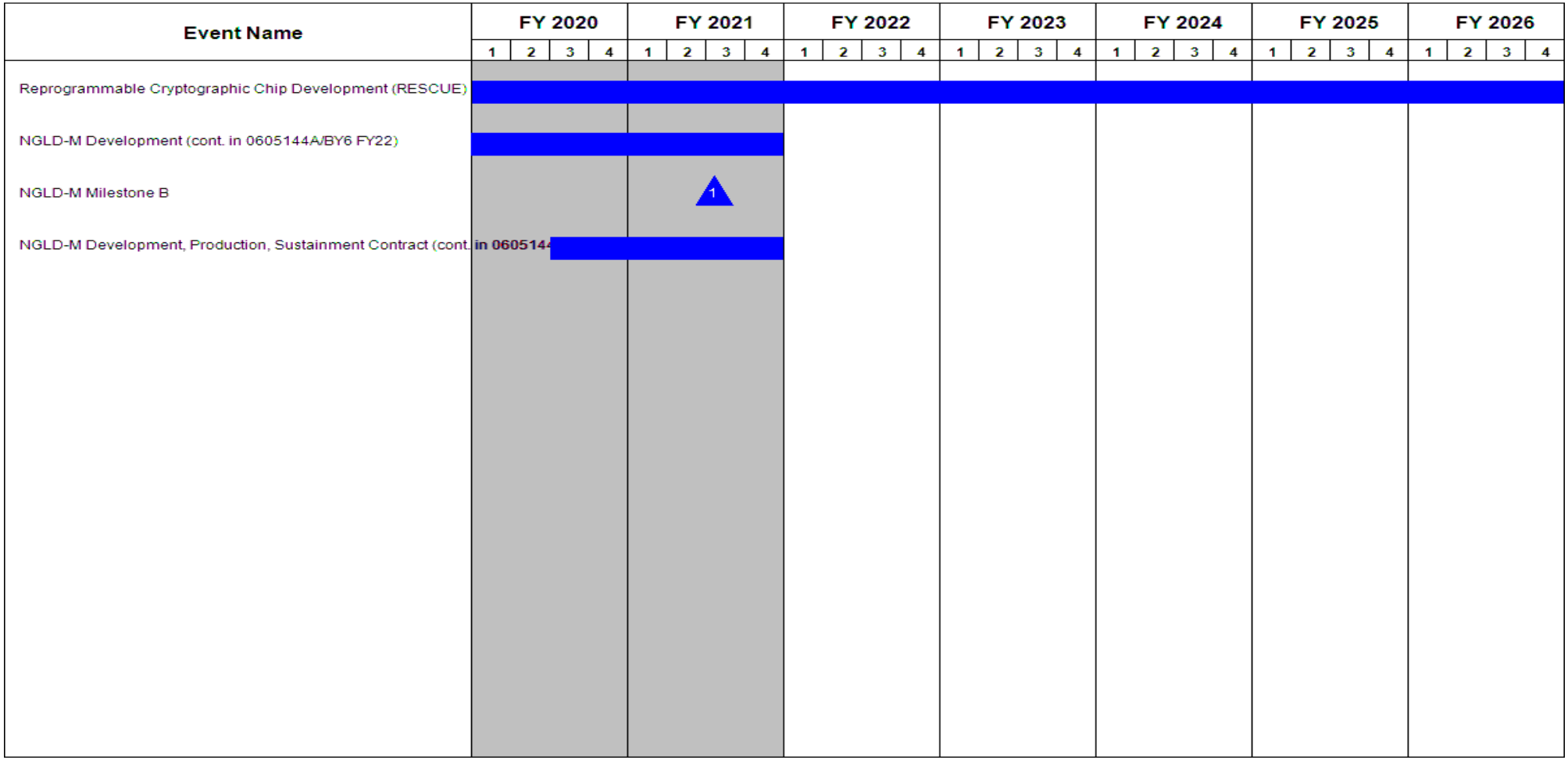


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV4 / *Key Management Infrastructure (KMI)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Reprogrammable Cryptographic Chip Development (RESCUE)	1	2019	4	2026
NGLD-M Development (cont. in 0605144A/BY6 FY22)	2	2019	4	2021
NGLD-M Milestone B	3	2021	3	2021
NGLD-M Development, Production, Sustainment Contract (cont. in 0605144A/BY6 FY22	3	2020	4	2021
NGLD-M Simplified Acquisition Management Plan	4	2019	4	2019

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*	Project (Number/Name) DV5 / *Crypto Modernization (Crypto Mod)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
DV5: *Crypto Modernization (Crypto Mod)*	-	5.655	7.804	7.796	-	7.796	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project DV5, Crypto Modernization (Crypto Mod), supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy. Communications Security (COMSEC) is governed by the Chairman of the Joint Chiefs of Staff Instruction (CJCSA) 6510.

Crypto Mod performs test, evaluation, development, and configuration management for cryptographic devices that receive key through fill devices and allow for secure communication through Army devices such as radios and satellite terminals. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army communications systems are required be upgraded to modern algorithms to meet emerging threat developed by our adversaries. Crypto Modernization necessitates the utilization of the latest National Security Agency (NSA) cryptographic capabilities in order to defeat adversarial efforts to decrypt, disrupt, or exploit US Army networks. Communications Security (COMSEC) is the Army's implementation of NSA protections to create a unified network that is protected, resilient, and survivable.

To accomplish this multi-faceted effort, consistent with Strategic Planning Guidance and the Army Modernization and Strategy Plan, Crypto Mod performs evaluation of emerging threats, development of advances protections to defeat these threats, testing of commercial and government off the shelf applications developed to provide protections against identified threats, and assessment of new software and hardware updates to these end user devices and software to ensure they remain hardened against cyber-attack. This ensures that all endpoints from singular NIPRNET, SIPRNET, JWICS and Intelligence workstations in the strategic Enterprise to Tactical vehicles and equipment utilized by dismounted personnel forward deployed in hot zone are protected when processing the critical mission and voice data that provides the strategic overmatch required to accomplish the Army's mission.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: VINSON/ANDVT (Advanced Narrowband Digital Voice Terminal) Cryptograph Modernization (VACM) program	0.746	0.300	0.306
Description: This program researches, assesses, tests, plans and works to integrate VACM products for the Army. These are a critical voice communications asset utilized for the president's air wing. The VACM program is a NSA mandated program established to replace legacy external cryptographic devices such as the KY-57, KY-99A, KY-58, KY-99, KY-100 and CV- 3591 / KYV-5. In order to ensure the confidentiality, integrity and availability of classified communications, the cryptographic modules must be tested for interoperability and form fit to ensure a successful fielding. Each software release will require testing to insure comparability and interoperability.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV5 / *Crypto Modernization (Crypto Mod)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2021 Plans: The program will continue to test and evaluate new software update to VACM devices to confirm continued capability and interoperability on Army networks and different tactical platforms as well as identifying new risk areas for compliance with COMSEC regulations and procedures. Development activities are ongoing as programs continue fielding, performing site surveys and installing at both CONUS and OCONUS locations. ***FY 2022 Plans:*** The program will continue to test and evaluate new software update to VACM devices to confirm continued capability and interoperability on Army networks and different tactical platforms as well as identifying new risk areas for compliance with COMSEC regulations and procedures. Development activities are ongoing as programs continue fielding, performing site surveys and installing at both CONUS and OCONUS locations. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The increase is due to the inflation.			
Title: Cryptographic Systems Test and Evaluation ***Description:*** This program supports the Army Cryptographic Modernization Transformational Initiative. This is accomplished by providing test and evaluation capabilities to the COMSEC community in order to assess emerging technologies before being released and approved for Army use; testing will be performed on hardware, software and network systems. ***FY 2021 Plans:*** Conduct testing and evaluation of COMSEC devices Link Encryptor Family (LEF), In-Line Network Encryptor (INE), Secure Voice (SV) to confirm capability and interoperability on Army networks and tactical systems as well as identifying risk areas for compliance with COMSEC regulations and procedures, with particular emphasis on the Advanced Cryptographic Capabilities (ACC) program lead by the NSA. The program will test and evaluate Crypto Systems compliant devices, Suite B IPSec devices built on commercial standards, Cryptographic High Value Product (CHVP), Commercial Solutions for Classified (CSfC) Guidance and new software releases to HAIPE 4.X devices in accordance with AR 700-142 Revision dated 8 June 2018. These devices provides the critical security backbone for all NIPRNET, SIPRNET, JWICS and Intelligence networks in both the Tactical and Enterprise networks. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure to defend against adversary attack and exploitation. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure. Additionally, this program evaluates performance of technologies and provides direction to ensure the lowest impact on performance while providing the greatest protection from loss of sensitive data. ***FY 2022 Plans:***	3.944	6.520	6.486

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV5 / *Crypto Modernization (Crypto Mod)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Conduct testing and evaluation of COMSEC devices Link Encryptor Family (LEF), In-Line Network Encryptor (INE), Secure Voice (SV) to confirm capability and interoperability on Army networks and tactical systems as well as identifying risk areas for compliance with COMSEC regulations and procedures, with particular emphasis on the Advanced Cryptographic Capabilities (ACC) program lead by the NSA. The program will test and evaluate Crypto Systems compliant devices, Suite B IPSec devices built on commercial standards, Cryptographic High Value Product (CHVP), Commercial Solutions for Classified (CSfC) Guidance and new software releases to HAIPE 4.X devices in accordance with AR 700-142 Revision dated 8 June 2018. These devices provides the critical security backbone for all NIPRNET, SIPRNET, JWICS and Intelligence networks in both the Tactical and Enterprise networks. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure to defend against adversary attack and exploitation. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure. Additionally, this program evaluates performance of technologies and provides direction to ensure the lowest impact on performance while providing the greatest protection from loss of sensitive data. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Change in mission requirements.			
Title: High Assurance Internet Protocol Encryption (HAIPE) extension manager ***Description:*** A management tool to configure the new extensions to the HAIPE standard and process the resulting data to provide early indications of cyber attacks. ***FY 2021 Plans:*** The program will continue software development efforts that will provide configuration and management of the HAIPE extensions and the user interface for collecting and analyzing the data that results from implementation of these HAIPE extensions. Addition of ACC software feature and new devices will be implemented. This will also facilitate the upgrade of the Army HAIPE to include new cyber sensor functionality for the tactical cell. ***FY 2022 Plans:*** The program will continue software development efforts that will provide configuration and management of the HAIPE extensions and the user interface for collecting and analyzing the data that results from implementation of these HAIPE extensions. Addition of ACC software feature and new devices will be implemented. This will also facilitate the upgrade of the Army HAIPE to include new cyber sensor functionality for the tactical cell. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** The increase is due to the inflation.	0.965	0.984	1.004
Accomplishments/Planned Programs Subtotals	5.655	7.804	7.796

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV5 / *Crypto Modernization (Crypto Mod)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• B96002: *CRYPTOGRAPHIC SYSTEMS (CRYPTO SYS)*	66.242	81.156	47.990	-	47.990	-	-	-	-	-	-
• BS9716: *NON PEO-SPARES*	3.857	3.896	3.596	-	3.596	-	-	-	-	-	-

Remarks

Line Item & Title:
B96002 - Cryptographic Systems - OPA2
BS9716 - NON PEO-SPARES - OPA4

D. Acquisition Strategy

The Cryptographic Systems procures NSA IDIQ contracts. Army RDT&E is used on existing and emerging encryptors which are tested and evaluated for Functionality, Security, Interoperability, and backward compatibility on software and hardware for both Tactical and Enterprise systems to ensure they remain hardened against cyberattack. CDD, approved by CIO/G6, 15 Jul 2010; ICD, approved by JROC, 25 Mar 2011; AAO; approved by G3, 15 Dec 2011 and revised and approved, 19 Jun 2015.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*	Project (Number/Name) DV5 / *Crypto Modernization (Crypto Mod)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering	SS/LH	CCDC C5ISR S&TCD : APG, MD	6.093	0.525	Nov 2019	0.540	Nov 2020	0.545	Nov 2021	-		0.545	Continuing	Continuing	Continuing
Engineering Support	C/CPFF	CACI : Aberdeen Maryland	7.442	0.340	Feb 2020	0.310	Feb 2021	0.315	Feb 2022	-		0.315	Continuing	Continuing	Continuing
Engineering Support	C/CPFF	Booz Allen Hamilton (BAH) : APG, MD	4.332	0.578	Feb 2020	0.234	Feb 2021	0.235	Feb 2022	-		0.235	Continuing	Continuing	Continuing
Engineering Support	C/CPFF	AASKI : Edgewood, Maryland	5.566	0.268	Apr 2020	0.200	Apr 2021	0.205	Apr 2022	-		0.205	Continuing	Continuing	Continuing
Information Assurance System Engineering Support	C/CPFF	Envision : Aberdeen, Maryland	0.966	-		-		-		-		-	0.000	0.966	Continuing
Embedded Crypto Modernization Support	C/LH	Canceled : Canceled	37.770	-		-		-		-		-	0.000	37.770	-
		Subtotal	62.169	1.711		1.284		1.300		-		1.300	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test & Evaluation	SS/LH	CCDC C5ISR S&TCD : APG, MD	0.262	0.272	Nov 2019	1.300	Nov 2020	1.301	Nov 2021	-		1.301	0.000	3.135	-
Test & Evaluation	C/CPFF	CACI : APG, MD	2.485	1.756	Feb 2020	1.800	Feb 2021	1.792	Feb 2022	-		1.792	0.000	7.833	-
Test & Evaluation	C/CPFF	Booz Allen Hamilton (BAH) : APG, MD	0.985	1.057	Feb 2020	1.820	Feb 2021	1.812	Feb 2022	-		1.812	0.000	5.674	-
Test & Evaluation	C/CPFF	AASKI : APG, MD	0.640	0.859	Apr 2020	1.600	Apr 2021	1.591	Apr 2022	-		1.591	0.000	4.690	-
		Subtotal	4.372	3.944		6.520		6.496		-		6.496	0.000	21.332	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	66.541	5.655		7.804		7.796		-		7.796	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / *Information Systems Security Program*	Project (Number/Name) DV5 / *Crypto Modernization (Crypto Mod)*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV5 / *Crypto Modernization (Crypto Mod)*

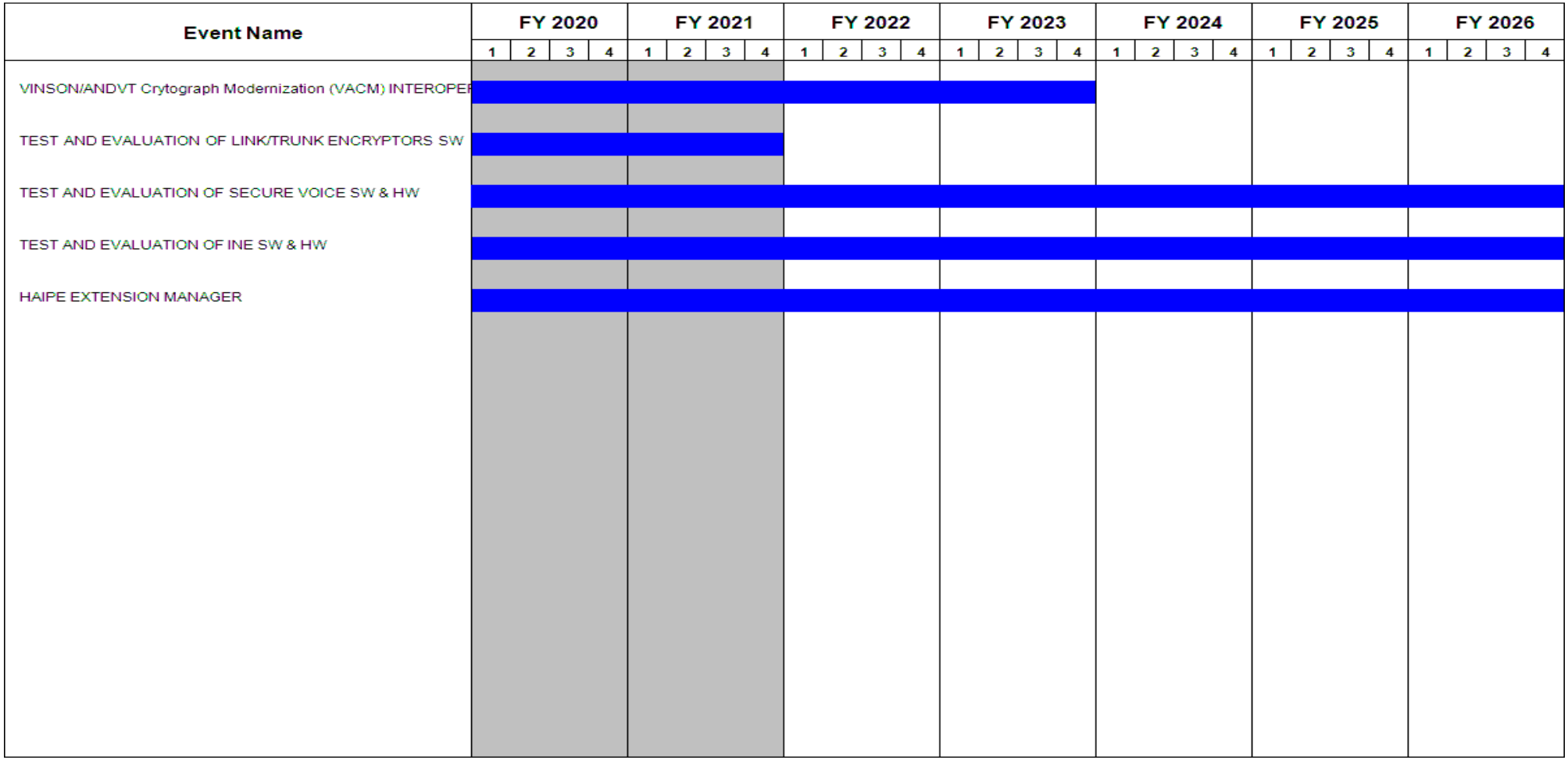


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303140A / *Information Systems Security Program*	**Project (Number/Name)** DV5 / *Crypto Modernization (Crypto Mod)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
VINSON/ANDVT Crytograph Modernization (VACM) INTEROPERABILITY	1	2016	4	2023
TEST AND EVALUATION OF LINK/TRUNK ENCRYPTORS SW	1	2016	4	2021
TEST AND EVALUATION OF SECURE VOICE SW & HW	4	2013	4	2026
TEST AND EVALUATION OF INE SW & HW	1	2017	4	2026
HAIPE EXTENSION MANAGER	1	2017	4	2026

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0303141A *I Global Combat Support System*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	57.604	70.652	52.739	-	52.739	-	-	-	-	-	-
083: *Global Combat Support Sys - Army*	-	12.507	20.883	20.375	-	20.375	-	-	-	-	-	-
EK2: *GCSS-A Increment 2*	-	45.097	49.769	32.364	-	32.364	-	-	-	-	-	-

Note

Effective February 2, 2017, the Department of Defense Instruction (DODI) 5000.75 was issued to establish policy for use of Business Capability Acquisition Cycle for Defense Business Systems. The DODI 5000.75 supersedes DODI 5000.02, improving the alignment of business systems to commercial best practices as well as optimizing efficiencies and effectiveness across the DOD for the acquisition of business systems. Decisions rendered by the Milestone Decision Authority, as outlined in the DODI 5000.75, are referred to as "Authority To Proceed" and replace DODI 5000.02 "Milestones."

A. Mission Description and Budget Item Justification

GCSS-Army Increment 1 gives combat forces a decisive edge by providing soldiers a seamless flow of timely, accurate, accessible, and secure logistics information to get combat power at the right place, at the right time. The GCSS-Army program is an information and communications technology investment that provides key enabling support to the transformation of the Army into a network-centric, knowledge-based future force. The GCSS-Army approved Capability Description Document (CDD) and Capability Production Document (CPD) require an enterprise approach to replace current logistics and maintenance Standard Army Management Information Systems (STAMIS) to include supply, maintenance, ammunition, aviation, and property book. GCSS-Army implements best business practices to streamline supply, accountability, maintenance, distribution, and reporting procedures in support of the future force transition path of The Army Campaign Plan.

GCSS-A must take critical steps towards integration and implementation of the next generation of Enterprise Business Systems capabilities. This effort will address the obsolescence of existing SAP Enterprise Resource Planning (ERP) logistics and financial management platforms that the vendor plans to sunset by FY 28. GCSS-A's modernization work sets the conditions for development of a converged, post-modern Defense Business System that streamlines and integrates the Army's core business functions.

GCSS-A must identify redundant processes as candidates for business process re-engineering. Funding will support the 1) market research of Industry best practices, 2) Initiation of an Army Enterprise Development Environment to enable prototyping which reduces risk by aiding the requirements development. This environment includes: Cloud-hosted infrastructure, applications, and programs and tools, 3) government Program Management and Systems Engineering and Technical Assistance (SETA) contractors needed to plan for and manage the initiation of the post-modern system implementation effort.

GCSS-Army Increment 2 consists of three waves: Wave 1- Enterprise Aviation (EAVN); Wave 2- Business Intelligence/Business Warehouse (BI/BW); Wave 3- Army Prepositioned Stocks (APS). Increment 2 builds on the current foundation by providing auditable EAVN maintenance, enhanced BI/BW, and APS functional capabilities which will directly impact the speed at which a deploying unit can draw combat equipment. Waves 1 and 2 will deliver greater efficiencies to Aviation Logistics

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303141A *I Global Combat Support System*

warfighters and improved information flow and accuracy in real time to decision makers, helping them make better decisions faster on the battlefield. Wave 3 will sunset the Army War Reserve Deployment System (AWRDS) legacy system.

The funds in the GCSS-Army Increment 1 Research Development Test & Evaluation (RDT&E) line are for building the software solution for disconnected supply, maintenance and accountability. The funds in FY 2020 are for critical change requests, coming from the warfighter and prioritized by the Combat Developer. In FY 2021, the Army will begin design, development and build of disconnected operations capability to support ground operations and will complete this effort in FY 2022.

In FY 2020, the Army Acquisition Executive (AAE) approved a change in technical approach for GCSS-Army Increment 2 due to unforeseen technical complexities identified by the vendor which would have significantly increased cost and schedule. The new technical approach will deliver capability in five capability drops for Waves 1 and 2 to be developed and deployed incrementally from FY 2020 thru FY 2023. FY 2022 funding will continue the GCSS-Army Enterprise Aviation development and deployment of the final three capability drops for Wave 1 and the third and fourth capability drops for Wave 2.

During this timeframe GCSS-Army Enterprise Aviation will integrate the Aircraft Notebook (ACN) data into GCSS-Army via an interface with the Enterprise Aviation Middleware components.

This integration of ACN with GCSS-Army will provide Warfighter level data to be populated into the Enterprise system that will provide Senior Leaders with a flight line view of Aviation assets as well as supports the data for Aviation reports through the Business Intelligence / Business Warehouse (BI/BW) application. The funding also supports trade studies, analysis and market research for SAP based ERP integration, consolidation and efficiencies.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	60.076	86.908	32.518	-	32.518
Current President's Budget	57.604	70.652	52.739	-	52.739
Total Adjustments	-2.472	-16.256	20.221	-	20.221
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-13.083			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.472	-3.173			
• Adjustments to Budget Years	-	-	20.221	-	20.221

Change Summary Explanation

FY22 will conclude design, development, and incremental testing for the three final capability drops of the GCSS-A INC 2 Wave 1 Enterprise Aviation capability in the GCSS-Army baseline software, along with associated Wave 2 BI/BW reporting capabilities.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / *Global Combat Support System*	Project (Number/Name) 083 / *Global Combat Support Sys - Army*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
083: *Global Combat Support Sys - Army*	-	12.507	20.883	20.375	-	20.375	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

GCSS-Army Increment 1 provides critical Army sustainment support to the soldier with a seamless flow of timely, accurate, accessible, and secure information management that gives combat forces a decisive edge and is essential for combat readiness. The GCSS-Army approved Capability Description Document (CDD) and Capability Production Document (CPD) require an enterprise approach to replace current logistics and maintenance Standard Army Management Information Systems (STAMIS) to include supply, maintenance, ammunition and property book. GCSS-Army implements best business practices to streamline supply, accountability, maintenance, distribution, and reporting procedures in support of the future force transition path of The Army Campaign Plan. GCSS-Army is financially compliant and is a key component for the Army Enterprise Strategy to be financially auditable.

The funds in the GCSS-Army Increment 1 Research Development Test & Evaluation (RDT&E) line are for building the software solution for disconnected supply, maintenance and accountability. Aviation applications could leverage the ground disconnected operations solution for common functions without additional development. The Army requires a disconnected operations architecture for GCSS-Army to support ground mission. The FY22 funding will continue building the software solution for disconnected supply, maintenance and accountability. Currently the Army has battlefield gaps without network connectivity: inability to maintain or regenerate combat power, order/process spare parts, track battle losses, or conduct maintenance. The disconnected operations architecture will alleviate these problems when there are disruptions in communications or cyber-attacks. In FY2022 the Army will complete design, development and build of disconnected operations capability to support ground operations. The FY 2022 funding also supports critical change requests in each fiscal year, coming from the warfighter and prioritized by the Combat Developer, for the baseline system.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Product Development	12.507	20.883	20.375
Description: The funds in the GCSS-Army Increment 1 RDT&E line are for building the software solution for disconnected supply, maintenance and accountability. The Army requires a disconnected operations architecture for GCSS-Army to support ground mission. The FY 2022 funding completes the development of the software solution for disconnected supply, maintenance and accountability. Aviation applications could leverage the ground disconnected operations solution for common functions without additional development.			
FY 2021 Plans: Currently the Army has battlefield gaps without network connectivity: inability to maintain or regenerate combat power, order/process spare parts, track battle losses, or conduct maintenance. The FY 2021 funding builds edge software for disconnected			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** 083 / *Global Combat Support Sys - Army*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
supply, maintenance and accountability, leveraging the Increment 2 architecture and revised technical approach approved in FY 2019. The disconnected operations architecture, using FY 2021 RDTE funding, will alleviate these problems when there are disruptions in communications or cyber-attacks. ***FY 2022 Plans:*** The FY 2022 funding will complete development of software for disconnected supply, maintenance and accountability. The disconnected operations architecture, using FY 2022 RDTE funding, will alleviate these problems when there are disruptions in communications or cyber-attacks. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 funding amount available is lower than FY21 due to completion of design and development in FY 2022.			
Accomplishments/Planned Programs Subtotals	12.507	20.883	20.375

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

GCSS-Army will design and develop the software solution for disconnected ground operations . The program will design and build user screens for disconnected supply, maintenance and accountability.The Army will use a disconnected operations architecture for GCSS-Army to support the ground missions. Aviation applications could leverage the ground disconnected operations solution for common functions without additional development. In FY21, the program office will award a development/ production base year (FY21) and option year (FY22) contract for the disconnected operations solution

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / *Global Combat Support System*	Project (Number/Name) 083 / *Global Combat Support Sys - Army*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
1 . PM GCSS-Army- PMO Operations	Various	PM GCSS-Army : Fort Lee, VA 23805	103.931	-		-		-		-		-	0.000	103.931	62.385
		Subtotal	103.931	-		-		-		-		-	0.000	103.931	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Enterprise Resource Planning (ERP) design and development	C/FPAF	Northrop Grumman Information Systems : Chester, VA 23836	467.058	-		-		-		-		-	0.000	467.058	457.056
Government Developer Subject Matter Experts	IA	ASA (FM&C), CASCOM and GFEBS : Various Locations	22.315	-		-		-		-		-	0.000	22.315	19.730
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	0.042	-		-		-		-		-	0.000	0.042	-
Disconnected Ground Operations	SS/TBD	TBD : Arlington VA	-	-		20.883		20.375		-		20.375	19.218	60.476	-
Continuous Enhancements	Option/ TBD	TBD : TBD	-	12.507	Sep 2020	-		-		-		-	6.182	18.689	-
		Subtotal	489.415	12.507		20.883		20.375		-		20.375	25.400	568.580	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
1. PM Support - Independent Verification and Validation (IV&V)	C/T&M	CAP Gemini : 2250 Corporate Park Dr, Herndon, VA 20171	1.031	-		-		-		-		-	0.000	1.031	1.031

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** 083 / *Global Combat Support Sys - Army*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
2. PM Support - Program Management Support Services A	C/T&M	Engility Corporation : 3750 Centerview Drive Chantilly, VA 20151	1.386	-		-		-		-		-	0.000	1.386	-
3. PM Support - Program Management Support Services B	C/T&M	Logistics Management Institue : Colonial Heights, VA 23834	42.101	-		-		-		-		-	0.000	42.101	42.101
		Subtotal	44.518	-		-		-		-		-	0.000	44.518	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
1. Test and Evaluation - Test and Evaluation	C/IDIQ	Northrop Grumman : McLean VA	39.950	-		-		-		-		-	0.000	39.950	-
		Subtotal	39.950	-		-		-		-		-	0.000	39.950	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	677.814	12.507		20.883		20.375		-		20.375	25.400	756.979	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** 083 / *Global Combat Support Sys - Army*

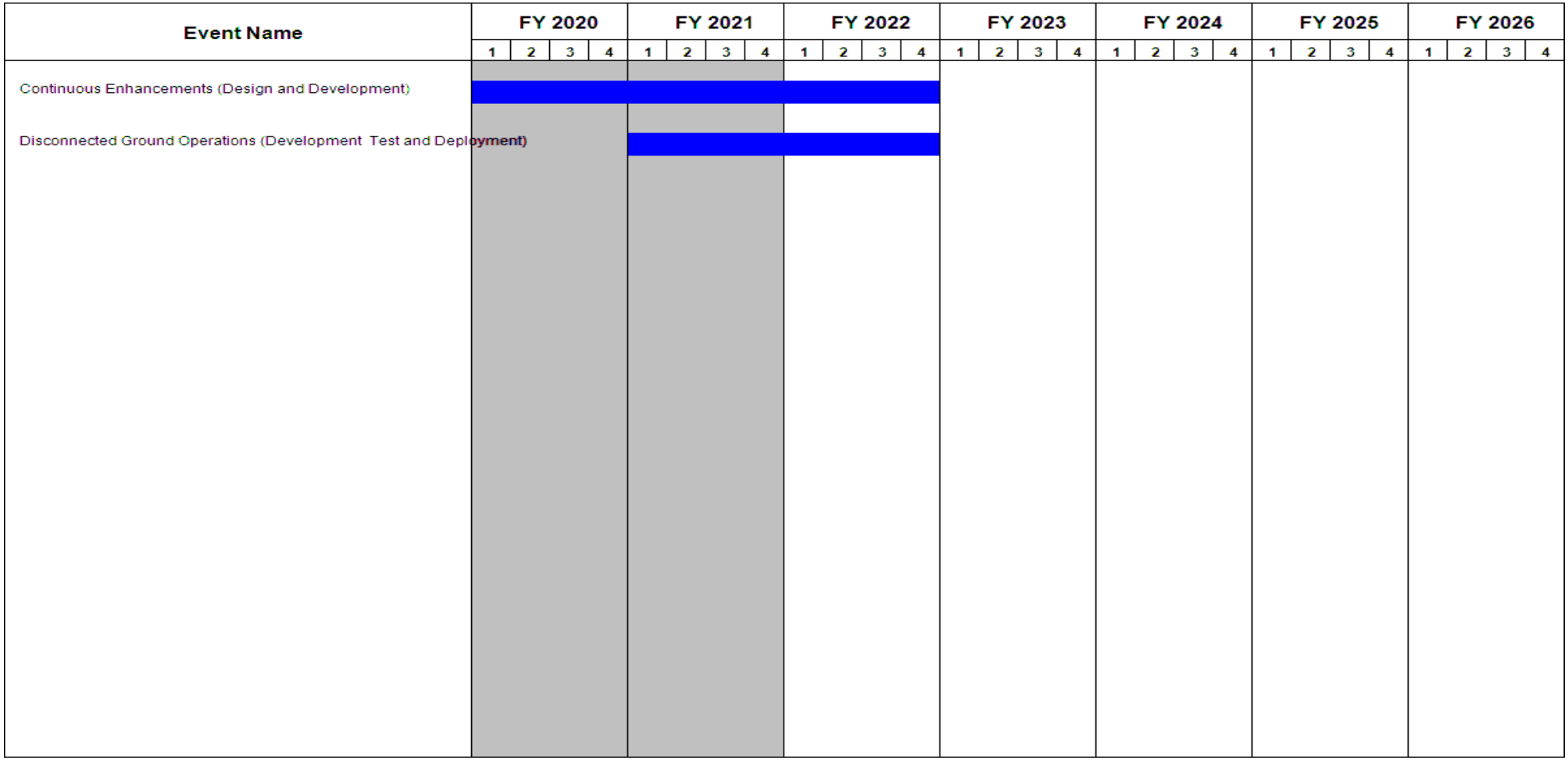


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** 083 / *Global Combat Support Sys - Army*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Seg 2 Contract Award	1	2008	1	2008
Increment 1 - Acquisition Review	2	2008	2	2008
Increment 1/Segment 1 Operational Assessment	1	2008	3	2010
Increment 1 - Milestone B	4	2008	4	2008
Increment 1/Release 1.1 DTOE	3	2010	4	2010
GCSS-Army Release 1.1 Design, Build, Test & Stabilize	1	2011	3	2011
Increment 1 - Milestone C	4	2011	4	2011
Release 1.1 Intial Operational Test and Evaluation (IOT&E)	1	2012	1	2012
Release 1.1 Stabilization	2	2011	1	2013
Lead Site Verification	1	2013	1	2013
Release 1.1 Full Deployment Decision	1	2013	1	2013
Field Wave 1	1	2013	1	2016
GCSS-Army Release 1.2 (Wave 2) Plan, Analyze, Design, Build & Test	3	2011	4	2015
Release 1.2 (Wave 2) Lead Site Verification Test	3	2015	3	2015
Release 1.2 (Wave 2) In Progress Review	4	2015	4	2015
Field Release 1.2 (Wave 2)	1	2015	1	2018
Continuous Enhancements (Design and Development)	1	2018	4	2022
Disconnected Ground Operations (Development Test and Deployment)	1	2021	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / *Global Combat Support System*	Project (Number/Name) EK2 / *GCSS-A Increment 2*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EK2: *GCSS-A Increment 2*	-	45.097	49.769	32.364	-	32.364	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

GCSS-Army Increment 1 gives combat forces a decisive edge by providing soldiers a seamless flow of timely, accurate, accessible, and secure logistics information to get combat power at the right place, at the right time. The GCSS-Army program is an information and communications technology investment that provides key enabling support to the transformation of the Army into a network-centric, knowledge-based future force. GCSS-Army implements best business practices to streamline supply, accountability, maintenance, distribution, and reporting procedures in support of the future force transition path of The Army Campaign Plan.

GCSS-Army Increment 2 builds on the current foundation by providing auditable Army Enterprise Aviation maintenance, enhanced Business Intelligence/Business Warehouse (BI/BW) and Army Pre-Positioned Stocks (APS) functional capabilities and will sunset the legacy system Army War Reserve Deployment System (AWRDS). Increment 2 will deliver greater efficiencies to Aviation Logistics warfighters and improve information flow and accuracy in real time to decision makers, helping them make better decisions faster on the battlefield.This Project is undertaking to develop the underlying common architecture for the next generation Enterprise Business System converged capabilities. This will include efforts to implement updated Business Processes through Business Process Reengineering in a modernized technical capability.

In FY 2020, the Army Acquisition Executive (AAE) approved the program's technical approach that provides the software solution for Enterprise Aviation via five incremental capability drops. The change resulted from technical risk identified by the vendor which would have significantly increased cost and schedule to the program. The new approach will integrate the Aircraft Notebook (ACN) with GCSS-Army for Aviation maintenance data, usage data, readiness data, Aviation supply processes, airworthiness data for Aviation assets, fully integrate the Aviation Critical Safety Item (Aviation Tracked Components for airworthiness) Process, and provide an end to end solution for the Aviation Directed Maintenance Action process.

Implementation of the BI/BW capabilities provide enhancements in materiel and supply chain readiness analytics that are critical to improve commanders' understanding of weapons systems readiness, helping them make better decisions faster on the battlefield.

The APS capabilities directly impacts the speed at which a deploying unit can draw combat equipment while reducing the burden of the day-to-day maintenance and accountability of Army Prepositioned Stocks.

The FY 2022 funding will continue design, development, and incremental testing for Enterprise Aviation capability in the GCSS-Army baseline software; FY 2022 RDTE funds will also allow the Army to develop critical maintenance, supply and financial reports that will be used for Enterprise Aviation and key functional areas in order to improve readiness reporting. FY 2022 will provide the development and deployment of the final three Capability Drops that will integrate the Aircraft Notebook with GCSS-Army for Aviation supply processes, airworthiness data for Aviation assets, fully integrate the Aviation Critical Safety Item (Aviation Tracked Components for airworthiness) Process, and provide an end to end solution for the Aviation Directed Maintenance Action process.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** EK2 / *GCSS-A Increment 2*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: System Design, Develop and Build	44.378	47.809	26.000
Description: The purpose of this phase is to begin the system development for an incremental capability that is affordable and executable to satisfy the Key Performance Parameters and Key System Attributes. ***FY 2021 Plans:*** Starting in FY2020, continuing through FY2021 and into FY2022, the program will perform design, development, and incremental testing for Enterprise Aviation (EAVN) software , which includes five capability drops: 1) Capability Drop 2.1 - Aircraft Logbook Data (Technical and Operational Readiness Status); 2) Capability Drop 2.2 - Personnel Flight Data, Aircraft Weapon Data and Aviation Daily Readiness data; 3) Capability Drop 2.3 - Integrated Aviation Technical Supply process; 4) Capability Drop 2.4 - Aviation Critical Safety Items (DA Form 2410 Tracked Components) Process (sunset interface from Aircraft Notebook to MCDS); and 5) Capability Drop 2.5 - End to End Directed Maintenance Action (DMA), Maintenance Work Order (MWO), Aviation Safety Message Tracking, and Aircraft Historical Records (airworthiness data). These capability drops will provide the required changes in the GCSS-Army baseline, the Aircraft Notebook (ACN), and the AESIP Enterprise Hub to accommodate the incorporation of the Aviation data and processes into the Enterprise. FY2021 RDTE funds will be used to complete software code development and developmental/Government testing on Capability Drops 2.1 and 2.2. As the development team completes 2.1 and 2.2, they will transition into the design and development of EAVN Capability Drops 2.3, 2.4, and 2.5. This design and development will continue throughout FY2021 and into FY2022. Implementation of GCSS-Army Wave 2 BI/BW reporting capabilities will provide enhancements to materiel and supply chain readiness with an additional capability to perform self-service analytics. The analyses will provide critical information to commanders' on weapons systems readiness enabling them to make quick decisions on the battlefield. BI/BW reporting will provide visibility and associated costs of materials and equipment, at the tactical and national levels, for Supply, Maintenance, Property Book functions, helping to improve lifecycle management and auditability. As directed, following an FY 2020 gap analysis, APS development will include integration of worldwide APS business processes to include conduct of operational assessment of APS in order to operationalize logistics management of APS overseas to improve readiness posture. ***FY 2022 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** EK2 / *GCSS-A Increment 2*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Building on the momentum initiated in FY2020 and continued through FY2021, the EAVN team will complete software design, development, and developmental testing on Capability Drops 2.3, 2.4, and 2.5 in FY2022. In addition to the planned developmental testing on these capabilities, Operational Testing is required for Capability Drops 2.3 and 2.5. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY22 will conclude design, development, and incremental testing for the three final capability drops of the GCSS-A INC 2 Wave 1 Enterprise Aviation capability in the GCSS-Army baseline software, along with associated Wave 2 BI/BW reporting capabilities.			
Title: Government System Test and Evaluation ***Description:*** Government System Test and Evaluation ***FY 2021 Plans:*** FY 2021 funding will provide for government personnel to conduct continuous evaluation assessment of developmental testing. ***FY 2022 Plans:*** FY2022 funding will provide for testing of Capability Drops 2.3, 2.4, and 2.5, including IOT&E as development of the capability drops concludes. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Capability Drop (Release 2) government testing will commence in FY 2021 and complete in FY 2022. The evaluation of operational suitability will include a demonstrated capability to maintain the software. IOT&E will include an end-to-end demonstration of regression test, automated, in the maintenance test environment. The demonstration will show how changes in requirements or discovered defects are mapped to lines of software that must be modified, and how modifications in software are mapped to the regression test scripts that will verify correct functioning of the modified software.	0.719	1.960	6.364
Accomplishments/Planned Programs Subtotals	45.097	49.769	32.364

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• W11011: *GCSS-Army Increment 2*	6.841	0.794	8.715	-	8.715	-	-	-	-	-	-
• OMA - 423612000-OMA: *GCSS-Army Increment2*	-	16.791	-	-	-	-	-	-	-	-	-

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** EK2 / *GCSS-A Increment 2*

D. Acquisition Strategy

GCSS-Army Increment 2 continues the evolutionary acquisition strategy of Increment 1 and will define, develop, and deploy additional and enhanced capabilities to GCSS-Army based upon proven technology, time-phased requirements, projected threat assessments, and demonstrated manufacturing capabilities.

GCSS-Army Increment 2 is being implemented in three waves:

Wave 1 provides the Army Enterprise Aviation logistics capability. Government System Integrator is the Combat Capability Development Command (CCDC) Aviation and Missile Center, System Simulation and Software Integration (S3I) Directorate. The program office will employ System Simulation and Software Integration Directorate (S3I) to design and develop the minimum viable Aviation solution through a series of five Capability Drops which will bring Aviation data and functionality into GCSS-Army and be independently designed, developed, and deployed.
Wave 2 provides the enhanced BI/BW capability. Base contract was awarded as a small business set aside IDIQ contract, June 2019. Option year awarded June 2020.

Wave 3 provides the APS capability. Will leverage Army Shared Service Center (ASSC) contract.

GCSS-Army will also leverage the partnership with the U.S. Army Communications-Electronics Command, and supplement the design and development team with architecture and engineering support from the existing support contract.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / *Global Combat Support System*	Project (Number/Name) EK2 / *GCSS-A Increment 2*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PMO Operations	Allot	PMO : Huntsville AL	1.860	-		-		-		-		-	0.000	1.860	-
		Subtotal	1.860	-		-		-		-		-	0.000	1.860	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
EAVN Blueprinting	RO	AMRDEC : Huntsville AL	90.815	-		-		-		-		-	0.000	90.815	90.815
EAVN System Design, Develop and Build	C/T&M	CCDC Aviation and Missile Cmd : Huntsville AL	34.139	24.691	Feb 2020	30.591	Oct 2020	22.145	Oct 2020	-		22.145	20.062	131.628	115.397
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	2.398	2.269		2.533		0.595		-		0.595	1.407	9.202	-
EAVN ADO Development	C/FFP	DOD ESI : Arlington VA	-	6.112		-		-		-		-	2.366	8.478	25.337
EAVN SME Services	C/T&M	DOD ESI : Richmond VA	-	1.555		1.667		-		-		-	1.701	4.923	5.168
EAVN SETA Supt	C/T&M	LMI : Arlington VA	5.963	7.035	Dec 2019	7.197	Dec 2020	2.150	Dec 2020	-		2.150	6.924	29.269	27.364
BI/BW Development	C/FFP	4M : Huntsville AL	2.140	0.918		2.491		0.447		-		0.447	4.971	10.967	10.677
BI/BW Program/SETA Support	C/T&M	LMI : Arlington VA	1.259	0.627		0.889		0.258		-		0.258	1.335	4.368	4.355
Program Support	TBD	Various : Various	0.748	0.486		1.219		0.405		-		0.405	1.335	4.193	4.033
EAVN Government Matrix Supt	RO	CCDC Aviation and Missile Cmd : Huntsville A	1.355	0.930		1.222		-		-		-	0.000	3.507	-
		Subtotal	138.817	44.623		47.809		26.000		-		26.000	40.101	297.350	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / *Global Combat Support System*	Project (Number/Name) EK2 / *GCSS-A Increment 2*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation	RO	ATEC : Aberdeen PG MD	0.625	0.474	Oct 2019	1.960	Oct 2019	6.364	Oct 2019	-		6.364	10.290	19.713	-
		Subtotal	0.625	0.474		1.960		6.364		-		6.364	10.290	19.713	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	141.302	45.097		49.769		32.364		-		32.364	50.391	318.923	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** EK2 / *GCSS-A Increment 2*

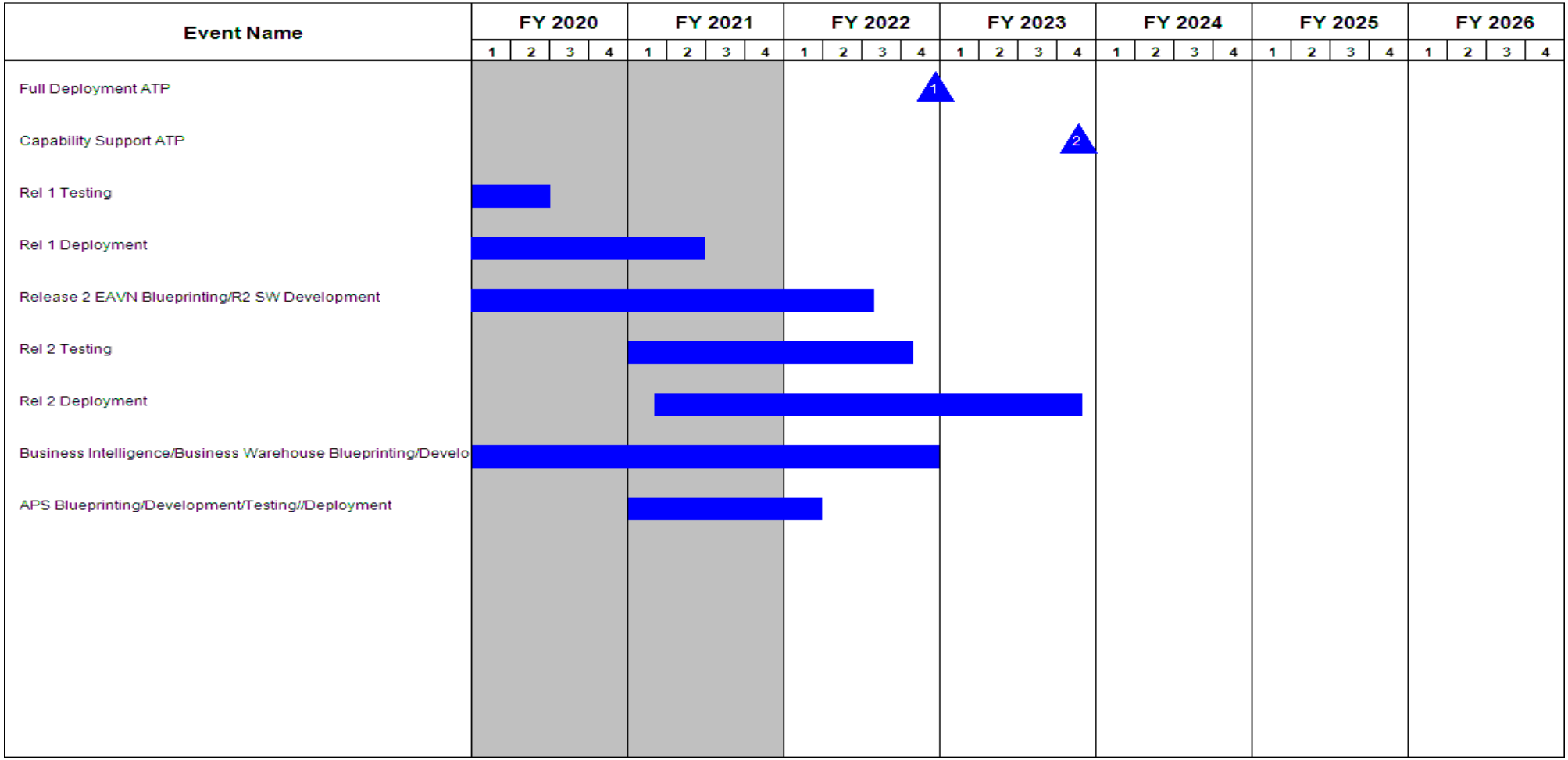


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303141A / *Global Combat Support System*	**Project (Number/Name)** EK2 / *GCSS-A Increment 2*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
MDA Meeting	2	2016	2	2016
Full Deployment ATP	4	2022	4	2022
Capability Support ATP	4	2023	4	2023
Rel 1 EAVN Blueprinting/ SW Development	1	2018	4	2019
Rel 1 Testing	1	2018	2	2020
Rel 1 Deployment	4	2019	2	2021
Release 2 EAVN Blueprinting/R2 SW Development	3	2019	3	2022
Rel 2 Testing	1	2021	4	2022
Rel 2 Deployment	1	2021	4	2023
Business Intelligence/Business Warehouse Blueprinting/Development	1	2019	4	2022
APS Blueprinting/Development/Testing//Deployment	1	2021	1	2022

Note

The schedule for GCSS-Army Increment 2 is based upon the Army Acquisition Executive (AAE) decision to utilize the Government System Integrator. Schedule reflects two releases for Enterprise Aviation (Wave 1), one release for Business Intelligence/Business Warehouse (Wave 2), and one release for Army Prepositioned Stock (Wave 3).

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0303142A *I SATCOM Ground Environment (SPACE)*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	-	18.002	15.247	-	15.247	-	-	-	-	-	-
253: *Dscs-Dcs (Phase II)*	-	-	4.212	4.105	-	4.105	-	-	-	-	-	-
456: *MILSATCOM System Engineering*	-	-	13.790	11.142	-	11.142	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Project 253, Dscs-Dcs (Phase II), SATCOM Ground Environment (SPACE) supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 - Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Fiscal Year 2022 (FY22) Base funding in the amount of $4.105 million develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations in support of the President, JCS, combatant commanders, military departments, Department of State and other government departments and agencies.

Project 456, MILSATCOM System Engineering supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team (N-CFT) capability set approach to achieve the network modernization strategy.

MILSATCOM System Engineering assures the tactical Army satellite communications (SATCOM) and SATCOM On-the-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM System Engineering shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM System Engineering represents the Army's tactical interests within Department of Defense (DoD), Commercial and International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts. MILSATCOM System Engineering also provides the technical and programmatic expertise to facilitate the Unified Network Capabilities and Integration (UNCI) integration mission of transport convergence and integration of N-CFT emerging solutions within the Tactical Network portfolio as part of future Capability Sets. MILSATCOM SE provides the programmatic and technical expertise to coordinate the UNCI mission to align and integrate elements of the Tactical Network portfolio in support of the Expeditionary Signal Battalion (ESB) and Multi Domain Task Force (MDTF).

Project 456 also includes Protected Anti-jam Tactical SATCOM efforts, which fill a critical communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and

protect against catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the tactical Army protection against interference that is either intentional or unintentional. These efforts are synchronized with the Space Force and DoD's plans for Protected Tactical Waveforms (PTW) on Wideband Global SATCOM (WGS), the Protected Tactical Satellite (PTS), and commercial SATCOM systems.

Protected Anti-jam Tactical SATCOM is a continuation of efforts previously funded under the MILSATCOM System Engineering (1203142A/FE2) and Protected Anti-jam Tactical SATCOM (1203142A/FI8) lines. MILSATCOM System Engineering supported development and testing of prototype PTW modems during the Protected Tactical Service Field Demo (PTSFD) in FY 2019. Protected Tactical Anti-jam SATCOM supported initial development, testing and certification of production representative PTW modems, incorporating Army specific requirements, to support continued spiral development of critical protected communications capabilities to address resiliency in jamming environments in FY 2020.

FY 2022 funding supports the systems engineering required to support technology maturation, systems analysis, experimentation and planning associated with Joint SATCOM development efforts. This line continues to fund the systems architecture and analysis for current and future SATCOM efforts in both wideband and protected satellite communications. It also funds system engineering efforts associated with the Protected Tactical Enterprise Service (PTES) program which will develop, test and enable the PTW modem over Wideband Global SATCOM (WGS) as well as Protected Tactical SATCOM (PTS), which is the next generation satellite constellation. Funding includes the Network Centric Waveform Tool (NCWT) development and testing and other efforts that have impacts on tactical Army use of military and commercial satellite constellations.

FY 2022 funding also supports continued collaborative development, testing and certification with Space Force of critical protected tactical capabilities.

MILSATCOM System Engineering (0303142A/456) funding is a realignment of funding from MILSACTOM System Engineering (1203142A/FE2) and Protected Anti-jam Tactical SATCOM (1203142A/FI8).

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.000	18.684	21.707	-	21.707
Current President's Budget	0.000	18.002	15.247	-	15.247
Total Adjustments	0.000	-0.682	-6.460	-	-6.460
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-0.682			
• Adjustments to Budget Years	-	-	-6.460	-	-6.460

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0303142A *I SATCOM Ground Environment (SPACE)*

Change Summary Explanation

In FY 2022, program funding was realigned for higher priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) 253 / *Dscs-Dcs (Phase II)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
253: *Dscs-Dcs (Phase II)*	-	-	4.212	4.105	-	4.105	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

1203142A (FE1) - SATCOM Ground Environment (SPACE) funding has been realigned to 0303142A (253) - SATCOM Ground Environment (SPACE) in FY 2021 and out. This is not a new start.

A. Mission Description and Budget Item Justification

Project 253, Dscs-Dcs (Phase II), SATCOM Ground Environment (SPACE) supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 - Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

Fiscal Year 2022 (FY22) Base funding in the amount of $4.105 million develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations in support of the President, JCS, combatant commanders, military departments, Department of State and other government departments and agencies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: SATCOM Terminal Digital Intermediate Frequency Implementation Analysis	-	2.190	1.299
Description: SATCOM Terminal Digital Intermediate Frequency (IF) implementation analysis aimed at improving bandwidth efficiency of gateway terminals while providing an additional layer of resiliency through terminal redundancy. These analyses include various evaluations for digital terminal components to replace current, less efficient, analog components. These analyses also include assessment of terrestrial connectivity among SATCOM terminals to enable Continuity Of Operations (COOP) and failover scenarios required for resiliency.			
FY 2021 Plans: Continue to demonstrate SATCOM Gateway resiliency through path diversity; use SATCOM terminals at different geographical locations to support any SATCOM mission.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 253 / *Dscs-Dcs (Phase II)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Integrate Digital IF Solutions for the Interconnect Facility (ICF) Replacement into the Prototyping, Integration, Test, Training (PITT) facility at Tobyhanna Army Depot (TYAD). Perform technical assessments and Wideband Global SATCOM (WGS) delta certification tests. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease due to use of satellite and network simulators in lieu of satellite airtime procurement. Test equipment procured in FY21 will be used to conduct tests in FY22.			
Title: Electromagnetic Interference Mitigation Analysis ***Description:*** Continue to assess multiple interference mitigation/cancellation technologies for effectiveness in improving reliability/resiliency of strategic and tactical communications. Mature technology to software/firmware that will improve protected SATCOM modem/terminal performance in a electro-magnetic interference contested environment. Technology will also improve terminal performance against adversary and friendly satellite link jamming resources. ***FY 2021 Plans:*** Continue to transition performance specifications to be implemented into next generation SATCOM modem. Mature and demonstrate gateway resiliency by using satellite links and terrestrial connectivity simultaneously to support SATCOM missions. ***FY 2022 Plans:*** Assess multiple interference mitigation/cancellation technologies for effectiveness in improving reliability/resiliency of strategic and tactical communications. Mature technology to software/firmware that will improve protected SATCOM modem/terminal performance in a electro-magnetic interference contested environment. Technology will also improve terminal performance against adversary and friendly satellite link jamming resources. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease since the Interference Cancellation development contract concludes in FY21. Remaining efforts will be focused on in house testing and analysis of alternatives.	-	2.022	1.495
Title: Low Earth Orbit (LEO)/Medium Earth Orbit (MEO) Satellite Service Integration ***Description:*** Investigate the availability of LEO/MEO Satellite Services in the commercial market place and assess their viability for use at Department of Defense (DoD) SATCOM gateways. ***FY 2022 Plans:***	-	-	1.311

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 253 / *Dscs-Dcs (Phase II)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Based on previously conducted studies and analyses, assess technology readiness for supporting DoD Gateway users in conjunction with Geosynchronous Earth Orbit (GEO) satellite services. Conduct analyses of alternatives and provide a recommendation on how to integrate these services into the DoD SATCOM Gateways. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Analysis of Alternatives will be required based on previously conducted market surveillance conducted in FY21. Multiple services will need to be integrated and assessed at Prototyping, Integration, Test, Training (PITT) Lab. This is not a new start.			
Accomplishments/Planned Programs Subtotals	-	4.212	4.105

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BB8500: *Defense Enterprise Wideband Satcom Systems*	98.399	101.498	97.369	-	97.369	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

This finances Project Manager, Defense Communications and Army Transmission Systems (PM DCATS) netcentric systems engineering, modem risk mitigation, and risk management framework support. Funding provides for SATCOM terminal upgrades, enhancement of baseband throughput capabilities, technology insertion and upgrades which improves SATCOM gateway resiliency while allowing for full utilization of Wideband Global SATCOM (WGS) capabilities. Both the Wideband SATCOM Operational Management System (WSOMS) and the Enterprise Wideband SATCOM Terminal System (EWSTS) Capability Production Documents (CPDs) contain Netcentric-Ready Key Performance Parameters (NR-KPPs) as required by CJCSI 6212.01C. Netcentric efforts are required to facilitate the migration from the current trunk-based communications systems to Internet Protocol (IP) based systems and to engineer, test and integrate IP based capabilities into WSOMS and EWSTS systems. Studies, risk mitigation, system integration and advanced demonstrations for Netcentric baseband and policy based control will accommodate technology insertion, data sharing, remote operations, architecture efforts and use of commercial technology, thus ensuring the life of the Defense Enterprise Wideband Satellite System (DEWSS) terminal family beyond 2025 and reducing lifecycle costs and enterprise requirements on the WGS and Defense Satellite Communication System (DSCS) satellites in the future. Contracting approach for new technology is through the use of Broad Agency Announcements (BAA) and Other Transaction Authority (OTA) contracts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) 253 / *Dscs-Dcs (Phase II)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SATCOM Terminal Digital IF Implementation Analysis	MIPR	Aberdeen Proving Ground : MD	-	-		1.885	Jan 2021	1.299	Jan 2021	-		1.299	Continuing	Continuing	Continuing
Electromagnetic Interference Mitigation Analysis	MIPR	Aberdeen Proving Ground : MD	-	-		1.666	Jan 2021	1.095	Jan 2021	-		1.095	Continuing	Continuing	Continuing
Low Earth Orbit/Medium Earth Orbit (LEO/MEO)	MIPR	Aberdeen Proving Ground : MD	-	-		-		1.116	Jan 2021	-		1.116	Continuing	Continuing	Continuing
		Subtotal	-	-		3.551		3.510		-		3.510	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
In-house Support	Allot	PdM WESS : Ft. Belvoir, VA	-	-		0.060		0.045		-		0.045	Continuing	Continuing	Continuing
Contractor Support	MIPR	ACC : Rock Island, IL	-	-		0.601	Jan 2021	0.550	Jan 2021	-		0.550	Continuing	Continuing	Continuing
		Subtotal	-	-		0.661		0.595		-		0.595	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		4.212		4.105		-		4.105	Continuing	Continuing	N/A

Remarks

SATCOM Terminal Digital Intermediate Frequency (IF) demonstrations with multi-vendor equipment will be conducted using live satellite links between Tobyhanna Army Depot (TYAD) and Joint SATCOM Engineering Center (JSEC) at Aberdeen Proving Grounds. All components demonstrated will be at Technology Readiness Level (TRL) 6.

Electromagnetic Interference Algorithms at TRL 6 will be hosted on a stand-alone hardware platform and tested at JSEC using live satellite links. All verified algorithms and performance specifications will transition to the Enterprise Digital IF Multi-Carrier (EDIM) modem program during 4Q FY 2021.

For the Low Earth Orbit/Medium Earth Orbit (LEO/MEO) effort, market surveillance of available services will be followed by Analyses of Alternatives. One or more options will be procured, integrated and tested at the Prototype Integration Test and Training (PITT) facility at Tobyhanna Army Depot.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 253 / *Dscs-Dcs (Phase II)*

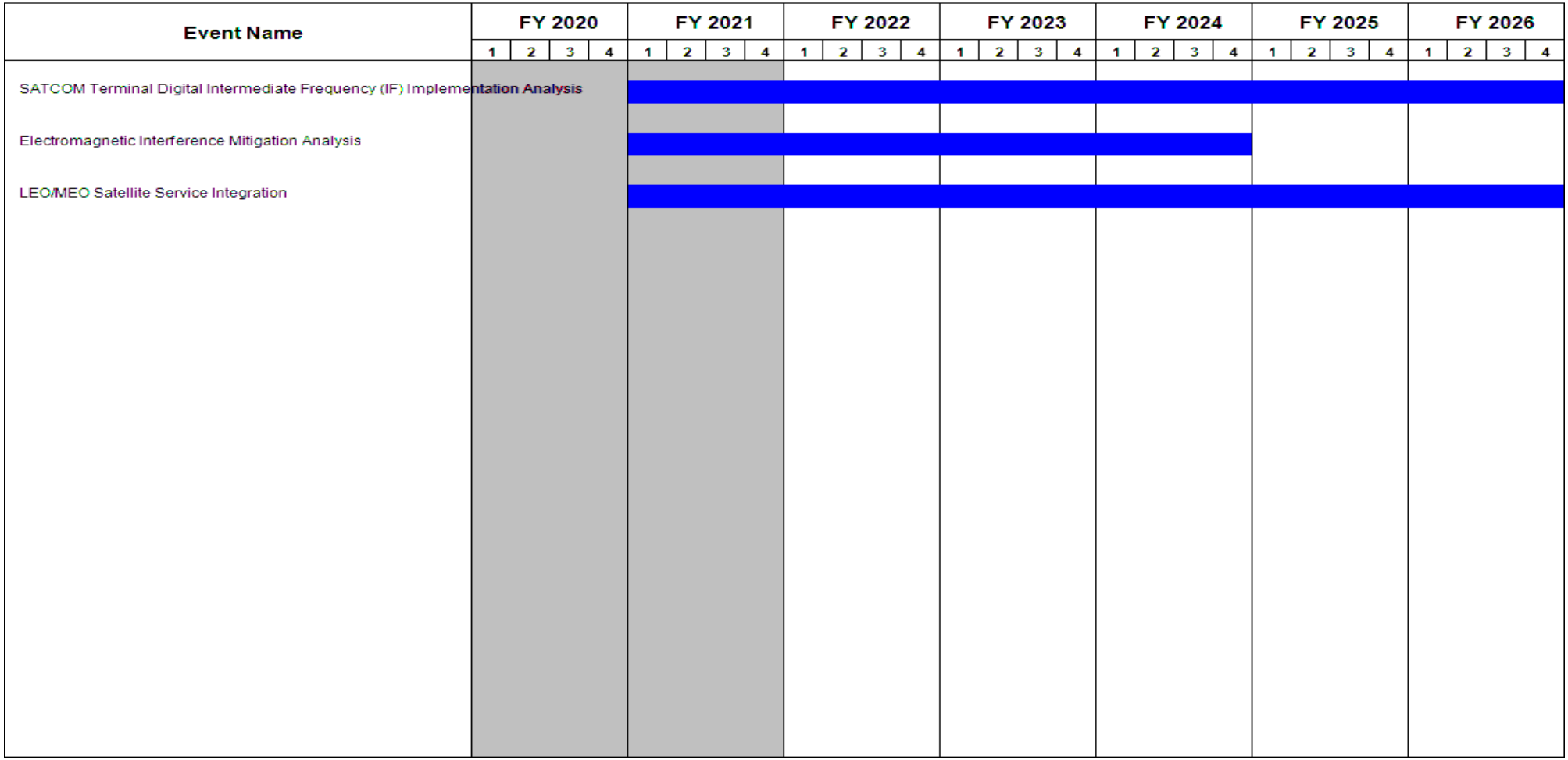


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 253 / *Dscs-Dcs (Phase II)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
SATCOM Terminal Digital Intermediate Frequency (IF) Implementation Analysis	1	2021	4	2026
Electromagnetic Interference Mitigation Analysis	1	2021	4	2024
LEO/MEO Satellite Service Integration	1	2021	4	2026

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303142A / *SATCOM Ground Environment (SPACE)*				Project (Number/Name) 456 / *MILSATCOM System Engineering*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
456: *MILSATCOM System Engineering*	-	-	13.790	11.142	-	11.142	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team (N-CFT) capability set approach to achieve the network modernization strategy.

MILSATCOM System Engineering assures the tactical Army satellite communications (SATCOM) and SATCOM On-the-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM System Engineering shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM System Engineering represents the Army's tactical interests within Department of Defense (DoD), Commercial and International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts. MILSATCOM System Engineering also provides the technical and programmatic expertise to facilitate the Unified Network Capabilities and Integration (UNCI) integration mission of transport convergence and integration of N-CFT emerging solutions within the Tactical Network portfolio as part of future Capability Sets. MILSATCOM SE provides the programmatic and technical expertise to coordinate the UNCI mission to align and integrate elements of the Tactical Network portfolio in support of the Expeditionary Signal Battalion (ESB) and Multi Domain Task Force (MDTF).

MILSATCOM System Engineering includes Protected Anti-jam Tactical SATCOM efforts, which fill a critical communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and protect against catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the tactical Army protection against interference that is either intentional or unintentional. These efforts are synchronized with Space Force and DoD's plans for Protected Tactical Waveforms (PTW) on Wideband Global SATCOM (WGS), the Protected Tactical Satellite (PTS), and commercial SATCOM systems.

Protected Anti-jam Tactical SATCOM is a continuation of efforts previously funded under the MILSATCOM System Engineering (1203142A/FE2) and Protected Anti-jam Tactical SATCOM (1203142A/FI8) lines. MILSATCOM System Engineering supported development and testing of prototype PTW modems during the Protected Tactical Service Field Demo (PTSFD) in FY 2019. Protected Tactical Anti-jam SATCOM supported initial development, testing and certification of production representative PTW modems, incorporating Army specific requirements, to support continued spiral development of critical protected communications capabilities to address resiliency in jamming environments in FY 2020.

FY 2022 funding supports the systems engineering required to support technology maturation, systems analysis, experimentation and planning associated with Joint SATCOM development efforts. This line continues to fund the systems architecture and analysis for current and future SATCOM efforts in both wideband and protected satellite communications. It also funds the system engineering efforts associated with the Protected Tactical Enterprise Service (PTES) program, which will develop,

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 456 / *MILSATCOM System Engineering*

test, and enable PTW communications over Wideband Global SATCOM (WGS) as well as Protected Tactical SATCOM (PTS), which is the next generation satellite constellation.

FY 2022 funding also supports continued collaborative development, testing and certification with Space Force of critical protected tactical capabilities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Protected communications system engineering and WGS communications	-	0.896	0.752
Description: Provides systems engineering support relating to the technology maturation, development and planning associated with joint SATCOM development efforts including Network Centric Waveform Tool (NCW-T), Protected Tactical Enterprise Service (PTES) and Protected Tactical SATCOM (PTS). ***FY 2021 Plans:*** Funding supports continued systems engineering and analysis for Protected Communications and WGS Communications, as well as development and technology maturation of NCW-T. ***FY 2022 Plans:*** Funding supports continued systems engineering and analysis for Protected Communications and WGS Communications, as well as development and technology maturation of NCW-T. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** $0.144 million reduction in system engineering support for Protected and WGS communications were realigned for higher priorities.			
Title: Systems architecture and analysis support	-	1.997	1.598
Description: Provides systems engineering support relating to the architecture and analysis of NCWT and the collaborative SATCOM, PTES, and PTS efforts as well as other efforts, such as research, analysis, technical engineering and integration services for bandwidth studies, and future technology insertions, that have impact on tactical Army use of military and commercial satellite constellations and integration of enabling technologies. These efforts have direct impact in reducing technical and programmatic risk for the acquisition efforts for tactical Army SATCOM systems using the WGS, commercial and military (Protected Tactical Satellites) constellations. ***FY 2021 Plans:*** Funding supports continued in house engineering support, contractor support and system architecture and analysis. ***FY 2022 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 456 / *MILSATCOM System Engineering*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Funding supports continued in house engineering support, contractor support, and system architecture and analysis. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** $0.399 million reductions in system engineering support relating to architecture and analysis of NCWT and joint DoD SATCOM efforts (including PTES and PTS efforts) were realigned for higher priorities.			
Title: Testing and certification of critical SATCOM and SATCOM On-the-Move communication and network technologies ***Description:*** Provides testing and certification of the critical SATCOM and SATCOM On-the-Move (SOTM) communication and network technologies. ***FY 2021 Plans:*** Funding supports continued testing and certification of critical SATCOM and SOTM communication and network technologies. ***FY 2022 Plans:*** Funding supports continued testing and certification of critical SATCOM and SATCOM On-the-Move communication and network technologies. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** $0.010 million increase due to minor scope adjustments for testing and certification of critical SATCOM and SOTM communications and network technologies.	-	0.425	0.435
Title: Protected Tactical Waveform (PTW) Modem Development and Testing ***Description:*** Development of large form factor and small form factor Protected Tactical Waveform (PTW) modems incorporating Army specific requirements. ***FY 2021 Plans:*** Funding supports the development and engineering of Army specific requirements for the PTW modem that will be utilized for protected tactical communications. ***FY 2022 Plans:*** Funding supports development and engineering of Army specific requirements for the PTW modem that will be utilized for protected tactical communications. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** $2.115 million reduction in development and engineering of PTW-capable modems in collaboration with USSF PATS program were realigned for higher priorities.	-	10.472	8.357
Accomplishments/Planned Programs Subtotals	-	13.790	11.142

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 456 / *MILSATCOM System Engineering*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

In FY 2021 funding was realigned from PE 1203142A / FE2 and 1203142A / FI8 to PE 0303142A / 456 line.

D. Acquisition Strategy

MILSATCOM System Engineering provides advanced systems engineering, research, development, test, evaluation (RDTE) and integration of new and emerging technologies to optimize terminal performance and communications control. Once the technologies are mature and deemed feasible, funding and management responsibility for implementation and integration of the technology will transition to PM Tactical Network and related Programs of Record.

Additionally, MILSATCOM System Engineering will provide RDTE of emerging protected SATCOM technologies to provide resilience and anti-jam protection against electronic warfare (EW), to include denial of geolocation transmissions, secure classified communications in a jamming environment, and a Protected Tactical Waveform (PTW). The program will leverage contracts established by Space Force beginning in FY 2020.

FY 2022 contract award will support the continued development, testing, experimentation and certification of a production representative large form factor PTW modem. Early development of PTW modems will enable Army preparedness to meet the Space Force's Protected Tactical Enterprise Service (PTES) Initial Operational Capability (IOC) planned for 1Q FY 2024.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) 456 / *MILSATCOM System Engineering*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Protected Communications and WGS Communications	TBD	Various : APG, MD	-	-		0.896	Apr 2021	0.752	Apr 2022	-		0.752	0.000	1.648	-
Protected Tactical Waveform (PTW) Modem Development	C/IDDQ	To Be Determined : To Be Determined	-	-		9.289	Apr 2021	7.710	Mar 2022	-		7.710	0.000	16.999	-
		Subtotal	-	-		10.185		8.462		-		8.462	0.000	18.647	N/A

Remarks

New contract award for Protected and WGS Communications development anticipated in Apr 2021.

Leveraging Space Force competitive Indefinite Delivery Indefinite Quantity (IDIQ) contracts to support PTW modem development, engineering, and testing.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering (In House)	MIPR	PM WIN-T : APG, MD	-	-		1.766	Dec 2020	0.647	Dec 2021	-		0.647	0.000	2.413	-
Engineering Contractor Support	C/CPFF	PM WIN-T : APG, MD	-	-		1.143	Jan 2021	1.598	Dec 2021	-		1.598	0.000	2.741	-
System Architecture and Analysis	MIPR	CERDEC : APG, MD	-	-		0.177	Sep 2021	-		-		-	0.000	0.177	-
		Subtotal	-	-		3.086		2.245		-		2.245	0.000	5.331	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support	MIPR	CERDEC : APG, MD	-	-		0.519	Aug 2021	0.435	Dec 2021	-		0.435	0.000	0.954	-
		Subtotal	-	-		0.519		0.435		-		0.435	0.000	0.954	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) 456 / *MILSATCOM System Engineering*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		13.790		11.142		-		11.142	0.000	24.932	N/A

Remarks

FY 2021 funding is a realignment from MILSATCOM System Engineering (1203142A/FE2) and Protected Anti-jam Tactical SATCOM (1203142A/FI8).

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 456 / *MILSATCOM System Engineering*

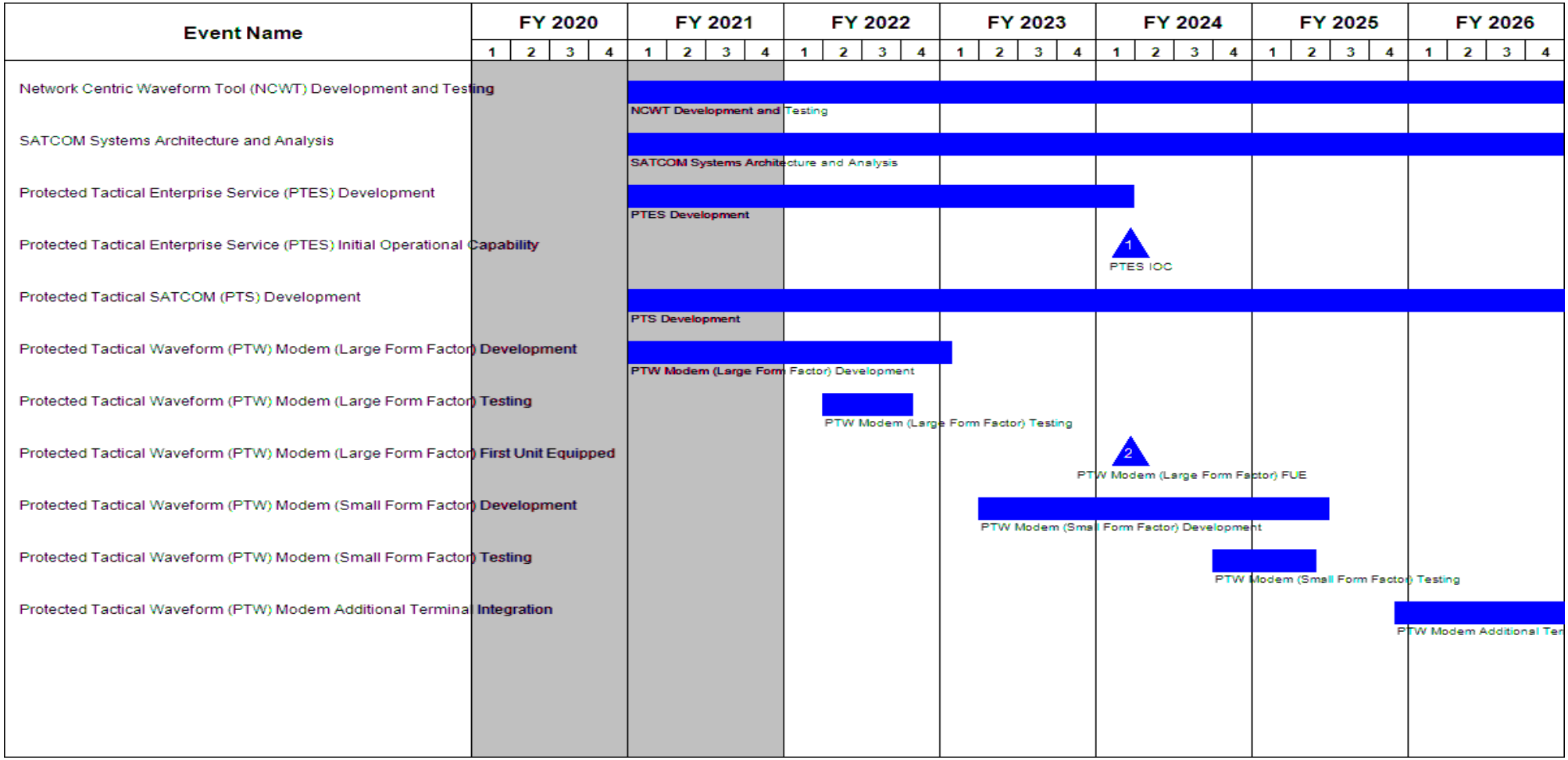


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** 456 / *MILSATCOM System Engineering*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Network Centric Waveform Tool (NCWT) Development and Testing	1	2021	4	2026
SATCOM Systems Architecture and Analysis	1	2021	4	2026
Protected Tactical Enterprise Service (PTES) Development	1	2021	1	2024
Protected Tactical Enterprise Service (PTES) Initial Operational Capability	1	2024	1	2024
Protected Tactical SATCOM (PTS) Development	1	2021	4	2028
Protected Tactical Waveform (PTW) Modem (Large Form Factor) Development	1	2021	1	2023
Protected Tactical Waveform (PTW) Modem (Large Form Factor) Testing	2	2022	4	2022
Protected Tactical Waveform (PTW) Modem (Large Form Factor) First Unit Equipped	1	2024	1	2024
Protected Tactical Waveform (PTW) Modem (Small Form Factor) Development	2	2023	2	2025
Protected Tactical Waveform (PTW) Modem (Small Form Factor) Testing	4	2024	2	2025
Protected Tactical Waveform (PTW) Modem Additional Terminal Integration	4	2025	4	2027

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0303150A *I WWMCCS/Global Command and Control System*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	1.988	-	-	-	-	-	-	-	-	-	-
C86: *Army Global C2 System*	-	1.988	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

All Fiscal Year 2020 (FY20) base funding will support Defense Readiness Reporting capabilities. The Defense Readiness Reporting System-Army (DRRS-A) is the Army's Authoritative Readiness Reporting System. This information technology system provides unit readiness reporting, unit registration and force planning and projection activities to enable Title 10 reporting to Congress. Specifically this funding will provide additional system enhancements and testing to support emerging developmental requirements to satisfy the Army's and Joint readiness reporting capabilities along with ensuring interoperability of Army and Joint Systems. DRRS-A is the Army's critical enabler which directly enables the Quarterly Readiness report to Congress.

Global Command and Control System-Army (GCCS-A): This project is the Army component of the Global Command and Control System (GCCS) Family of Systems (FoS). GCCS-A has transitioned into sustainment.

Army Joint and Strategic Command and Control (AJaSC2) is a modernization development effort for the Army's joint and strategic C2 capabilities. AJaSC2 provides the materiel solution in response to the Army Mission Command for Unified Action Capability Definition Package (AMCUA CDP). AJaSC2 enables Army operational headquarters to integrate with the Joint Force Commands and Unified Action Partners (UAP). AJaSC2 provides Army leaders: Joint Common Operating Picture (COP); Adaptive planning and execution capabilities for distributed, synchronous and asynchronous collaboration services to develop, revise, and execute their warfighting plans supported by theaterwide analytics; strategic Situational Awareness (SA) to coalition operations and other mission partners and Coordination and synchronization of Joint Execution Mission Management.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	2.073	0.000	0.000	-	0.000
Current President's Budget	1.988	0.000	0.000	-	0.000
Total Adjustments	-0.085	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.085	-			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303150A / *WWMCCS/Global Command and Control System*	Project (Number/Name) C86 / *Army Global C2 System*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
C86: *Army Global C2 System*	-	1.988	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Program has no FY 2021 funding request.

All Fiscal Year 2020 base funding will support Defense Readiness Reporting capabilities. The Defense Readiness Reporting System-Army (DRRS-A) is the Army's Authoritative Readiness Reporting System. This information technology system provides unit readiness reporting, unit registration and force planning and projection activities to enable Title 10 reporting to Congress. Specifically this funding will provide additional system enhancements and testing to support emerging developmental requirements to satisfy the Army's and Joint readiness reporting capabilities along with ensuring interoperability of Army and Joint Systems. DRRS-A is the Army's critical enabler which directly enables the Quarterly Readiness report to Congress.

Global Command and Control System-Army (GCCS-A): This project is the Army component of the Global Command and Control System (GCCS) Family of Systems (FoS). GCCS-A will transition into sustainment in FY 2019.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Defense Readiness Reporting System (DRRS-A) - Software Enhancements (Design/Develop) ***Description:*** Support to design, develop, and deploy emerging requirements into the Army's authoritative readiness reporting system to include. Software enhancements to support evolving DoD and Army readiness policies, processes, technical standards and new interace and interoperability requirements needed to share Army authoritative readiness data with Joint and Army data sharing partners.	0.994	-	-
Title: Defense Readiness Reporting Sytem (DRRS-A) - Test and Integration ***Description:*** Support for developmental and interoperability testing required for the Army's authoritative readiness reporting system.	0.994	-	-
Accomplishments/Planned Programs Subtotals	1.988	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303150A / *WWMCCS/Global Command and Control System*	**Project (Number/Name)** C86 / *Army Global C2 System*

D. Acquisition Strategy

The Readiness Reporting development effort in FY 2020 is accomplished through a Cost Plus Fixed Fee contract with Sotera Defense Solutions Inc. and testing is managed at the Army Software Engineering Center at Aberdeen Proving Grounds, Maryland. This project will satisfy readiness reporting requirements from Army Readiness Division (DAMO-ODR). The acquisition approach consists of a support agreement with CECOM LCMC SEC as the prime software developer utilizing a mix of government and contractor support.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303150A / *WWMCCS/Global Command and Control System*	Project (Number/Name) C86 / *Army Global C2 System*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Office Management (GCCS-A)	Various	Various : Various Locations	16.088	-		-		-		-		-	0.000	16.088	15.805
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	0.094		-		-		-		-	0.000	0.094	-
		Subtotal	16.088	0.094		-		-		-		-	0.000	16.182	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Defense Readiness Reporting System-Army Software Development	Option/ CPFF	Software Engineering Center : APG, MD	16.413	0.947	Mar 2020	-		-		-		-	0.000	17.360	10.217
GCCS-A/DRRS-A Bridge Effort Software Development (GCCS-A)	MIPR	Software Engineering Center : APG, MD	17.845	-		-		-		-		-	0.000	17.845	4.893
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	0.065	-		-		-		-		-	0.000	0.065	-
		Subtotal	34.323	0.947		-		-		-		-	0.000	35.270	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Contractors (GCSS-A)	C/FP	Various : Various	17.499	-		-		-		-		-	0.000	17.499	17.333
		Subtotal	17.499	-		-		-		-		-	0.000	17.499	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303150A / *WWMCCS/Global Command and Control System*	Project (Number/Name) C86 / *Army Global C2 System*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATEC/JTIC/CTSF/ SEC(GCCS-A)	MIPR	Various : Various	6.048	-		-		-		-		-	0.000	6.048	6.878
Defense Readiness Reporting System - Army (DRRS-A)	IA	Army Software Engineering Center : Aberdeen Proving Grounds, MD	1.175	0.947	Mar 2020	-		-		-		-	0.000	2.122	-
		Subtotal	7.223	0.947		-		-		-		-	0.000	8.170	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	75.133	1.988		0.000		-		-		-	0.000	77.121	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303150A / *WWMCCS/Global Command and Control System*	**Project (Number/Name)** C86 / *Army Global C2 System*

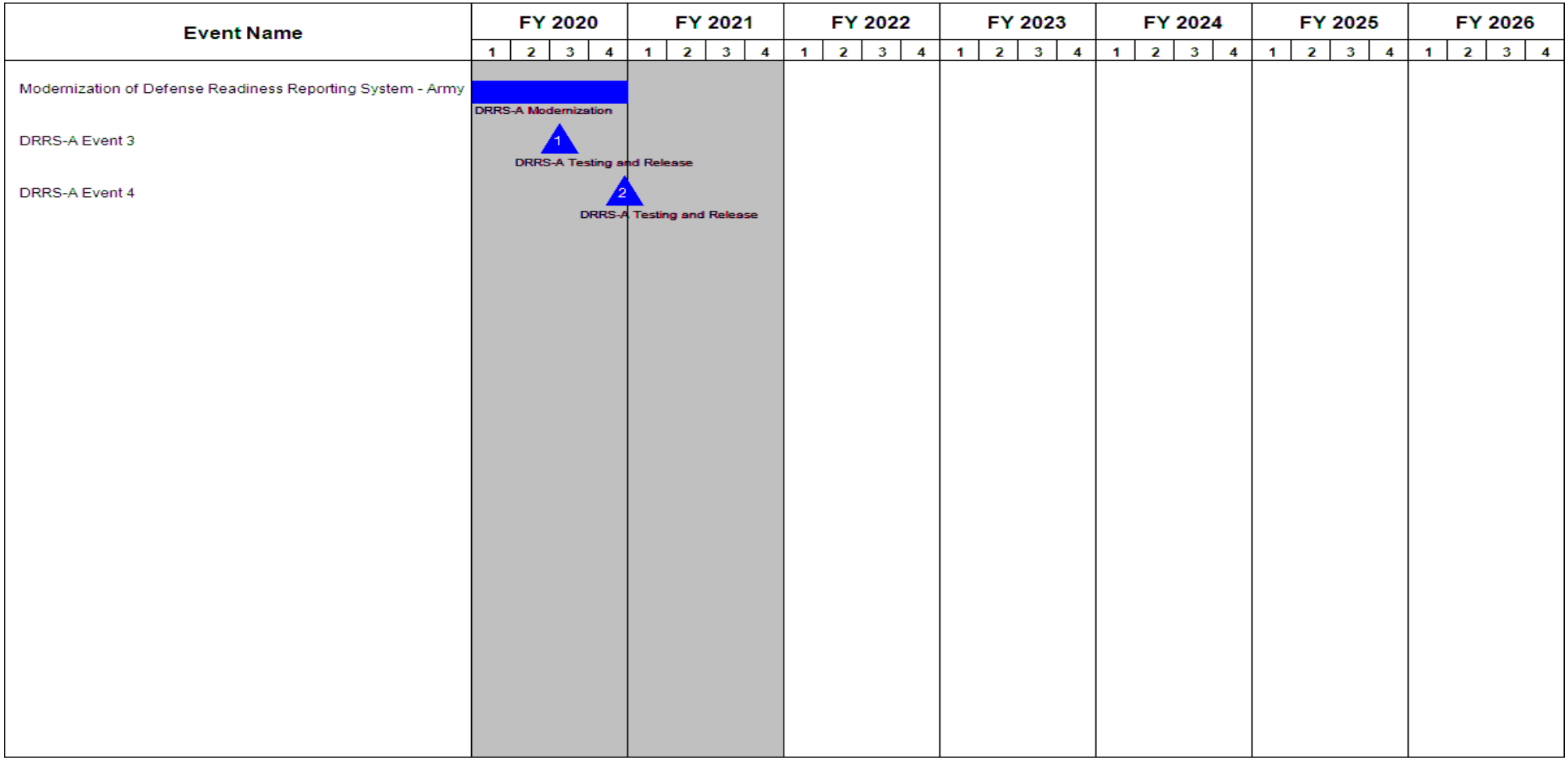


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0303150A / *WWMCCS/Global Command and Control System*	**Project (Number/Name)** C86 / *Army Global C2 System*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Modernization of Defense Readiness Reporting System - Army	1	2018	4	2020
DRRS-A Testing	3	2019	3	2019
DRRS-A Event 1	3	2019	3	2019
DRRS-A Event 2	4	2019	4	2019
DRRS-A Event 3	3	2020	3	2020
DRRS-A Event 4	4	2020	4	2020

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305179A / *Integrated Broadcast Service (IBS)*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.459	0.382	5.430	-	5.430	-	-	-	-	-	-
EF4: *Integrated Broadcast System*	-	0.459	0.382	5.430	-	5.430	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Joint Program Office (JPO) for Integrated Broadcast Service (IBS) Terminals supports the Joint Services and the Special Operations Command (SOCOM). The IBS transmits worldwide time-sensitive tactical and strategic intelligence and targeting data to all echelons of Joint Service operational users. The JPO is responsible for coordinating modernization and sustainment of IBS terminals compatible with the UHF SATCOM IBS broadcasts in support of Air and Missile Defense, Long Range Precision Fires, Soldier Lethality, and Network Command, Control, Communications and Intelligence Cross Functional Teams and Tactical Intelligence Targeting Access Node. The JPO is pursuing a next generation non-developmental item to replace the existing Joint Tactical Terminals (JTT) due to obsolescence and sustainment costs with current JTT configurations. The transmit/receive-capable JTT systems currently consist of the JTT-Senior and JTT-IBS configurations. The JTT is the official IBS producer system, and ensures continued IBS interoperability to a variety of tactical producers/consumers across the Joint Services Program.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	0.459	0.467	0.500	-	0.500
Current President's Budget	0.459	0.382	5.430	-	5.430
Total Adjustments	0.000	-0.085	4.930	-	4.930
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-0.085			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	4.930	-	4.930

Change Summary Explanation

FY22 funds are increased to initiate Joint Tactical Terminal (JTT) and Integrated Broadcast Services (IBS) modernization efforts.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305179A / *Integrated Broadcast Service (IBS)*	Project (Number/Name) EF4 / *Integrated Broadcast System*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EF4: *Integrated Broadcast System*	-	0.459	0.382	5.430	-	5.430	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Program Office (JPO) for Integrated Broadcast Service (IBS) Terminals supports the Joint Services and the Special Operations Command (SOCOM). The IBS transmits worldwide time-sensitive tactical and strategic intelligence and targeting data to all echelons of Joint Service operational users. The JPO is responsible for coordinating modernization and sustainment of IBS terminals compatible with the UHF SATCOM IBS broadcasts. The JPO is pursuing a next generation non-developmental item to replace the existing Joint Tactical Terminals (JTT) and performs JTT life cycle program management and technical fixes. The IBS network uses Type-1 encryption, Common Interactive Broadcast (CIB), and Common Message Format (CMF). Funds support acquisition related technical development, requirements, interoperability, testing and integration of next generation JTT systems and components.

FY 2022 funds will be used for government testing, integration and certification of the next generation JTT and to support development for the IBS modernization efforts.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Support Costs and Management Services	0.459	0.382	0.500
Description: Testing support ***FY 2021 Plans:*** Will continue testing support. ***FY 2022 Plans:*** Will continue testing support. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to inflation.			
Title: Modernization Efforts	-	-	4.930
Description: Joint Tactical Terminal (JTT) and Integrated Broadcast Services (IBS) modernization efforts.' ***FY 2022 Plans:*** Funds are required to initiate Joint Tactical Terminal (JTT) and Integrated Broadcast Services (IBS) modernization efforts. ***FY 2021 to FY 2022 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305179A / *Integrated Broadcast Service (IBS)*	**Project (Number/Name)** EF4 / *Integrated Broadcast System*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Funds are increased to initiate Joint Tactical Terminal (JTT) and Integrated Broadcast Services (IBS) modernization efforts.			
Accomplishments/Planned Programs Subtotals	0.459	0.382	5.430

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• V29600: *JTT/CIBS-M*	7.686	5.304	5.463	-	5.463	-	-	-	-	-	-

Remarks

FY 2022 funds continue support of the modernized JTT acquisition initiated in FY 2020 as well as the IBS modernization efforts initiated in FY2022.

D. Acquisition Strategy

The Integrated Broadcast Service (IBS) was designed to consolidate legacy broadcasts into an interoperable set of broadcasts that can carry threat warning and situational data to both users and producers. The requirement for IBS is documented in the Integrated SIGINT Information Mission Needs Statement (MNS) validated by the Joint Requirements Oversight Council (JROC) Memo (JROCM) 115-95 on 15 September 1995. The JTT program is an effort to provide common tactical terminals capable of receiving and transmitting into the IBS UHF broadcasts. The House Permanent Select Committee for Intelligence (HPSCI) requested an IBS Implementation Plan, which was approved by the Assistant Secretary for Defense for Command, Control, Communications and Intelligence (ASD/C3I) (ref (i)) on 24 October 1995. The JTT was included as part of the solution in the Implementation Plan. The JTT program Operational Requirements Document (ORD) was signed on 24 September 1996. Subsequent updates in March 2005 and November 2017 were made to reflect changes in interoperability/Net Readiness certifications and Post Milestone C enhancements respectively. Additional fact of life administrative changes were made and the updated ORD was signed on 25 April 2018. The JTT is integrated into platforms that have a requirement to interact (transmit and/or receive) with the IBS Common Interactive Broadcast (CIB). The legacy IBS Terminals will reach sustainment end-of-life in FY2027. The procurement of a post-Milestone C replacement was initiated to replace the end-of-life systems, leverage updated technology, and enable flexible configurations to meet Joint customer operational needs. The procurement for a modernized Non-Developmental Item terminal will access multiple vendors by leveraging competitively awarded contracts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305179A / *Integrated Broadcast Service (IBS)*	Project (Number/Name) EF4 / *Integrated Broadcast System*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
User Support	MIPR	ICOE : Fort Huachuca, AZ	0.046	-		-		-		-		-	0.000	0.046	-
Project Management Support	Allot	PM DCGS-A : APG, MD; Fort Huachuca, AZ	0.075	-		-		-		-		-	0.000	0.075	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	Allot	PM DCGS-A : APG, MD	0.002	-		-		-		-		-	0.000	0.002	-
		Subtotal	0.123	-		-		-		-		-	0.000	0.123	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IBS Modernization	MIPR	TBD : TBD	0.448	-		-		4.930	Jan 2022	-		4.930	0.000	5.378	-
Integration and Testing of JTT fleet Modernization	MIPR	JITC : Fort Huachuca, AZ; APG,MD	0.629	0.459		0.382	Jun 2021	0.500	Jun 2022	-		0.500	0.000	1.970	-
		Subtotal	1.077	0.459		0.382		5.430		-		5.430	0.000	7.348	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1.200	0.459		0.382		5.430		-		5.430	0.000	7.471	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305179A / *Integrated Broadcast Service (IBS)*	**Project (Number/Name)** EF4 / *Integrated Broadcast System*

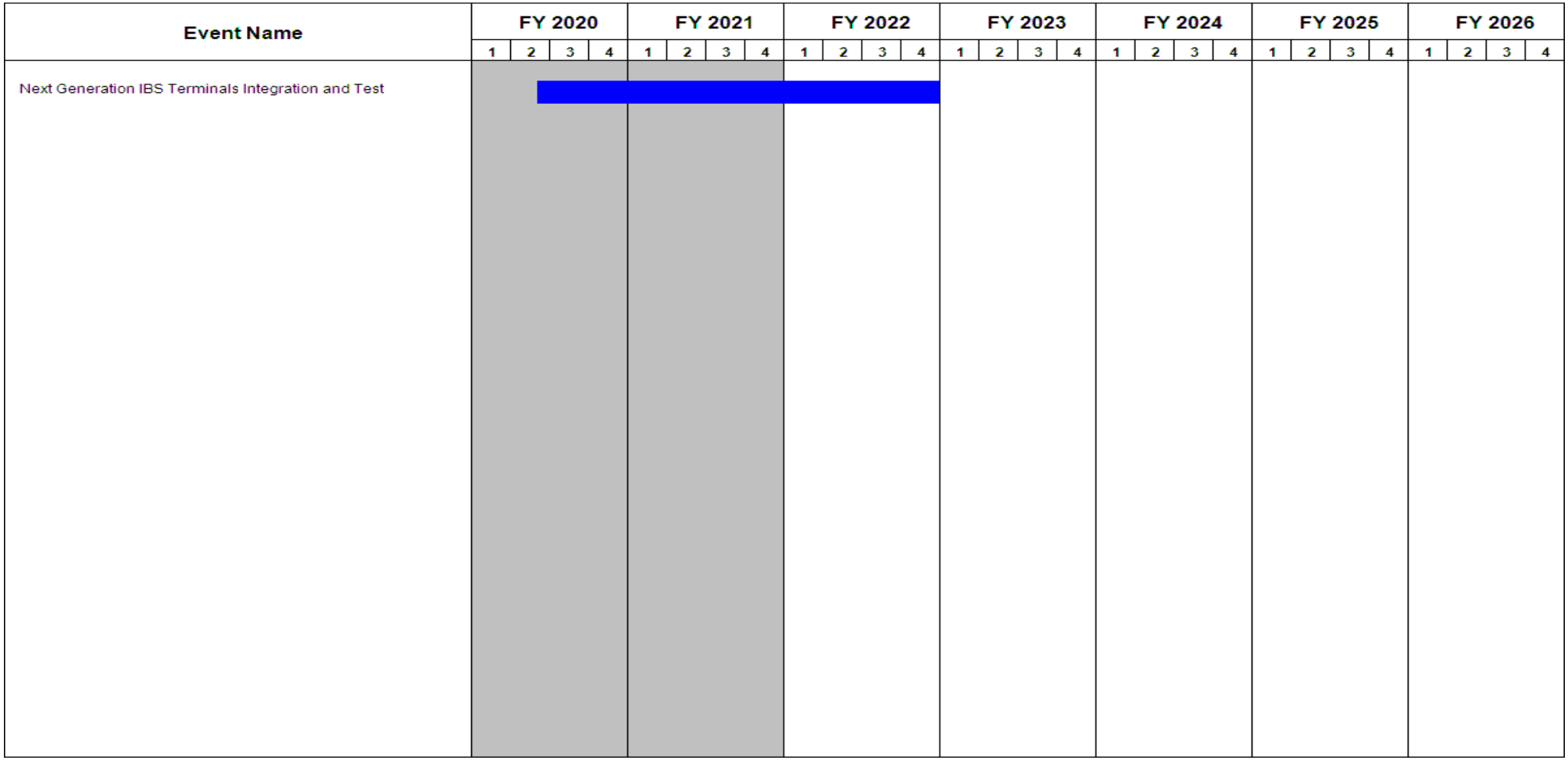


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305179A / *Integrated Broadcast Service (IBS)*	**Project (Number/Name)** EF4 / *Integrated Broadcast System*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Next Generation IBS Terminals Integration and Test	2	2020	4	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305204A / *Tactical Unmanned Aerial Vehicles*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	22.147	38.151	8.410	-	8.410	-	-	-	-	-	-
11A: *Advanced Payload Develop & Spt*	-	17.193	34.246	8.410	-	8.410	-	-	-	-	-	-
123: *Joint Technology Center System Integration*	-	4.954	3.905	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Fiscal Year (FY) 2022 Direct War/Enduring Operations dollars in the amount of $8.410 million will continue to support Project 11A Advanced Payload Develop & Spt: The Advanced Payloads Development project is a shared funding line between multiple payload programs. These payload programs support the Army's transformation by developing Reconnaissance, Surveillance and Target Acquisition (RSTA) and Intelligence, Surveillance and Reconnaissance (ISR) payload systems for Brigade Combat Teams, Divisions, and Corps Unmanned Aircraft Systems (UAS). This is in accordance with Headquarters Department of the Army (HQDA) and Training and Doctrine Command (TRADOC) UAS priorities. Additionally, this Program Element (PE) supports Future Advanced Payloads for Army UAS systems.

Common Sensor Payload (CSP) - Electro Optical / Infrared / Laser Designator (EO/IR/LD) provides High Definition (HD) Full Motion Video (FMV) in both the Electro Optical and Mid Wave IR spectrums with day/night capability to collect and display continuous imagery and the ability to designate targets of interest for attack by laser guided precision weapons. It is the EO/IR/LD sensor for the Gray Eagle UAS which supports force applications, battlespace awareness, force protection, and net-centric operations across the battlefield to provide wide area, near real time RSTA capabilities. Current product improvements continue to focus on the development and implementation of the Target Location Accuracy (TLA) capabilities that directly support emerging requirements of the Army's Current and Future Force.

Project 123 Joint Technology Center System Integration: The UAS Joint Technology Center/Systems Integration Laboratory (JTC/SIL) is a Joint facility that develops, integrates, and supports the enhancement of its Multiple Unified Simulation Environment (MUSE) capability for Army systems and operational concepts. The JTC/SIL conducts prototype hardware and software development, builds the UAS Institutional Mission Simulator (IMS) trainers for the Shadow, Hunter, and Gray Eagle programs, and provides modeling and simulation support. The MUSE is a real-time, operator in-the-loop simulation that may be integrated with larger simulations in support of Army and Joint training and exercises. The MUSE is also employed as a Mission Rehearsal Tool for ongoing combat operations. This project funds the management of the JTC/SIL and MUSE enhancements. This system supports the Legacy to Objective transition path of the Transformation Campaign Plan (TCP).

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*		R-1 Program Element (Number/Name) PE 0305204A / *Tactical Unmanned Aerial Vehicles*			
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	22.147	38.151	4.323	-	4.323
Current President's Budget	22.147	38.151	8.410	-	8.410
Total Adjustments	0.000	0.000	4.087	-	4.087
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	4.087	-	4.087

Change Summary Explanation

FY 2022 Base Funds increase of $8.410 million supports continuation of the Target Location Accuracy (TLA) product improvement effort for the Common Sensor Payload (CSP) under project 11A.
FY 2022 Base Funds were decreased by $4.323 million on project 123.
This results in an overall increase by $4.087 million.

Additionally, the Army decided not to move forward with development for the Tactical Awareness Improvement (TAI) product improvement effort which accounts for the significant decrease in funding on project 11A from $34.246 million in FY 2021 to $8.410 million in FY 2022.

No FY2022 budget submission STARLite Program of Record (POR).

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / *Tactical Unmanned Aerial Vehicles*	Project (Number/Name) 11A / *Advanced Payload Develop & Spt*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
11A: *Advanced Payload Develop & Spt*	-	17.193	34.246	8.410	-	8.410	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Advanced Payloads Development project is a shared funding line between multiple payload programs. These payload programs support the Army's transformation by developing Reconnaissance, Surveillance and Target Acquisition (RSTA) and Intelligence, Surveillance and Reconnaissance (ISR) payload systems for Brigade Combat Teams, Divisions, and Corps Unmanned Aircraft Systems (UAS). This is in accordance with Headquarters Department of the Army (HQDA) and Training and Doctrine Command (TRADOC) UAS priorities. Additionally, this Program Element (PE) supports Future Advanced Payloads for Army UAS systems.

Common Sensor Payload (CSP) - Acquisition Category (ACAT) III - Electro Optical / Infrared / Laser Designator (EO/IR/LD) provides Standard Definition (SD) or High Definition (HD) Full Motion Video (FMV) in both the Electro Optical and Mid Wave IR spectrums. These systems provide day/night capability to collect and display continuous imagery and the ability to designate targets of interest for attack by laser guided precision weapons. It is the EO/IR/LD sensor for the Gray Eagle UAS which supports intelligence gathering, force applications, battlespace awareness, force protection, and net-centric operations across the battlefield to provide wide area, near real time RSTA capabilities. FY 2022 Direct War/Enduring Operation dollars in the amount of $8.410 million funds product improvements to enhance CSP lethality through enhanced Target Location Accuracy (TLA). TLA provides validated, precision geolocation data for real-time targeting by coordinate-seeking weapons, reducing the kill chain timeline from minutes to seconds.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: CSP Increased Usability and Lethality	17.193	34.246	8.410
Description: Software and Hardware developments to increase lethality and usability of the CSP while reducing cognitive burden on the Warfighter.			
FY 2021 Plans: Will continue Night Vision and Electronic Sensor Division Lab technological support to the CSP program. Will complete Target Location Accuracy (TLA) hardware and software design and integration, begin assembling prototypes supporting development and operational testing, and conduct preliminary Integration, Verification, and Validation activities.			
FY 2022 Plans: Complete TLA contractor Qualification testing, perform platform integration and conduct government testing			
FY 2021 to FY 2022 Increase/Decrease Statement: TLA development effort enters final stage in FY22			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305204A / *Tactical Unmanned Aerial Vehicles*	**Project (Number/Name)** 11A / *Advanced Payload Develop & Spt*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
TAI effort will not be funded and accounts for the significant decrease in FY22 OCO funding			
Accomplishments/Planned Programs Subtotals	17.193	34.246	8.410

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A01005: *CSP FMV*	-	-	-	-	-	-	-	-	-		

Remarks

D. Acquisition Strategy

The Enhanced EO/IR Capability Production Document, approved 19 December 2016, defines additional KPP requirements for the FMV sensor on the Gray Eagle platform. The first KPP increases detection, recognition, and identification requirements which can only be met with the HD variation of the CSP. Currently, units are being fielded with HD CSPs, with additional HD CSPs in production and retrofit. The second KPP requirement is for the CSP to be a metric sensor providing rapid and enhanced Target Location Accuracy (TLA). A five (5) year follow-on production and system support contract was awarded in 2019 for integration, test, upgrade, and sustainment of these enhanced capabilities. The FY 2022 acquisition strategy for CSP includes the completion of testing supporting CSP-TLA development

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / *Tactical Unmanned Aerial Vehicles*	Project (Number/Name) 11A / *Advanced Payload Develop & Spt*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CSP Program Management	MIPR	PM EOIR : Fort Belvoir, VA	0.922	2.217	Dec 2019	2.261	Dec 2020	0.800	Dec 2021	-		0.800	Continuing	Continuing	Continuing
		Subtotal	0.922	2.217		2.261		0.800		-		0.800	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CSP Development	C/CPFF	Raytheon : McKinney, TX	84.022	-		-		-		-		-	0.000	84.022	-
CSP HW/SW Improvements Reduce Cognitive Burden	MIPR	Night Vision Labs : Fort Belvoir, VA	4.447	0.143		0.146	Dec 2020	-		-		-	Continuing	Continuing	Continuing
CSP Target Location Accuracy (TLA)	SS/CPFF	Raytheon : McKinney, TX	6.187	8.776		4.718	Dec 2020	-		-		-	Continuing	Continuing	Continuing
CSP Tactical Awareness Improvement (TAI)	SS/CPFF	Raytheon : McKinney, TX	-	-		11.335	Dec 2020	-		-		-	Continuing	Continuing	Continuing
CSP TLA Integration	MIPR	Various : Various	-	3.755		1.021	Dec 2020	-		-		-	Continuing	Continuing	Continuing
CSP TAI Integration	MIPR	Various : Various	-	-		2.292	Dec 2020	-		-		-	Continuing	Continuing	Continuing
		Subtotal	94.656	12.674		19.512		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CSP TLA Integration (NRE)	SS/CPFF	PM MAE(General Automics) : San Diego, CA	0.781	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	0.781	-		-		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / *Tactical Unmanned Aerial Vehicles*	Project (Number/Name) 11A / *Advanced Payload Develop & Spt*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CSP Testing	MIPR	Various : Various	17.086	-		-		-		-		-	0.000	17.086	-
CSP HW/SW Improvements Reduce Cognitive Burden	MIPR	Night Vision Labs : Fort Belvoir, VA	0.611	-		-		-		-		-	Continuing	Continuing	Continuing
CSP Testing (TLA)	MIPR	Various : Various	-	1.732		6.195	Dec 2020	-		-		-	Continuing	Continuing	Continuing
CSP Testing (TLA)	SS/CPFF	Raytheon : McKinney, TX	-	0.570		4.450	Dec 2020	7.610	Dec 2021	-		7.610	Continuing	Continuing	Continuing
CSP Testing (TAI)	MIPR	Various : Various	-	-		0.914	Dec 2020	-		-		-	Continuing	Continuing	Continuing
CSP Testing (TAI)	SS/CPFF	Raytheon : McKinney, TX	-	-		0.914	Dec 2020	-		-		-	Continuing	Continuing	Continuing
		Subtotal	17.697	2.302		12.473		7.610		-		7.610	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	114.056	17.193		34.246		8.410		-		8.410	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305204A / *Tactical Unmanned Aerial Vehicles*	**Project (Number/Name)** 11A / *Advanced Payload Develop & Spt*

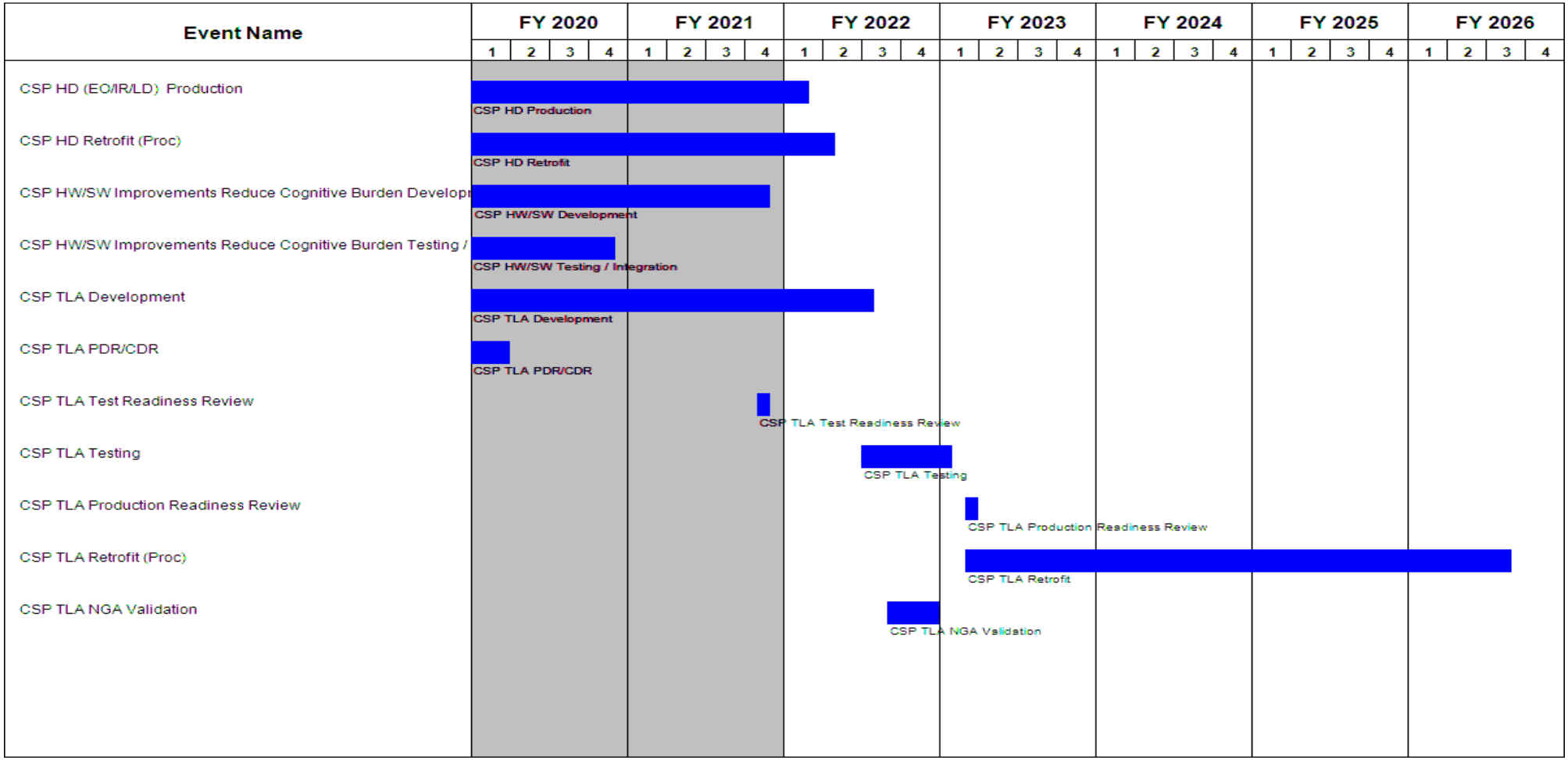


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305204A / *Tactical Unmanned Aerial Vehicles*	**Project (Number/Name)** 11A / *Advanced Payload Develop & Spt*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
CSP HD (EO/IR/LD) Production	2	2013	1	2022
CSP HD Retrofit (Proc)	4	2013	2	2022
CSP HW/SW Improvements Reduce Cognitive Burden Development	1	2016	4	2021
CSP HW/SW Improvements Reduce Cognitive Burden Testing / Integration	3	2017	4	2020
CSP TLA Development	4	2018	3	2022
CSP TLA PDR/CDR	1	2020	1	2020
CSP TLA Test Readiness Review	4	2021	4	2021
CSP TLA Testing	3	2022	1	2023
CSP TLA Production Readiness Review	1	2023	1	2023
CSP TLA Retrofit (Proc)	1	2023	3	2026
CSP TLA NGA Validation	3	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / *Tactical Unmanned Aerial Vehicles*	Project (Number/Name) 123 / *Joint Technology Center System Integration*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
123: *Joint Technology Center System Integration*	-	4.954	3.905	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program development discontinued for transition to sustainment

A. Mission Description and Budget Item Justification

The Joint Technology Center/Systems Integration Laboratory (JTC/SIL) is a Joint facility that supports UAS and RPA programs within the Joint Services by providing the system engineering, test and integration, interoperability, rapid technology insertion and develops training capability to include the MUSE/AFSERS system. This project funds the management of the JTC/SIL and MUSE/AFSERS Enhancements

The Multiple Unified Simulation Environment (MUSE) is the DoD simulation/training system for Unmanned Aircraft Systems (UAS), RPA, and ISR systems. MUSE is also known as the Air Force Synthetic Environment for Reconnaissance and Surveillance (AFSERS) in its Air Force Application. The MUSE/AFSERS is a software suite that simulates ISR & strike systems, tailored air vehicle & data links, and visualization systems used for payload product outputs-including Full Motion Video (FMV), Fixed Frame Imagery (FFI), Ground Moving Target Indicator (GMTI) data, and Link 16 (J2.2 and J3.5) tracking messages. Outputs are compliant with applicable DoD standards and are continually tested against actual ground ISR processors to ensure interoperability with over 40 systems within DoD.

The MUSE/AFSERS creates a realistic operational environment which supports the ability to assess military utility, architecture and concept of employment development, Tactics, Techniques, and Procedures (TTP) refinement, practice Processing, Exploitation, and Dissemination (PED) of intelligence information, conduct emerging concepts experimentation, and optimize tactical operations within warfighting exercises and experiments. MUSE/AFSERS is currently in use across Services and most unified commands simulating MQ-1, MQ-9, RQ-4, MQ-1C, M/RQ-5, RQ-7, national and commercial satellite collectors, P-3, E-8, and the U-2. During warfighting exercises, the MUSE/AFSERS provides National Imagery Transmission Format (NITF) images for associated C4ISR systems to support the execution of PED. The MUSE/AFSERS is also used as a mission rehearsal tool for current, on-going military combat operations. Most of the components of the MUSE/AFSERS software suite are also used in multiple UAS RPA system training devices including those for the RQ-7 [Shadow], MQ-1C [Gray Eagle], M/RQ-5 [Hunter], MQ-9 [Medium Altitude Long Endurance Tactical (MALET) JSIL Aircrew Trainer (MJAT)] and RQ-4 [Global Hawk Sensor Operator Part Task Trainer (GHSOPTT) and Global Hawk Weapon System Trainer (WST)].

This system supports the Legacy to Objective transition path of the Transformation Campaign Plan (TCP).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Product Development	4.354	3.455	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305204A / *Tactical Unmanned Aerial Vehicles*	**Project (Number/Name)** 123 / *Joint Technology Center System Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: Funding is provided for the following efforts planned each Fiscal Year (FY). ***FY 2021 Plans:*** - Continue development and release of MUSE/AFSERS RPA and ISR simulation capability supporting theater level exercises such as Dong Maeng (formerly Ulchi Freedom Guardian and Key Resolve), Yama Sakura, Talisman Saber, Pacific Sentry, Austere Challenge, and associated events. - Continue incorporation of mandated Cyber Security updates. - Complete the re-architecture of Vignette Planning & Rehearsal Software (ViPRS) capability to include transitioning it to be web browser accessible, developing an after action report (AAR) capability, and more realistic attrition. - Continue architecture software optimization and modularization to facilitate extensibility and scalability. -Begin prototype development of an improved image generator based upon the results of the image generator trade study conducted during FY20. - Fully integrate the high fidelity SAR model into the MUSE/AFSERS baseline which provides realistic SAR imagery based upon material encoded terrain. - Fully integrate MTI/SAR sensor cross-cuing capability in MUSE/AFSERS. -Develop and integrate low-cost, fixed-wing support to UAS/RPA operations. -Integrate a Vehicle and Dismount Exploitation Radar (VADER) sensor model in MUSE/AFSERS. -Begin development of the Long Range Radar (LRR) sensor MUSE/AFSERS model. -Development and Integration of Air Launched Effects (ALE) Simulation -Develop IFF Modes 4, 5, & S in MUSE/AFSERS. - Continue integration testing with designated federations (ASCCE, JLVC, JLCCTC) ensuring joint interoperability with services and JS/J7 capabilities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program development discontinued for transition to sustainment			
Title: Management Services ***Description:*** Funding is provided for the following efforts. ***FY 2021 Plans:*** Continue coordination and oversight of MUSE product development. ***FY 2021 to FY 2022 Increase/Decrease Statement:***	0.600	0.450	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305204A / *Tactical Unmanned Aerial Vehicles*	**Project (Number/Name)** 123 / *Joint Technology Center System Integration*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Program development discontinued for transition to sustainment			
Accomplishments/Planned Programs Subtotals	4.954	3.905	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• PE 0305206F Air Force: *PE 0305206F Air Force*	3.548	3.607	-	-	-	-	-	-	-	-	-

Remarks

The JTC/SIL and the MUSE receive funding from the Air Force, Program Element (PE) 0305206F. This effort is a continuing effort in support of Service UAS programs.

D. Acquisition Strategy

The acquisition strategy is to continue MUSE development which will be accomplished through a combination of Government in-house functional directorate support using a variety of existing contract vehicles.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / *Tactical Unmanned Aerial Vehicles*	Project (Number/Name) 123 / *Joint Technology Center System Integration*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	AMC, AMCOM, AMRDEC, SED : Redstone Arsenal, AL	4.039	0.600		0.450	Oct 2020	-		-		-	Continuing	Continuing	Continuing
		Subtotal	4.039	0.600		0.450		-		-		-	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MUSE Development	MIPR	AMC, AMCOM, AMRDEC, SED : Redstone Arsenal, AL	25.499	4.354		3.455		-		-		-	Continuing	Continuing	Continuing
		Subtotal	25.499	4.354		3.455		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperability Support	MIPR	AMC, RDECOM, AMRDEC : Redstone Arsenal, AL	9.460	-		-		-		-		-	0.000	9.460	-
		Subtotal	9.460	-		-		-		-		-	0.000	9.460	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	38.998	4.954		3.905		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305204A / *Tactical Unmanned Aerial Vehicles*	**Project (Number/Name)** 123 / *Joint Technology Center System Integration*

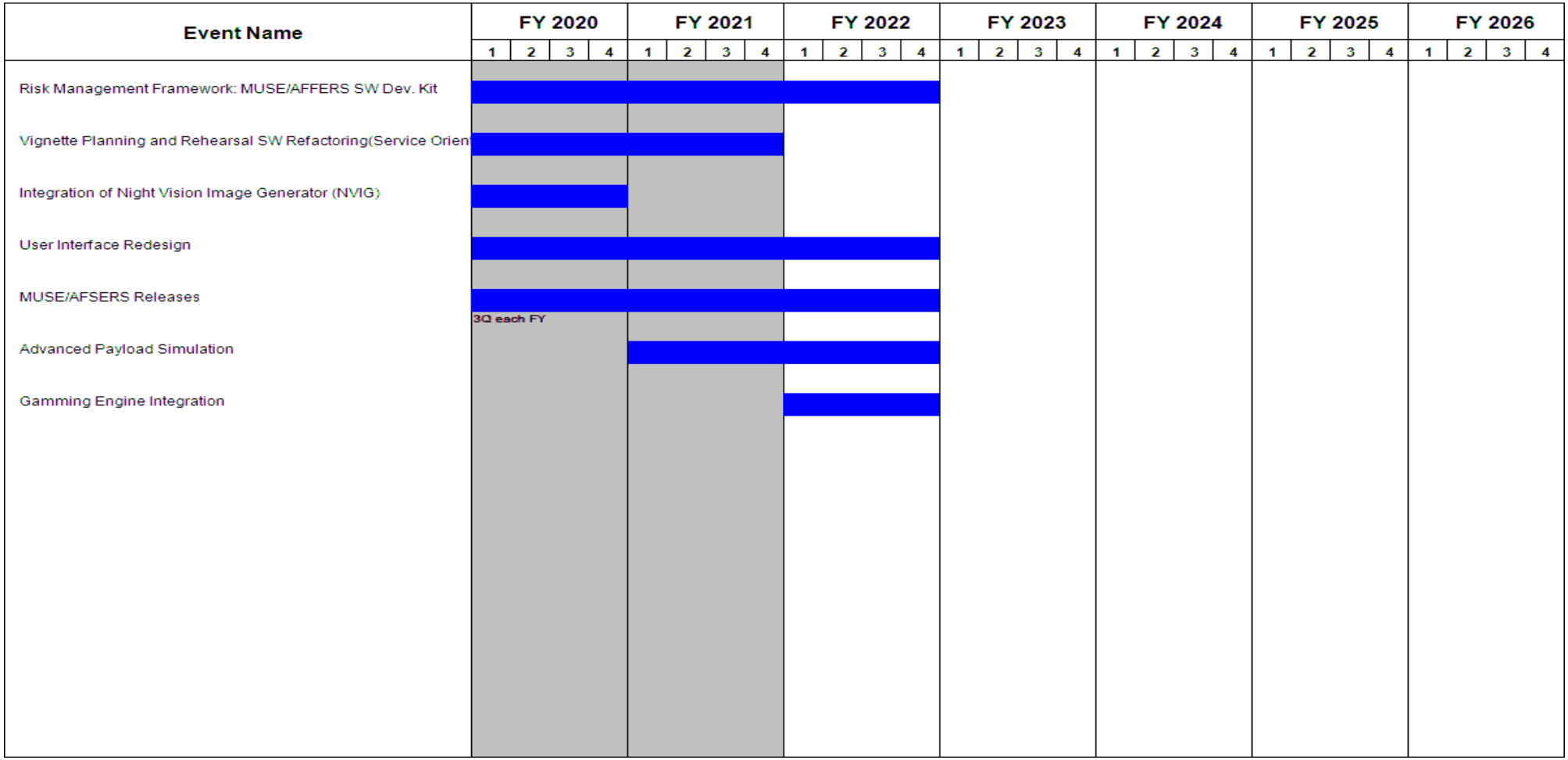


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305204A / *Tactical Unmanned Aerial Vehicles*	**Project (Number/Name)** 123 / *Joint Technology Center System Integration*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Windows Entity Server and NetLink Redesign	1	2015	3	2016
Risk Management Framework: MUSE/AFFERS SW Dev. Kit	3	2015	4	2022
Vignette Planning and Rehearsal SW Refactoring(Service Oriented Architecture)	2	2015	4	2021
Incorporate Command and Control Using STANAG 4586	1	2016	3	2017
Generic 6 Degrees of Freedom	1	2017	4	2018
Web Based MUSE/AFSERS	1	2018	4	2019
Integration of Night Vision Image Generator (NVIG)	2	2019	4	2020
User Interface Redesign	1	2015	4	2022
MUSE/AFSERS Releases	3	2015	4	2022
Advanced Payload Simulation	1	2021	4	2022
Gamming Engine Integration	1	2022	4	2022

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305206A *I Airborne Reconnaissance Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	13.177	28.858	24.460	-	24.460	-	-	-	-	-	-
EH2: *EMARSS ADV DEV*	-	3.218	1.998	1.834	-	1.834	-	-	-	-	-	-
EH3: *EMARSS Payloads ADV DEV*	-	5.959	6.290	11.194	-	11.194	-	-	-	-	-	-
EH5: *ARL Payloads ADV DEV*	-	2.000	16.574	7.417	-	7.417	-	-	-	-	-	-
EH7: *Guardrail Common Sensor (GRCS) Payloads*	-	2.000	3.996	4.015	-	4.015	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Fiscal Year (FY) 2022 Direct War/Enduring Operations dollars in the amount of $5.278 million for Project EH3 will continue to support the Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS) is the Army's newest generation C-12 based, direct support, manned airborne intelligence collection, processing, and targeting support system. It provides a persistent capability to detect, locate, classify/identify, and track surface targets with a high degree of timeliness and accuracy. EMARSS is assigned to the United States (U.S.) Army Intelligence and Security Command (INSCOM) Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance support to combatant commanders. EMARSS is also assigned to the United States Army Training and Doctrine Command (TRADOC) in support of training at the US Army Intelligence Center of Excellence (USAICoE). The Army Acquisition Objective for EMARSS is 36 systems, with an Army Procurement Objective of 24, to include the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT). Budget Item Justification is addressed in each Project.

The FY 2022 Direct War/Enduring Operations dollars in the amount of $4.140 million for Project EH5 will continue to support the Airborne Reconnaissance Low - Enhanced (ARL-E) is a worldwide self-deployable airborne Intelligence Surveillance Reconnaissance (ISR) system designed for timely, accurate, assured support to tactical forces over the full spectrum of operations. This system is a De Havilland DHC-8 aircraft replacing the DHC-7 in accordance with the Aerial ISR (AISR) 2020 Strategy. ARL-E will enhance the ARL-M sensor capability sets through the procurement of new and refurbished sensors to meet the ARL-E Capabilities Production Document (CPD) requirements. It provides a persistent capability to include: Broad-Area Surveillance and/or Focused Stare on Target Areas of Interest (Point or Objective Targets), Electro-Optical/Infrared (EO/IR)/Full-Motion Video (FMV) , Multi-Mode Radar, Robust Communications Intelligence (COMINT), on-Board Collection, Analysis, Sensor Cross Cue and dissemination through Distributed Common Ground System-Army (DCGS-A) Enabled workstations. ARL-E will be assigned to the U.S. Army Intelligence and Security Command's Aerial ISR Brigade providing AISR support to combatant commanders. For the overall system, the Army Acquisition Objective and the Army Procurement Objective, is nine (9). The Mission Equipment Package (MEP) objective is eight (8). Budget Item Justification is addressed in each Project.

The RC-12X Guardrail Common Sensor (GRCS) is a fixed-wing, airborne COMINT and Electronic Intelligence (ELINT) collection and precision targeting location system. GRCS provides a persistent capability to detect, locate and classify/identify high value targets with a relevant degree of timeliness and accuracy. GRCS is assigned to two (2) U.S. Army INSCOM Aerial Exploitation Battalions providing Aerial Intelligence, Surveillance and Reconnaissance (AISR) support to combatant commanders. The

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305206A *I Airborne Reconnaissance Systems*

Army's Acquisition Objective/Army's Procurement Objective is 19 RC-12X; seven (7) fielded to 3rd MI; and seven (7) fielded to the 204th MI, and five (5) trainers within TRADOC and INSCOM. Budget Item Justification is addressed in each Project.

GRCS is currently the most capable Army AISR system that currently provides SIGINT capabilities to support long range targeting of peer threats in an A2AD environment.

Research Development Technology & Evaluation (RDT&E) and procurement funding currently planned will address obsolescence issues for critical SIGINT and ELINT capabilities on the GRCS platform. These investments ensure GRCS AISR support in the A2AD environment is not impacted, which would prevent critical intelligence collection at large standoff which is needed to address long range targeting of peer threats and maintain system relevancy.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	13.177	28.858	21.386	-	21.386
Current President's Budget	13.177	28.858	24.460	-	24.460
Total Adjustments	0.000	0.000	3.074	-	3.074
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	3.074	-	3.074

Change Summary Explanation

FY 2022 Base Funds decrease on EH2 funding is for EMARSS Advanced Development
FY 2022 increase in funding supports the development of Synthetic Aperture Radar (SAR) / Moving Target Indicator (MTI) modification (EH3) and development of Long Range Radar software enhancements (EH5).

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / *Airborne Reconnaissance Systems*	Project (Number/Name) EH2 / *EMARSS ADV DEV*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EH2: *EMARSS ADV DEV*	-	3.218	1.998	1.834	-	1.834	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS) is the Army's newest generation C-12 based, direct support, manned airborne intelligence collection, processing, and targeting support system. It provides a persistent capability to detect, locate, classify/identify, and track surface targets with a high degree of timeliness and accuracy. EMARSS is assigned to the United States (U.S.) Army INSCOM Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance support to combatant commanders. EMARSS is also assigned to the United States Army Training and Doctrine Command (TRADOC) in support of training at the US Army Intelligence Center of Excellence (USAICoE). The Army Acquisition Objective for EMARSS is 36 systems, with an Army Procurement Objective of 24, to include the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT).

This funding line supports non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of current or future EMARSS Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems. Funding provides for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards and future integration efforts supporting A-ISR modernization in the Multi-Domain Operations (MDO) environment. It also enhances aircraft communications, navigations and surveillance (CNS); aircraft survivability equipment (ASE) to include integration of Air Launched Effects onto Army fixed wing platforms; integration of AISR mission equipment package (MEP); as well as solving obsolescence issues and increasing commonality across EMARSS aircraft.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Non-Recurring Engineering	3.218	1.998	1.834
Description: This funding line supports non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of current or future EMARSS Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems. Funding provides for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft communications, navigations and surveillance (CNS); aircraft survivability equipment (ASE) to include integration of Air Launched Effects onto Army fixed wing platforms; integration of AISR mission equipment package (MEP); as well as solving obsolescence issues and increasing commonality across EMARSS aircraft.			
FY 2021 Plans: This funding line supports NRE, development of TC, testing and integration of Army AISR systems. Funding provides for the integration of DoD mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH2 / *EMARSS ADV DEV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
CNS, ASE performance and the integration of the AISR MEP as well as obsolescence issues involved with the transition from QRC to POR in regards to platform survivability equipment such as the Navy AAR-47 changing to Army AAR-57, BFT to BFT-2 and the APX-123 Transponder to APX-119 Transponder. ***FY 2022 Plans:*** This funding line supports non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of current or future EMARSS Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems. Funding provides for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards and future integration efforts supporting A-ISR modernization in the Multi-Domain Operations (MDO) environment. It also enhances aircraft communications, navigations and surveillance (CNS); aircraft survivability equipment (ASE) to include integration of Air Launched Effects onto Army fixed wing platforms; integration of AISR mission equipment package (MEP); design and integration of Modular Open System Architecture (MOSA) onto Army fixed wing platforms as well as solving obsolescence issues and increasing commonality across EMARSS aircraft. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease reflects the successfully completed prior year NRE activities. The $1.834 million in FY2022 allows for completion of additional NRE efforts as listed in the FY 2022 Base Plan above.			
Accomplishments/Planned Programs Subtotals	3.218	1.998	1.834

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A02112: *EMARSS SEMA MODS*	43.139	28.912	1.568	-	1.568	-	-	-	-	-	-
• AZ2054: *EMARSS PAYLOADS*	12.146	12.174	9.912	-	9.912	-	-	-	-	-	-
• EH3: *EMARSS Payloads ADV DEV*	5.959	6.290	11.194	-	11.194	-	-	-	-	-	-

Remarks

The EMARSS Research Development Technology & Evaluation (RDT&E) efforts are found in the following two project lines; 0305206AEH2 EMARSS ADV DEV (Fixed Wing Project Office) and 0305206AEH3 EMARSS Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting Aircraft Procurement Army (APA lines are A02112 (P-1 Line #23) for Fixed Wing and AZ2054 (P-1 Line #18) for Aerial Intelligence. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum, to assign overall acquisition lead for manned airborne intelligence systems to Program Executive Officer for Aviation; and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH2 / *EMARSS ADV DEV*

D. Acquisition Strategy

The acquisition strategy, supported by the EMARSS CPD, is to design, test and field 24 systems as well as provide enhancements to the following sensor capabilities in order to maintain relevancy to the Warfighter: Electro-optical/Infrared (EO/IR)/Full Motion Video (FMV); Communications Intelligence (COMINT); Wide Area Aerial Surveillance (WAAS); Light Imaging Detection and Ranging (LiDAR) and improved Synthetic Aperture Radar / Moving Target Indicator (SAR/MTI) radar; line-of-site (LOS) and beyond line-of-site (BLOS) communications; and Processing Exploitation and Dissemination (PED) supporting two Distributed Common Ground System - Army (DCGS-A) enabled operator workstations. The EMARSS fleet of 24 systems will consist of the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / *Airborne Reconnaissance Systems*	Project (Number/Name) EH2 / *EMARSS ADV DEV*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PMO	RO	FW PO/ PM SAI : Huntsville, AL/ Aberdeen, MD	0.376	0.273	Jan 2020	0.160	Jan 2021	0.156	Jan 2022	-		0.156	0.000	0.965	-
		Subtotal	0.376	0.273		0.160		0.156		-		0.156	0.000	0.965	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Non-Recurring Engineeering (OEM Design)/FAA Testing and Certification	SS/CPFF	Textron : Wichita, KS	2.933	2.945	May 2020	1.838	May 2021	1.678	May 2022	-		1.678	0.000	9.394	-
		Subtotal	2.933	2.945		1.838		1.678		-		1.678	0.000	9.394	N/A

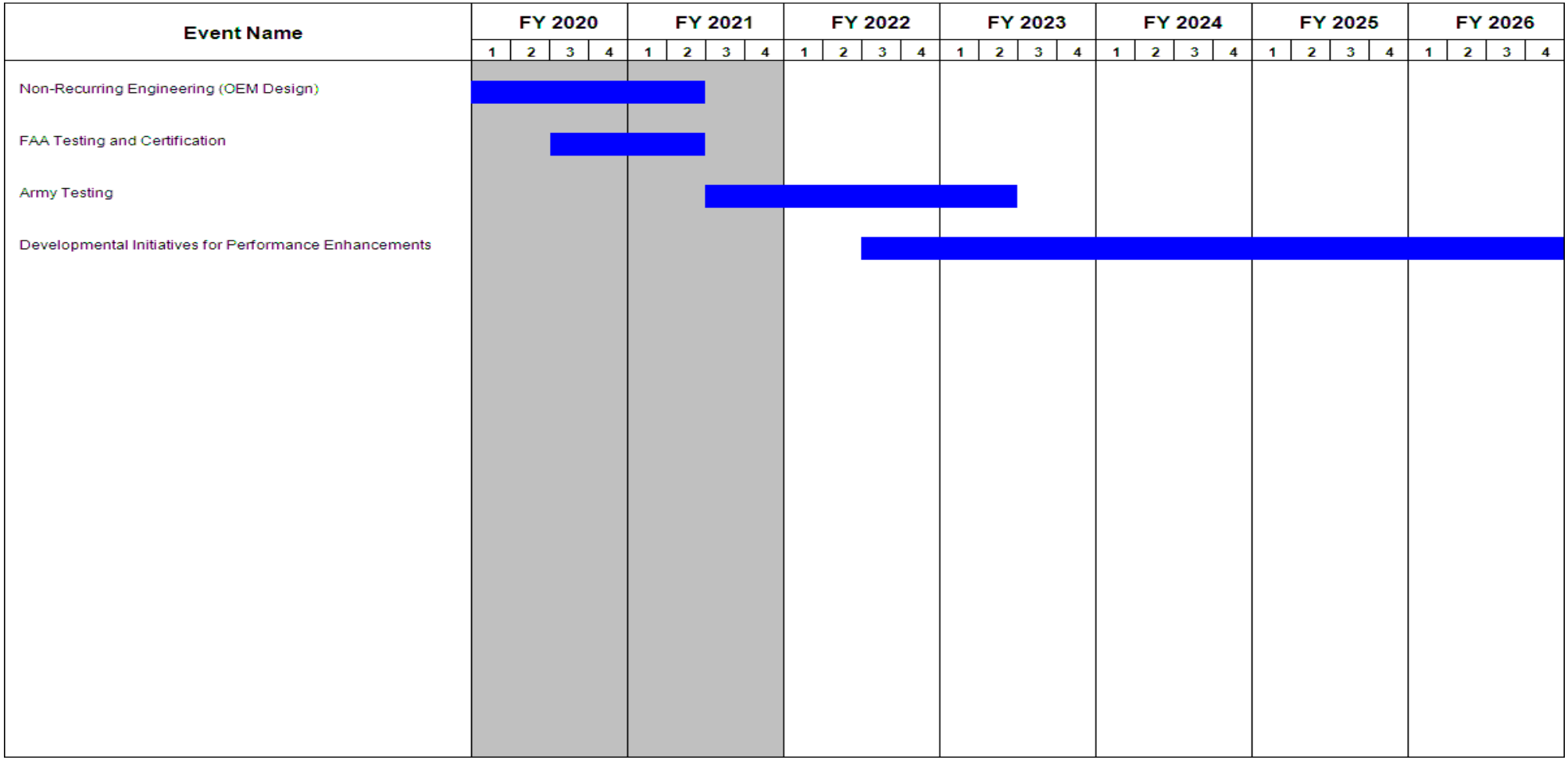
Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Testing	MIPR	AFTD RTC : Eglin, AFB, FL	1.636	-		-		-		-		-	0.000	1.636	-
		Subtotal	1.636	-		-		-		-		-	0.000	1.636	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	4.945	3.218		1.998		1.834		-		1.834	0.000	11.995	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH2 / *EMARSS ADV DEV*



Note

FY20 $3.218 FY21 $1.998 FY22 $1.834 FY23 $2.023 FY24 $5.658 FY25 $18.711 FY26 $18.711

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH2 / *EMARSS ADV DEV*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Non-Recurring Engineering (OEM Design)	3	2019	2	2021
FAA Testing and Certification	3	2020	2	2021
Army Testing	3	2021	2	2023
Developmental Initiatives for Performance Enhancements	3	2022	4	2026

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / *Airborne Reconnaissance Systems*	Project (Number/Name) EH3 / *EMARSS Payloads ADV DEV*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EH3: *EMARSS Payloads ADV DEV*	-	5.959	6.290	11.194	-	11.194	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS) is the Army's newest generation C-12 based, direct support, manned airborne intelligence collection, processing, and targeting support system. It provides a persistent capability to detect, locate, classify/identify, and track surface targets with a high degree of timeliness and accuracy. EMARSS is assigned to the United States (U.S.) Army Intelligence and Security Command's Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance support to combatant commanders. EMARSS is also assigned to the U.S. Army Training and Doctrine Command (TRADOC) in support of training at the US Army Intelligence Center of Excellence (USAICoE). The Army Acquisition Objective for EMARSS is 36 systems, with an Army Procurement Objective of 24, to include the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT).

This funding line supports enhancements to the following sensor capabilities in order to maintain relevancy to the Warfighter: Communications Intelligence (COMINT); Signals Intelligence (SIGINT); Wide Area Aerial Surveillance (WAAS); Light Imaging Detection and Ranging (LiDAR) and improved Synthetic Aperture Radar / Moving Target Indicator (SAR/MTI) Radar; Line-Of-Site (LOS) and Beyond Line-Of-Sight (BLOS) communications; and Processing Exploitation and Dissemination (PED) supporting two Distributed Common Ground System - Army (DCGS-A) enabled operator workstations.

Fiscal Year (FY) 2022 Base funding of $5.038 million continues the development of SIGINT server software and sensor enhancements. These enhancements are accomplished through SIGINT software porting and development of new SIGINT software focusing on resource management and emerging signals of interest applicable in a peer environment. This continued development effort leverages previous SIGINT server investments by PM SAI and other services facilitating rapid and continuous integration of capabilities targeting emerging signal sets and threats. This SIGINT development work will continue to address new threats as they emerge.

FY 2022 Direct War/Enduring Operations funding of $5.278 million provides peer readiness and mitigates ongoing sensor sub-component obsolescence impacting the Enhanced Synthetic Aperture Radar (SAR) / Moving Target Indicator (MTI) Sensor Systems. This funding will begin the development of upgraded extended range antenna and associated signal processor to provide increased effective range and target processing. This sensor development work will continue through FY 2025.

FY 2022 Base funding of $0.878 million provides sensor engineering and program management office support.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: EMARSS - Sensor Enhancement	5.826	5.706	5.038

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH3 / *EMARSS Payloads ADV DEV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: Enhancement of EMARSS JADO SIGINT capabilities to decrease target identification time, increase probability of intercept, and increased signal simultaneity. Efforts include software porting and design analysis of modular open system architecture. ***FY 2021 Plans:*** Continue sensor software updates to develop the next generation SIGINT capability and improve performance in a near peer environment to integrate capabilities developed by other programs. ***FY 2022 Plans:*** Continues sensor software updates to develop the next generation SIGINT capability and improve performance in a near peer environment to integrate capabilities developed by other programs. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease from FY 2021 to FY 2022 due to shift in program priority towards development of Synthetic Aperture Radar (SAR) / Moving Target Indicator (MTI) modification efforts.			
Title: EMARSS - Synethetic Aperture Radar / Moving Target Indicator (SAR/MTI) ***Description:*** Efforts include development of upgraded Synthetic Aperture Radar (SAR) / Moving Target Indicator (MTI) extended range antenna and associated signal processor to provide increased effective range and target processing. ***FY 2022 Plans:*** Begins development of Synthetic Aperture Radar (SAR) / Moving Target Indicator (MTI) modification due to VaDER obsolescence and to increase range for improved JADO mission relevancy. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding provided to begin development of SAR/MTI due to VaDER obsolescence.	-	-	5.278
Title: EMARSS - Sensor Engineering Support ***Description:*** Matrix engineering support for sensor enhancements. ***FY 2021 Plans:*** Continue matrix government engineering support for sensor enhancements. ***FY 2022 Plans:***	0.083	0.310	0.588

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH3 / *EMARSS Payloads ADV DEV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Continue matrix government engineering support for sensor enhancements and provides engineering support required for SAR/ MTI development efforts. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase from FY 2021 to FY 2022 due to engineering support required to continue software updates and begin SAR/MTI development.			
Title: Program Management Support ***Description:*** Program Management Office (PMO) support and travel, as well as Systems Engineering and Technical Assistance (SETA) support. ***FY 2021 Plans:*** Continue Program Management Office government support and SETA support. ***FY 2022 Plans:*** Continue Program Management Office government support and SETA support. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase from FY 2021 to FY 2022 due to program support required to continue software updates and begin SAR/MTI development.	0.050	0.274	0.290
Accomplishments/Planned Programs Subtotals	5.959	6.290	11.194

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A02112: *EMARSS SEMA MODS*	43.139	28.912	1.568	-	1.568	-	-	-	-	-	-
• AZ2054: *EMARSS PAYLOADS*	12.146	12.174	9.912	-	9.912	-	-	-	-	-	-
• EH2: *EMARSS ADV DEV*	3.218	1.998	1.834	-	1.834	-	-	-	-	-	-

Remarks

The EMARSS Research Development Technology & Evaluation (RDT&E) efforts are found in the following two (2) project lines; 0305206AEH2 EMARSS ADV DEV (Fixed Wing Project Office) and 0305206AEH3 EMARSS Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting procurement lines are A02112 and AZ2054. AZ2054 funding supports subsequent procurement and integration of the RDTE funded sensor enhancements. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum to assign overall acquisition lead for manned airborne intelligence systems to Program Executive Officer for Aviation and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH3 / *EMARSS Payloads ADV DEV*

D. Acquisition Strategy

The acquisition strategy, supported by the EMARSS CPD, is to provide enhancements to the following sensor capabilities in order to maintain relevancy to the Warfighter: EO/IR FMV; COMINT; WAAS; LiDAR and improved SAR/MTI radar; LOS and BLOS communications; and PED supporting two DCGS-A enabled operator workstations. The EMARSS fleet of 24 systems consists of the following variants: eight EMARSS-G (Geo-INT); four EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight EMARSS-M (Multi-INT); and four EMARSS-S (SIGINT).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH3 / *EMARSS Payloads ADV DEV*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PMO	C/CR	PEO IEW&S, PM SAI : APG, MD	0.827	0.050	Jul 2020	0.274	Nov 2020	0.290	Nov 2021	-		0.290	Continuing	Continuing	-
		Subtotal	0.827	0.050		0.274		0.290		-		0.290	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LiDAR sensor enhancement	SS/CPFF	JHU APL : Laurel, MD	1.500	-		-		-		-		-	0.000	1.500	-
AWAPSS sensor enhancement	C/CPIF	BAE : Nashua, CT	0.200	-		-		-		-		-	0.000	0.200	-
SIGINT sensor enhancement	C/CPFF	CACI/Boeing : APG, MD	0.114	-		-		-		-		-	0.000	0.114	-
SIGINT sensor enhancement	C/CPFF	Lockheed Martin Integrated Systems : Marlton, NJ	0.948	-		-		-		-		-	0.000	0.948	-
Advanced LiDAR Development	SS/CPFF	Johns Hopkins University Applied Physics Laboratory, LLC : Laurel, Md	7.424	-		-		-		-		-	0.000	7.424	-
SIGINT Sensor Enhancement	C/CPFF	AASKI : Tinton Falls, NJ	-	5.826	Jan 2020	5.706	Dec 2020	5.038	Jan 2022	-		5.038	Continuing	Continuing	-
SAR/MTI Development	C/CPFF	AASKI : Tinton Falls, NJ	-	-		-		5.278	Feb 2022	-		5.278	Continuing	Continuing	-
		Subtotal	10.186	5.826		5.706		10.316		-		10.316	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / *Airborne Reconnaissance Systems*	Project (Number/Name) EH3 / *EMARSS Payloads ADV DEV*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Government Engineering Support	MIPR	CCDC : APG, MD	0.390	0.083	Mar 2020	0.310	Dec 2020	0.588	Dec 2021	-		0.588	Continuing	Continuing	-
Contractor Engineering Support	C/CPFF	BAH : APG, MD	0.776	-		-		-		-		-	0.000	0.776	-
		Subtotal	1.166	0.083		0.310		0.588		-		0.588	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Government Testing	MIPR	CFA : Lakehurst, NJ	0.125	-		-		-		-		-	0.000	0.125	-
		Subtotal	0.125	-		-		-		-		-	0.000	0.125	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	12.304	5.959		6.290		11.194		-		11.194	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH3 / *EMARSS Payloads ADV DEV*

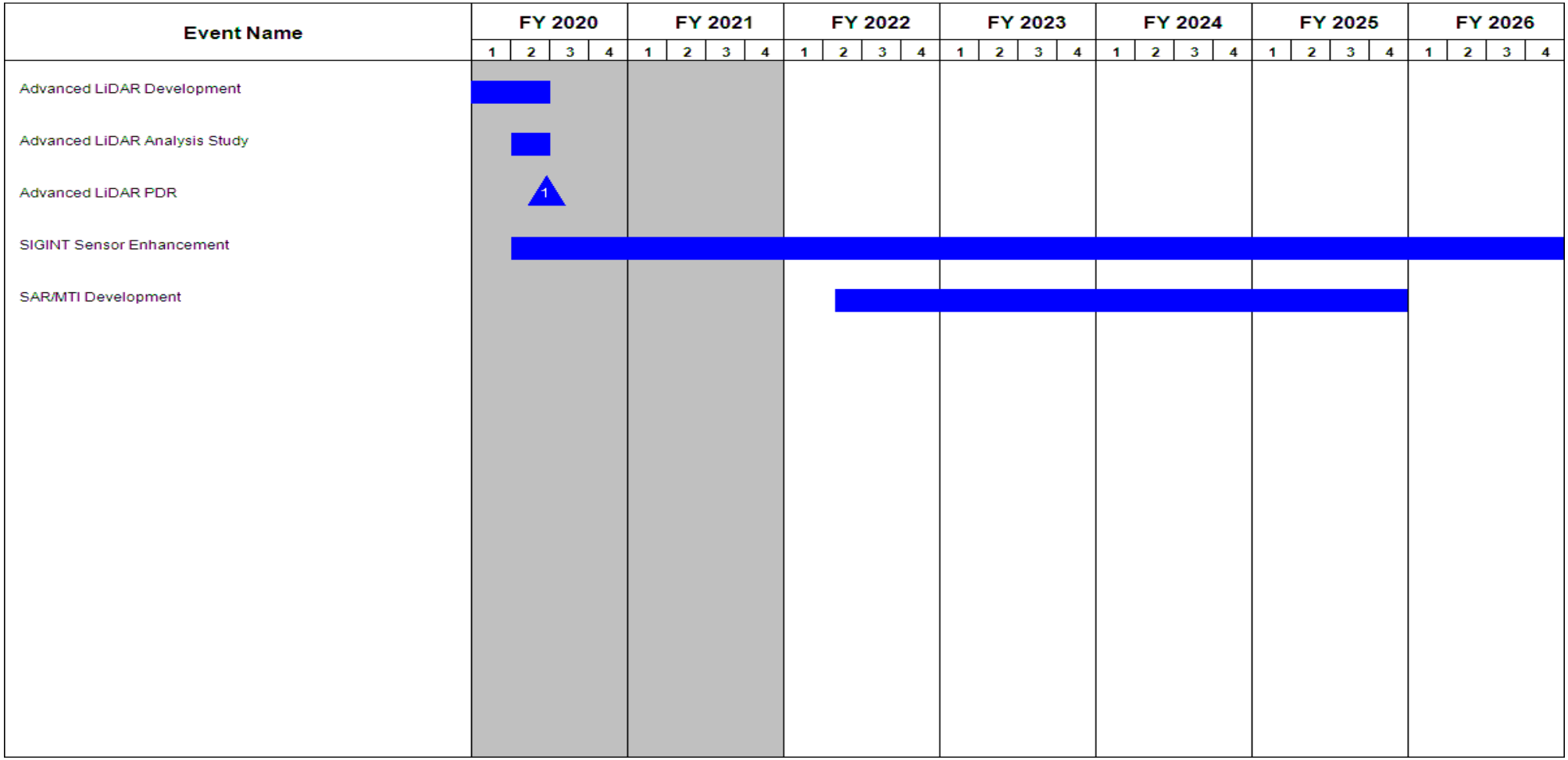


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH3 / *EMARSS Payloads ADV DEV*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
QRC to EMARSS POR Modification and Conversion	2	2015	4	2019
EMARSS Fielding	3	2017	4	2019
Advanced LiDAR Development	2	2018	2	2020
Advanced LiDAR Analysis Study	2	2020	2	2020
Advanced LiDAR PDR	2	2020	2	2020
SIGINT Sensor Enhancement	2	2020	4	2026
SAR/MTI Development	2	2022	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army										Date: May 2021		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305206A / *Airborne Reconnaissance Systems*				Project (Number/Name) EH5 / *ARL Payloads ADV DEV*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
EH5: *ARL Payloads ADV DEV*	-	2.000	16.574	7.417	-	7.417	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Airborne Reconnaissance Low - Enhanced (ARL-E) is a worldwide self-deployable airborne Intelligence Surveillance Reconnaissance (ISR) system designed for timely, accurate, assured support to tactical forces over the full spectrum of operations. This system is a De Havilland DHC-8 aircraft replacing the DHC-7 IAW the Aerial ISR (AISR) 2020 Strategy. ARL-E will enhance the ARL-M sensor capability sets through the procurement of new and refurbished sensors to meet the ARL-E Capabilities Production Document (CPD) requirements. It provides a persistent capability to include: Broad-Area Surveillance and/or Focused Stare on Target Areas of Interest (Point or Objective Targets), Electro-Optical/Infrared (EO/IR)/Full-Motion Video (FMV) , Multi-Mode Radar, Robust Communications Intelligence (COMINT), on-Board Collection, Analysis, Sensor Cross Cue and dissemination through Distributed Common Ground System-Army (DCGS-A) Enabled workstations. ARL-E will be assigned to the United States (U.S.) Army Intelligence and Security Command's Aerial ISR Brigade providing AISR support to combatant commanders. For the overall system, the Army Acquisition Objective and the Army Procurement Objective, is nine. The Mission Equipment Package (MEP) objective is eight.

Fiscal Year (FY) 2022 Base funding of $5.253 million will fund the continued the new signal enhancement development efforts for Signals 3 and Signal 4 to enhance the COMINT collection capabilities including lab and flight test to meet the requirements in the ARL-E CPD.

Fiscal Year (FY) 2022 Direct War/Enduring Operations funding of $2.164 million will fund the development of the Long Range Radar software enhancements, to include deep sea state to allow better collection of targets in water, and to increase combat effectiveness in contested environments and improve capability to detect and locate advanced targets.

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022**
Title: New Signals (COMINT/Software Upgrades)	2.000	16.574	7.417
Description: To develop software for Signals 1, 3, 4, 5, and 6.			
FY 2021 Plans: FY 2021 Base funding of $0.999 million will continue to fund the new signal enhancement development effort to continue development of Signal 3. This funding line supports continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH5 / *ARL Payloads ADV DEV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Fiscal Year (FY) 2022 Base funding of $5.253 million will fund the continued the new signal enhancement development efforts for Signals 3 and Signal 4 to enhance the COMINT collection capabilities including lab and flight test to meet the requirements in the ARL-E CPD. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** New Signals Development and Long Rang Radar Software Enhancement efforts were previously funded in FY21 with BEDI OCO dollars ($15.575M) and Base dollars ($0.999M). The New Signals Development funding has decreased and moved to the Base in FY22.			
Accomplishments/Planned Programs Subtotals	2.000	16.574	7.417

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• AZ2050: *ARL PAYLOADS*	77.895	78.561	81.989	-	81.989	-	-	-	-	-	-
• DX9: *National Integration To Tactical Systems*	4.490	4.219	2.796	-	2.796	-	-	-	-	-	-
• A02109: *A02109*	12.294	9.796	-	-	-	-	-	-	-	-	-
• A02110: *ARL SEMA MODS*	6.566	9.598	9.437	-	9.437	-	-	-	-	-	-

Remarks

The ARL-E Research Development Technology & Evaluation (RDT&E) efforts are found in the following two (2) project lines; 0305206AEH4 ARL ADV DEV (Fixed Wing Project Office) and 0305206AEH5 ARL Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting procurement lines are A02110 and AZ2050. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum, to assign overall acquisition lead for manned airborne Intelligence systems to Program Executive Officer for Aviation; and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.

D. Acquisition Strategy

ARL-E will enhance the ARL-M sensor capability sets through the procurement of new and refurbished sensors to meet the ARL-E CPD requirements. It provides a persistent capability to include: Broad-Area Surveillance and/or Focused Stare on Target Areas of Interest (Point or Objective Targets), EO/IR FMV, COMINT, on-Board Collection, Analysis, Sensor Cross Cue and dissemination through DCGS-A Enabled workstations. This includes software development to enhance COMINT collection capabilities. The software will be added to existing COMINT systems to effectively prosecute high priority and emerging modern signal emitters.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / *Airborne Reconnaissance Systems*	Project (Number/Name) EH5 / *ARL Payloads ADV DEV*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	TBD	PM SAI : Aberdeen Proving Ground, MD	0.260	-		-		-		-		-	0.000	0.260	-
		Subtotal	0.260	-		-		-		-		-	0.000	0.260	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
New Signals (COMINT/ Software Upgrades)	C/CPFF	Boeing Argon : Mountain View, CA	38.968	2.000	Jan 2020	12.575	Jan 2021	3.253	Jan 2022	-		3.253	0.000	56.796	-
Radar Software Electronic Protection Measures/ Enhancements	SS/CPFF	Northrup Grumman : Baltimore, MD	-	-		1.799	Nov 2020	1.964	Nov 2021	-		1.964	0.000	3.763	-
		Subtotal	38.968	2.000		14.374		5.217		-		5.217	0.000	60.559	N/A

Remarks

New Signals Contract: W56KGY-16-D-0001/ 0006. Fiscal Year (FY) 2022 Base funding of $3.253 million continues the new signal enhancement development effort for Signal 3 and 4. This funding line supports continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.

Radar Development Contract: W56KGY-20-D-0012. Fiscal Year (FY) 2022 Base funding of $1.964 million starts the development of LRR software enhancements, to include deep sea state to allow better collection of targets in water, and to increase combat effectiveness in contested environments and improve capability to detect and locate advanced targets.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support to New Signals (COMINT/Software Upgrades)	C/CPFF	Boeing Argon : Mountain View, CA	10.690	-		2.000	Jan 2021	2.000	Jan 2022	-		2.000	0.000	14.690	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / *Airborne Reconnaissance Systems*	Project (Number/Name) EH5 / *ARL Payloads ADV DEV*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Radar Software Electronic Protection Measures/ Enhancements	SS/CPFF	Northrup Grumman : Batlimore, MD	-	-		0.200	Nov 2020	0.200	Nov 2021	-		0.200	0.000	0.400	-
		Subtotal	10.690	-		2.200		2.200		-		2.200	0.000	15.090	N/A

Remarks

New Signals Contract: W56KGY-16-D-0001/ 0006. Fiscal Year (FY) 2022 Base funding of $2.000 million completes the lab and flight test for Signal 3 and 4 to meet the requirements in the ARL-E CPD.
Radar Development Contract: W56KGY-20-D-0012. Fiscal Year (FY) 2022 Base funding of $0.200 million starts the lab and flight test for software enhancements.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	49.918	2.000		16.574		7.417		-		7.417	0.000	75.909	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH5 / *ARL Payloads ADV DEV*

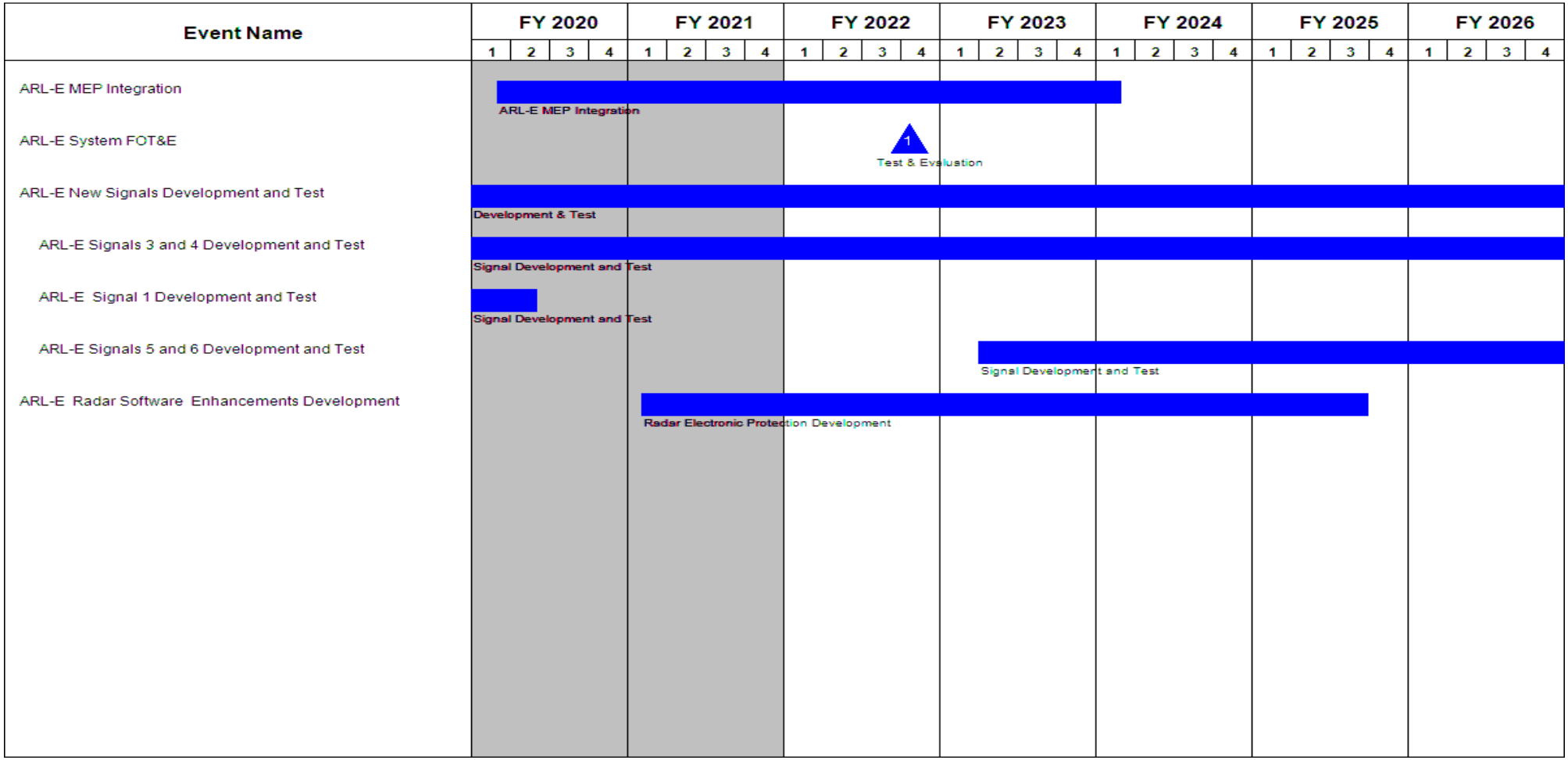


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH5 / *ARL Payloads ADV DEV*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
ARL-E MEP Contract Award	1	2016	1	2016
ARL-E MEP Integration	1	2016	1	2024
ARL-E System FOT&E	4	2022	4	2022
ARL-E New Signals Development and Test	2	2016	4	2027
ARL-E Signals 3 and 4 Development and Test	2	2016	4	2027
ARL-E Signal 1 Development and Test	4	2017	2	2020
ARL-E Signals 5 and 6 Development and Test	2	2023	4	2027
ARL-E Radar Software Enhancements Development	1	2021	3	2025
ARL-E Long Range Radar Development	4	2017	3	2019
ARL-E Long Range Radar Testing	3	2019	3	2019

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / *Airborne Reconnaissance Systems*	Project (Number/Name) EH7 / *Guardrail Common Sensor (GRCS) Payloads*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EH7: *Guardrail Common Sensor (GRCS) Payloads*	-	2.000	3.996	4.015	-	4.015	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Guardrail Common Sensor (GRCS) is an airborne Signals Intelligence (SIGINT) Collection and Location System capable of providing Tactical Commanders Near-Real Time intelligence. It provides a persistent capability to detect, locate and classify/identify critical targets with a relevant degree of timeliness and accuracy. GRCS is assigned to two (2) United States (U.S.) Army Intelligence and Security Command's Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance (AISR) support to combatant commanders. In accordance with the Army's AISR 2020 strategy, the Army's Acquisition Objective/Army's Procurement Objective (AAO/APO) is 19 RC-12X; seven (7) fielded to 3rd MI BN; seven (7) fielded to the 204th MI BN, and five (5) pilot trainers to support Force Generation. The five (5) trainers are not equipped with Primary Mission Equipment (PME).

GRCS Fiscal Year (FY) 2022 Base RDT&E funding request in the amount of $4.015 million supports continuation of advanced signal enhancement efforts, software development and testing of SIGINT infrastructure for GRCS sensors. Funding also supports development of simulation capabilities for future software enhancements to pace threat signals and to provide additional training tools to maintain military proficiency. GRCS is currently the most capable Army AISR system that provides SIGINT capabilities to support long range targeting of near-peer threats in an A2AD environment. RDT&E and procurement funding currently planned will address obsolescence issues for critical SIGINT capabilities on the GRCS platform. These investments ensure GRCS AISR support in the A2AD environment is not impacted, which would prevent critical intelligence collection at large standoff which is needed to address long range targeting of near-peer threats and maintain system relevancy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: GRCS SIGINT Sensor Upgrades	1.924	3.674	3.833
Description: Funding line supports GRCS advanced signal enhancement efforts and software development and testing of signal enhancement infrastructure for GRCS updated SIGINT sensor development. Funding also supports simulation development to allow for continued software enhancements and capability development to keep pace with emerging threats and new technology as well as provide the training required to maintain military proficiency.			
FY 2021 Plans: FY 2021 funding line supports GRCS advanced signal enhancement efforts and software development and testing of signal enhancement infrastructure for GRCS updated SIGINT sensor development.			
FY 2022 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH7 / *Guardrail Common Sensor (GRCS) Payloads*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 funding continues advanced signal enhancement efforts, software development and testing of SIGINT infrastructure for GRCS sensors. Funding also supports development of simulation capabilities for future software enhancements to pace threat signals and to provide additional training tools to maintain military proficiency. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding increase due to simulation development effort for the GRCS program.			
Title: Program Management Support ***Description:*** Funds support program management office (PMO) efforts including travel. ***FY 2021 Plans:*** This FY 2021 funding will support PMO efforts including travel. ***FY 2022 Plans:*** FY 2022 funding will support PMO efforts including travel. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding decrease due to ramp down of program support as GRCS RDT&E funding ends in FY 2022.	0.076	0.322	0.182
Accomplishments/Planned Programs Subtotals	2.000	3.996	4.015

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• AZ2052: *GUARDRAIL PAYLOADS*	25.408	25.869	18.554	-	18.554	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The acquisition strategy is to address obsolescence by providing advanced signal enhancement efforts, software development and testing to the GRCS SIGINT Sensors to extend the useful life through FY 2028. Existing PM SAI contracts to be leveraged.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH7 / *Guardrail Common Sensor (GRCS) Payloads*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
USFK ONS Development/ JICD 4.2 Compliance	C/CPFF	PEO IEW&S : Aberdeen Proving Ground, MD	0.700	-		-		-		-		-	0.000	0.700	0.700
Program Management Support	C/Various	Various : Various	-	0.076	Jan 2020	0.322	Dec 2020	0.182	Dec 2021	-		0.182	0.000	0.580	-
		Subtotal	0.700	0.076		0.322		0.182		-		0.182	0.000	1.280	N/A

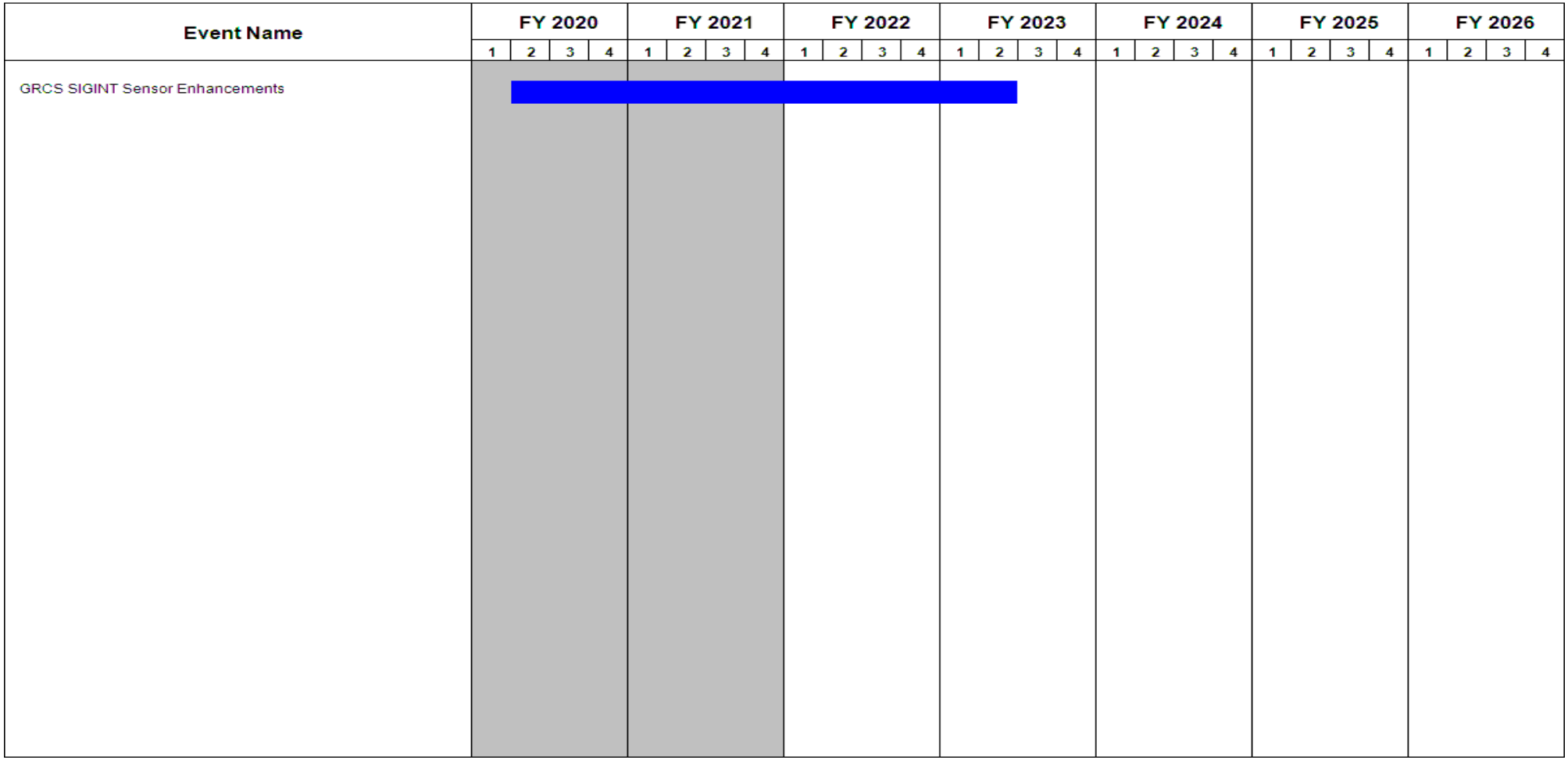
Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
GRCS SIGINT Sensor Enhancements	C/CPFF	AASKI : Tinton Falls, NJ	-	1.924	Apr 2020	3.674	Dec 2020	3.833	Dec 2021	-		3.833	0.000	9.431	2.000
		Subtotal	-	1.924		3.674		3.833		-		3.833	0.000	9.431	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.700	2.000		3.996		4.015		-		4.015	0.000	10.711	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH7 / *Guardrail Common Sensor (GRCS) Payloads*



Note

Execution of FY 2022 funding continues into FY 2023 due to non-severable contract.

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305206A / *Airborne Reconnaissance Systems*	**Project (Number/Name)** EH7 / *Guardrail Common Sensor (GRCS) Payloads*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
USFK ONS Development/JICD 4.2 Compliance	1	2019	2	2019
GRCS SIGINT Sensor Enhancements	2	2020	2	2023

Note

JICD: Joint Interface Control Document
GRCS SIGINT: Guardrail Common Sensor Signals Intelligence

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305208A *I Distributed Common Ground/Surface Systems*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	28.821	40.771	-	-	-	-	-	-	-	-	-
D07: *DCGS-A Common Modules*	-	28.821	40.771	-	-	-	-	-	-	-	-	-

Note

Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.

A. Mission Description and Budget Item Justification

Distributed Common Ground System - Army (DCGS-A) is the Intelligence, Surveillance and Reconnaissance (ISR) System of Systems (SoS) for Joint, Interagency, Allied, Coalition, and National data analysis, sharing and collaboration. The core functions of DCGS-A are: the vertical and horizontal synchronization of ISR Processing, Exploitation and Dissemination (PED) efforts; operations in a networked environment at multiple security levels; the control of select Army and joint sensor systems; the fusion of all acquired data and information, and distribution of relevant red (threat), gray (non-aligned), and environmental (weather and terrain) information; and providing the Warfighters' early warning, targeting, and sensor ground station capabilities. DCGS-A provides a single integrated ISR ground processing system composed of common components that are interoperable with sensors, other information sources, all Warfighting Functions, compliant with standards providing the Defense Information & Intelligence Enterprise (DI2E) and Intelligence Community Information Technology Enterprise (IC ITE). DCGS-A is fielded in Fixed, Mobile, and embedded configurations emphasizing the use of reach and split based operations by improving accessibility of data in order to reduce forward deployed footprint. As enhanced commercial capabilities are integrated and tested, a continuing series of software capability drop releases will be provided into Army Common/commodity hardware and fielded to units IAW the Army Resourcing Priority List (ARPL) process.

DCGS-A is designated as a Program of Record (PoR) within the Command Post Computing Environment (CPCE) of the Common Operating Environment (COE). DCGS-A provides the Single and Shareable Geospatial Foundation (SSGF) Cross Cutting Capability (CCC), and is defining the DCGS-A architecture to fit within the COE as described by the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)) COE Implementation Plan. This is in accordance with the G-3/5/7 priority to align all Army networks, procurements and enhancements under one COE and one vision leveraging intelligence community investments. PM DCGS-A continues to work with PM Mission Command (PM MC) to converge on CP CE Tactical Server Infrastructure (TSI).

DCGS-A provides technologically advanced Processing, Exploitation, and Dissemination (PED) capabilities through iterative software releases delivered in tailored and scalable mobile, fixed, and embedded configurations in all maneuver and maneuver support units from Company Intelligence Support Team to Army Service Component Command, and in select maneuver sustainment units battalion and above.

PE 0305208A has no FY22 funds request.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0305208A *I Distributed Common Ground/Surface Systems*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	28.821	47.204	40.186	-	40.186
Current President's Budget	28.821	40.771	0.000	-	0.000
Total Adjustments	0.000	-6.433	-40.186	-	-40.186
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-6.433			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-40.186	-	-40.186

Change Summary Explanation

Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / *Distributed Common Ground/Surface Systems*	Project (Number/Name) D07 / *DCGS-A Common Modules*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
D07: *DCGS-A Common Modules*	-	28.821	40.771	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The Distributed Common Ground System - Army was formerly designated a Major Automation Information System (MAIS) program. Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.

A. Mission Description and Budget Item Justification

Distributed Common Ground System - Army (DCGS-A) is the Intelligence, Surveillance and Reconnaissance (ISR) System of Systems (SoS) for Joint, Interagency, Allied, Coalition, and National data analysis, sharing and collaboration. The core functions of DCGS-A are: the vertical and horizontal synchronization of ISR Processing, Exploitation and Dissemination (PED) efforts; operations in a networked environment at multiple security levels; the control of select Army and joint sensor systems; the fusion of all acquired data and information, and distribution of relevant red (threat), gray (non-aligned), and environmental (weather and terrain) information; and providing the Warfighters' early warning, targeting, and sensor ground station capabilities. DCGS-A provides a single integrated ISR ground processing system composed of common components that are interoperable with sensors, other information sources, all Warfighting Functions, compliant with standards providing the Defense Information & Intelligence Enterprise (DI2E) and Intelligence Community Information Technology Enterprise (IC ITE). DCGS-A is fielded in Fixed, Mobile, and embedded configurations emphasizing the use of reach and split based operations by improving accessibility of data in order to reduce forward deployed footprint. As enhanced commercial capabilities are integrated and tested, a continuing series of software capability drop releases will be provided into Army Common/commodity hardware and fielded to units IAW the Army Resourcing Priority List (ARPL) process.

DCGS-A is designated as a Program of Record (PoR) within the Command Post Computing Environment (CPCE) of the Common Operating Environment (COE). DCGS-A provides the Single and Shareable Geospatial Foundation (SSGF) Cross Cutting Capability (CCC), and is defining the DCGS-A architecture to fit within the COE as described by the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)) COE Implementation Plan. This is in accordance with the G-3/5/7 priority to align all Army networks, procurements and enhancements under one COE and one vision leveraging intelligence community investments. PM DCGS-A continues to work with PM Mission Command (PM MC) to converge on CP CE Tactical Server Infrastructure (TSI).

DCGS-A provides technologically advanced Processing, Exploitation, and Dissemination (PED) capabilities through iterative software releases delivered in tailored and scalable mobile, fixed, and embedded configurations in all maneuver and maneuver support units from Company Intelligence Support Team to Army Service Component Command, and in select maneuver sustainment units battalion and above.

PE 0305208A has no funds request in FY22.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Integrate and Test Software	9.831	7.639	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305208A / *Distributed Common Ground/Surface Systems*	**Project (Number/Name)** D07 / *DCGS-A Common Modules*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: DCGS-A Intelligence applications will issue commercial contracts to vendors on multiple-award contract/s. Initial contract awards will be followed by brief design and develop periods, incorporating maximum Soldier participation and feedback to inform procurement and fielding decisions. Each evaluate, modify (if necessary) and integrate period will result in minor modifications to adapt commercial capabilities for military use through customization, cyber accreditation, and integration with other Army systems. ***FY 2021 Plans:*** Integrate and test All-Source and Collection Management Applications with CPCE. Complete Integration and Testing of CD2. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.			
Title: Government Matrix Support for Integration ***Description:*** Matrix Support Government for software integration to the target platforms. ***FY 2021 Plans:*** Continue Government Matrix Support for software integration to the target platforms. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.	5.130	3.516	-
Title: Project Management ***Description:*** Project Management support to manage the cost, schedule, and performance metrics for the program. ***FY 2021 Plans:*** Acquisition preparation and support for Next Generation Analytic efforts. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.	3.021	3.492	-
Title: Army and Joint Interoperability and Operational Testing ***Description:*** Testing of DCGS-A ***FY 2021 Plans:***	5.110	3.024	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305208A / *Distributed Common Ground/Surface Systems*	**Project (Number/Name)** D07 / *DCGS-A Common Modules*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Complete Interoperability and Operational Testing for CD2 and Intelligence Applications: All-Source and Collection Management. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.			
Title: Training Development ***Description:*** Training support - embedded computer based training (CBT) for the DCGS-A software. ***FY 2021 Plans:*** Continue training support - embedded computer based training (CBT) for the DCGS-A software. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.	4.230	1.045	-
Title: Logistics Documentation ***Description:*** Logistics activities including maintenance task analysis, level of repair analysis, user manual, training support package, and MANPRINT activities. ***FY 2021 Plans:*** Continue logistics activities including task maintenance task analysis, level of repair analysis, user manual, training support package, and MANPRINT activities. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.	1.499	0.990	-
Title: Ground Station Modernization ***Description:*** Ground Station evaluation, modernization, modification, and risk reduction activities. ***FY 2021 Plans:*** Ground Station evaluation, software modification, and risk reduction activities. DCGS-A will also evaluate new designs and replacements for its aging Ground Station platforms to process and fuse space, aerial, and terrestrial sensor data to produce targeting solutions for long-range precision fires. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.	-	18.094	-
Title: Next Generation Analytics Evaluation	-	2.971	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305208A / *Distributed Common Ground/Surface Systems*	**Project (Number/Name)** D07 / *DCGS-A Common Modules*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: Next generation analytics market research, studies, evaluate, modify, and integrate experimentation ***FY 2021 Plans:*** Next generation analytics market research studies, evaluate, modify, and integrate experimentation ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Program Element 0305208A funds restructured to PE 0605148A Tactical Intel Targeting Access Node (TITAN) EMD in FY22.			
Accomplishments/Planned Programs Subtotals	28.821	40.771	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BZ7316: *DCGS-A-INTEL*	205.219	197.595	92.613	-	92.613	-	-	-	-	-	-

Remarks

The Distributed Common Ground System - Army is designated a ACAT IAC

D. Acquisition Strategy

The DCGS-A program will consist of multiple capability drops structured to meet DCGS-A User requirements. The DCGS-A program will follow the Information Technology (IT) Box concept for an agile acquisition strategy to iteratively provide and field Intelligence, Surveillance, and Reconnaissance (ISR) capabilities, hosted on Commercial off the Shelf (COTS) equipment/hardware, providing low risk, efficient, time- phased releases of capability to satisfy the Army's operational needs.

The DCGS-A capabilities under Increment 1 will be leveraged to the maximum extent where applicable to meet the future DCGS-A requirements set. The DCGS-A will also leverage the Increment 1 configuration platforms fielded across the Army.

DCGS-A is a collection of software packages (COTS, and GOTS products) selected to provide each Army echelon (from Battalion up to Echelon Above Corps (EAC)) the capability to synthesize and exploit intelligence data. DCGS-A delivers these software packages on COTS and GOTS hardware components, tailored to meet each Army Echelon's intelligence mission requirements. DCGS-A is the Army's ISR Foundation Layer for Tasking, Processing, Exploitation, Dissemination (TPED) and development of situation understanding using intelligence information about the threat, weather, and terrain at all Army Echelons. DCGS-A provides the capabilities necessary for Commanders to access information, task organic sensors, and synchronize non-organic sensor assets with their organic assets. DCGS-A will continuously acquire and synthesize data and information from Joint, Interagency, Intergovernmental, and Multi-national (JIIM) sources to maintain an updated and accurate understanding of the operational environment to inform critical and time sensitive command decisions.

The DCGS-A software baseline will be updated and iteratively deployed to address emerging and prioritized operational requirements. PM DCGS-A, in coordination with the operational user community, will align releases with the technological readiness of targeted enhancements, and to support low-risk integration and test cycle

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305208A / *Distributed Common Ground/Surface Systems*	**Project (Number/Name)** D07 / *DCGS-A Common Modules*

times. As requirements are approved, DCGS-A will leverage commercially-available solutions and non-developmental items (NDI) to meet user needs, based on market research results. DCGS-A will issue commercial contracts or conduct NDI technology transitions from DoD Science and Technology organizations, or will re-use NDI from other Army programs, Services, or other Governmental Agencies. The DCGS-A software will be hardware agnostic so that the software can be deployed in any processing hardware equipment. This allows the DCGS-A software to be scalable and deployable in different hardware system configurations, as required by the Army at different echelons. The implementation of the latest COTS hardware procurement through the Army Common Hardware System (CHS) program with the established post-deployment hardware sparing, sustainment, and maintenance provisions, will result in significant cost efficiencies.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / *Distributed Common Ground/Surface Systems*	Project (Number/Name) D07 / *DCGS-A Common Modules*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Management	Allot	DCGS-A : APG, MD	7.930	3.021	Oct 2019	3.492	Oct 2020	-		-		-	Continuing	Continuing	-
Milestone preparation; Activities; Trade Space Analysis (TSA)	MIPR	Various : Various	3.318	-		-		-		-		-	0.000	3.318	-
		Subtotal	11.248	3.021		3.492		-		-		-	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrate & Test software	C/FP	Various : Various	65.322	9.831	Dec 2019	7.639	Dec 2020	-		-		-	Continuing	Continuing	Continuing
System reconfiguration	C/FP	Various : Various	4.020	-		-		-		-		-	Continuing	Continuing	-
Ground Station Modernization	C/CPFF	Various : Various	-	-		18.094	Feb 2021	-		-		-	Continuing	Continuing	-
Next Generation Analytics Evaluation	C/CPFF	Various : Various	-	-		2.971	Feb 2021	-		-		-	Continuing	Continuing	-
		Subtotal	69.342	9.831		28.704		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Support	MIPR	Various : Various	12.595	5.130	Oct 2019	-		-		-		-	Continuing	Continuing	-
Training Development	MIPR	Various : Various	7.370	4.230	Oct 2019	1.045	Feb 2021	-		-		-	Continuing	Continuing	-
Logistics Documentation	MIPR	Various : Various	1.123	1.499	Jan 2020	0.990	Jan 2021	-		-		-	Continuing	Continuing	-
Government Matrix Support for Integration	MIPR	Various : Various	-	-		3.516	Feb 2021	-		-		-	Continuing	Continuing	-
FY 2018 NDAA SEC 825 MDAP Cost Overrun	Allot	PM DCGS-A : APG, MD	0.011	-		-		-		-		-	0.000	0.011	-
		Subtotal	21.099	10.859		5.551		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / *Distributed Common Ground/Surface Systems*	Project (Number/Name) D07 / *DCGS-A Common Modules*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Test & Integration Lab	MIPR	Various : Various	8.658	5.110	Mar 2020	-		-		-		-	Continuing	Continuing	-
Army and Joint Interoperability & operational Testing	MIPR	Various : Various	-	-		3.024	Feb 2021	-		-		-	Continuing	Continuing	-
		Subtotal	8.658	5.110		3.024		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	110.347	28.821		40.771		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305208A / *Distributed Common Ground/Surface Systems*	**Project (Number/Name)** D07 / *DCGS-A Common Modules*

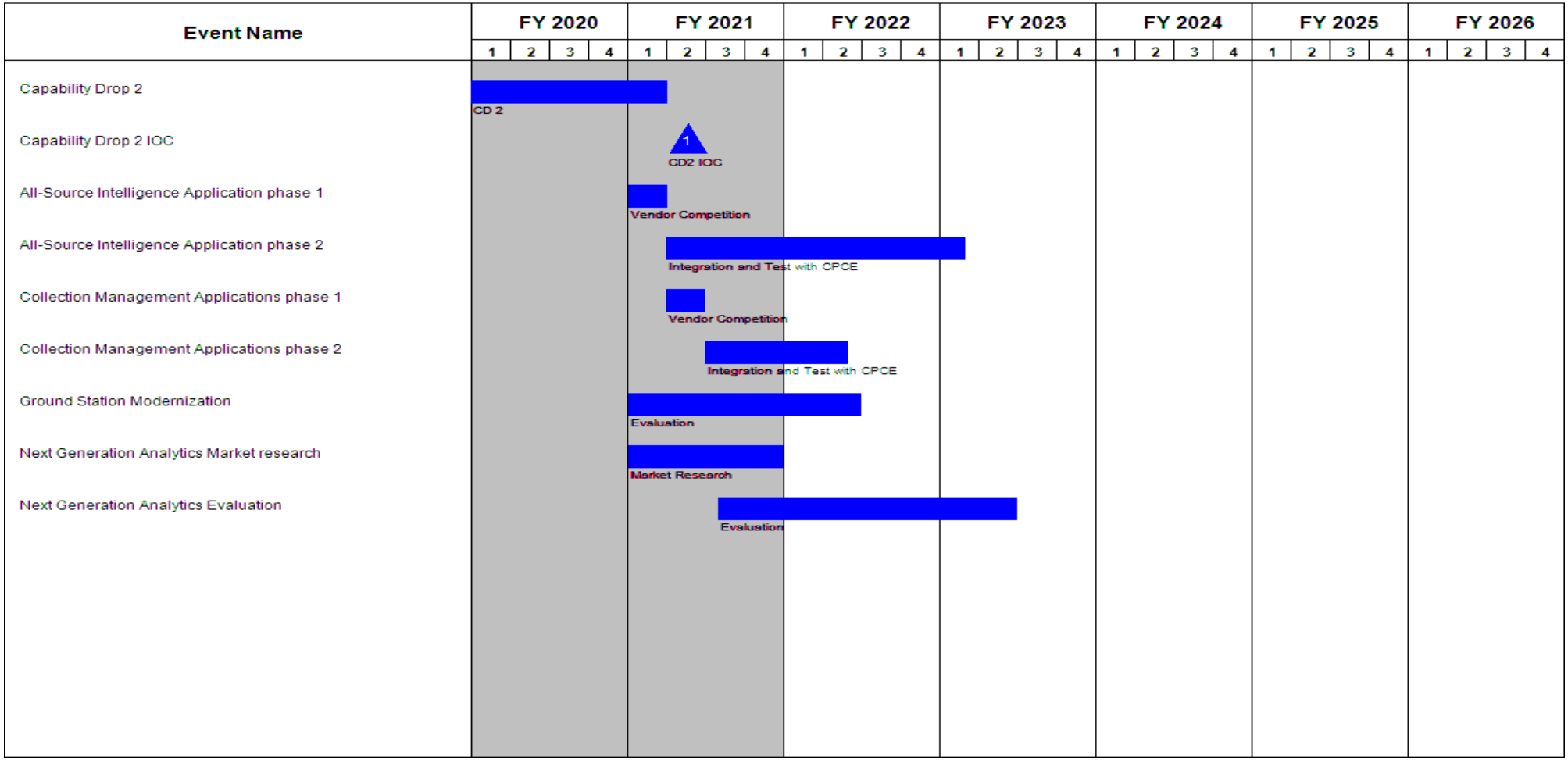


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305208A / *Distributed Common Ground/Surface Systems*	**Project (Number/Name)** D07 / *DCGS-A Common Modules*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Capability Drop 1	4	2017	3	2019
Capability Drop 1 IOC	3	2019	3	2019
Capability Drop 2	4	2019	1	2021
Capability Drop 2 IOC	2	2021	2	2021
All-Source Intelligence Application phase 1	1	2021	1	2021
All-Source Intelligence Application phase 2	2	2021	1	2023
Collection Management Applications phase 1	2	2021	2	2021
Collection Management Applications phase 2	3	2021	2	2022
Ground Station Modernization	1	2021	2	2022
Next Generation Analytics Market research	1	2021	4	2021
Next Generation Analytics Evaluation	3	2021	2	2023

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0305219A / *MQ-1 Gray Eagle UAV*

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	5.000	-	-	-	-	-	-	-	-	-	-
MQ1: *MQ-1 Gray Eagle - Army UAV*	-	5.000	-	-	-	-	-	-	-	-	-	-

Program MDAP/MAIS Code: 420

A. Mission Description and Budget Item Justification

FY 2020 funding was an appropriated increase from $0 requested for "Program increase - additional sensor development".

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	5.000	0.000	0.000	-	0.000
Current President's Budget	5.000	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: MQ1: *MQ-1 Gray Eagle - Army UAV*		
Congressional Add: *Program increase - additional sensor development*	5.000	-
Congressional Add Subtotals for Project: MQ1	5.000	-
Congressional Add Totals for all Projects	5.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305219A / *MQ-1 Gray Eagle UAV*	Project (Number/Name) MQ1 / *MQ-1 Gray Eagle - Army UAV*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
MQ1: *MQ-1 Gray Eagle - Army UAV*	-	5.000	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

FY 2020 funding was an appropriated increase from $0 requested for "Program increase - additional sensor development".

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: Program increase - additional sensor development	5.000	-
FY 2020 Accomplishments: Program increase - additional sensor development		
Congressional Adds Subtotals	5.000	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A00005: *MQ-1 UAV*	144.000	110.000	-	-	-	-	-	-	-	-	-
• AA6601: *Gray Eagle Mods2*	14.699	30.280	3.143	-	3.143	-	-	-	-	-	-
• EB6: *MQ-1C Gray Eagle MODS*	8.896	11.261	-	-	-	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

An Extended Range Multi-Purpose (ERMP) Operational Requirement Document (ORD) was approved by the Joint Requirement Oversight Council (JROC) 6 Apr 2005. Milestone B occurred on 20 Apr 2005, and the System Development and Demonstration contract was awarded 8 Aug 2005, as a result of a competitive solicitation which included a vendor system capabilities demonstration. A Capabilities Production Document (CPD), version 8.7 was approved on 17 Jul 15. MQ-1C Gray Eagle completed FOTE 12 Jun 2015. On 14 Jul 2015, the trigger Configuration Steering Board (CSB) concurred with the Course of Action (COA) to validate the revised requirement for the Echelons Above Division (EAD) Gray Eagle and grant authorities through a new Acquisition Decision memorandum (ADM) to pursue the extended range capable Gray Eagle configuration. MQ-1C Gray Eagle Extended Range is an enhanced derivative of the MQ-1C Gray Eagle UAS and closes the capability gap by delivering extended surveillance coverage which supports Army RSTA missions in excess of 34 hours. MQ-1C Gray Eagle Extended Range's increased performance provides the capacity for multi-intelligence payloads, precision strike capability, and reconnaissance in support of Special Operations Forces (SOF), Mission Command from Aerial Intelligence Brigade (AIB) and U.S. Army Special Operations Command (USASOC). The Gray Eagle Research, Development, Test, and Evaluation (RDTE) acquisition strategy emphasis will be to complete Developmental test events (Environmental, E3, Transportability, software and Air Vehicle Performance Tests) to define and address system risks, followed by an FOTE II for the MQ-1C Gray Eagle Extended Range.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305219A / *MQ-1 Gray Eagle UAV*	Project (Number/Name) MQ1 / *MQ-1 Gray Eagle - Army UAV*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program increase - additional sensor development	TBD	TBD : TBD	-	5.000		-		-		-		-	0.000	5.000	-
		Subtotal	-	5.000		-		-		-		-	0.000	5.000	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	5.000		0.000		-		-		-	0.000	5.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305219A / *MQ-1 Gray Eagle UAV*	**Project (Number/Name)** MQ1 / *MQ-1 Gray Eagle - Army UAV*

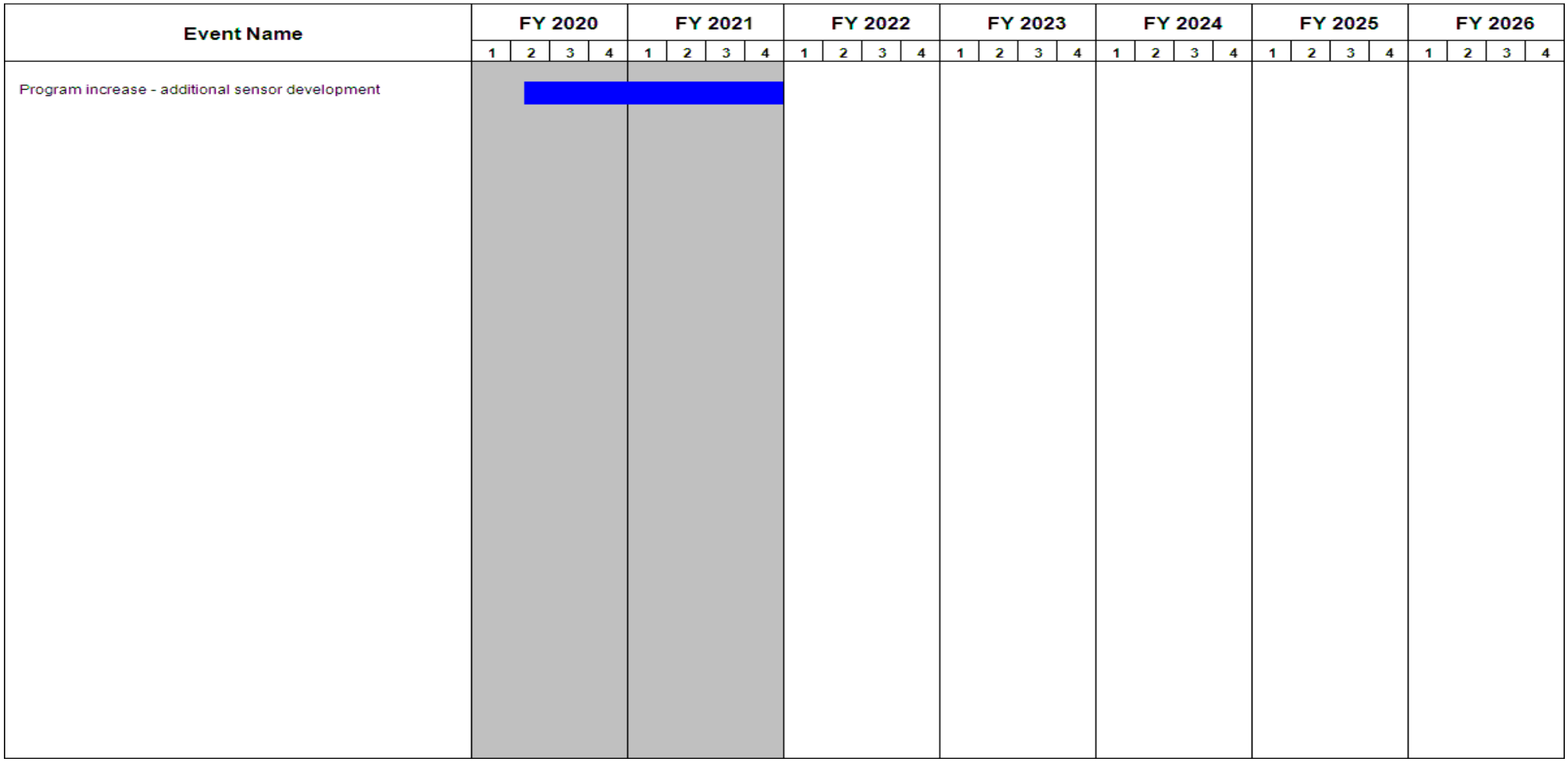


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305219A / *MQ-1 Gray Eagle UAV*	**Project (Number/Name)** MQ1 / *MQ-1 Gray Eagle - Army UAV*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Program increase - additional sensor development	2	2020	4	2021

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army												Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305232A / *RQ-11 UAV*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	3.218	-	-	-	-	-	-	-	-	-	-
RA7: *RQ-11 Raven*	-	3.218	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Rucksack Portable Unmanned Aircraft System (RPUAS) Family of Small Unmanned Aircraft System (FoSUAS) provides battalion and below ground maneuver elements with critical situational awareness and enhanced force protection. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. Other compatible receivers, such as the One System Remote Video Terminal and appropriately equipped manned platforms may also receive the FoSUAS products.

The RPUAS FoSUAS provides the battalion and below ground maneuver elements with an organic, on-demand, asset to develop situational awareness, enhance force protection, and secure routes, points, and areas. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. The RPUAS FoSUAS includes a combination of three separate hand-launched mission specific configurable aircraft that do not require an improved launch/recovery. The three separate mission specific configurable Unmanned Aircraft (UA) are the Short Range Reconnaissance (SRR)), the Medium Range Reconnaissance (MRR), and the Long Range Reconnaissance (LRR). In addition to the aircraft, the system contains ground control equipment, which includes an interoperable handheld ground control station (H-GCS) which incorporates the Tactical Open Government Owned Architecture (TOGA). FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with Short Range Reconnaissance (SRR) and Long Range Reconnaissance (LRR) options under development.

B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	3.218	0.000	0.000	-	0.000
Current President's Budget	3.218	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-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305232A / *RQ-11 UAV*	Project (Number/Name) RA7 / *RQ-11 Raven*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
RA7: *RQ-11 Raven*	-	3.218	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY 2021 funding has been reprogrammed from Program Element (PE) 0305232A RQ-11 UAV (6.7) Project RA7 to PEs 0604101A Small Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Soldier Unmanned Aircraft System and 0605205A SUAV (6.5) Project BR7 Small Unmanned Aircraft System.

A. Mission Description and Budget Item Justification

The Family of Small Unmanned Aircraft System (FoSUAS) provides battalion and below ground maneuver elements with critical situational awareness and enhanced force protection. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. Other compatible receivers, such as the One System Remote Video Terminal and appropriately equipped manned platforms may also receive the FoSUAS products.

The RPUAS FoSUAS provides the battalion and below ground maneuver elements with an organic, on-demand, asset to develop situational awareness, enhance force protection, and secure routes, points, and areas. The system provides the small unit commander an organic and responsive reconnaissance and targeting capability with real-time Full Motion Video and sensor data. The RPUAS FoSUAS includes a combination of three separate hand-launched mission specific configurable aircraft that do not require an improved launch/recovery. The three separate mission specific configurable Unmanned Aircraft (UA) are the Short Range Reconnaissance (SRR)), the Medium Range Reconnaissance (MRR), and the Long Range Reconnaissance (LRR). In addition to the aircraft, the system contains ground control equipment, which includes an interoperable handheld ground control station (H-GCS), which incorporates the Tactical Open Government Owned Architecture (TOGA). FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with Short Range Reconnaissance (SRR) and Long Range Reconnaissance (LRR) options under development.

FY 2021 funding has been reprogrammed from Program Element (PE) 0305232A RQ-11 UAV (6.7) to PEs 0604101A Soldier Unmanned Aerial Vehicle (SUAV) (6.4) Project BR6 Soldier Unmanned Aircraft System and 0605205A SUAV (6.5) Project BR7 Soldier Unmanned Aircraft System.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Systems Engineering/Program Management (SEPM) ***Description:*** Systems Engineering and Program Management Support during SRR engineering, integration and preparation of documentation for FRP decision.	0.244	-	-
Title: SRR Developmental Engineering ***Description:*** SRR Developmental Engineering and integration with H-GCS.	0.974	-	-
Title: LRR Requirements Decomposition/Systems Engineering/Component Level Projects/Market Research	0.750	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305232A / *RQ-11 UAV*	**Project (Number/Name)** RA7 / *RQ-11 Raven*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: Funding provided to initiate the Long Range Reconnaissance prototype materiel baseline			
Title: SRR Test and Evaluation ***Description:*** Test and Evaluation of the SRR.	1.250	-	-
Accomplishments/Planned Programs Subtotals	3.218	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A00010: *SMALL UNMANNED AIRCRAFT SYSTEM*	21.420	16.551	16.005	-	16.005	-	-	-	-	-	-
• 0604101A: *Small Unmanned Aerial Vehicle (SUAV) (6.4)*	-	1.328	0.926	-	0.926	-	-	-	-	-	-
• 0605205A: *Small Unmanned Aerial Vehicle (SUAV) (6.5)*	-	5.780	2.275	-	2.275	-	-	-	-	-	-

Remarks

FY 2020 - 2025 funding procures the original SRR AAO of 2589 systems. RDT&E funding reprogrammed to PEs 604101A and 605205A starting in FY2021.

D. Acquisition Strategy

The Product Office will contract utilizing full and open competition via an Other Transaction Agreement (OTA) or a traditional contracting method to host a fly-off and down select. The Government will make contract award based upon competitive source selection criteria.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305232A / *RQ-11 UAV*	Project (Number/Name) RA7 / *RQ-11 Raven*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering/ Program Management (SEPM)	RO	PM-TUAS/ AMRDEC : Redstone Arsenal, AL	3.085	0.244		-		-		-		-	0.000	3.329	-
		Subtotal	3.085	0.244		-		-		-		-	0.000	3.329	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Engineering 1	C/IDIQ	Various : Various	9.824	-		-		-		-		-	0.000	9.824	-
Developmental Engineering 2	C/IDIQ	AMRDEC : Redstone Arsenal, Al	1.935	-		-		-		-		-	0.000	1.935	-
SRR Prototype Developmental Engineering	TBD	Various : Various	10.650	0.974		-		-		-		-	0.000	11.624	-
LRR Requirements Decomposition/Systems Engineering/Component Level Projects/Market Research	TBD	Various : Various	5.000	0.750		-		-		-		-	0.000	5.750	-
		Subtotal	27.409	1.724		-		-		-		-	0.000	29.133	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation 1	MIPR	Various : Various	1.046	-		-		-		-		-	0.000	1.046	-
Test and Evaluation 2	MIPR	Various : Various	0.300	-		-		-		-		-	0.000	0.300	-
SRR Test and Evaluation	TBD	Various : Various	1.826	1.250		-		-		-		-	0.000	3.076	-
		Subtotal	3.172	1.250		-		-		-		-	0.000	4.422	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305232A / *RQ-11 UAV*	Project (Number/Name) RA7 / *RQ-11 Raven*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	33.666	3.218		0.000		-		-		-	0.000	36.884	N/A

Remarks

All funding has been removed from this PE starting in FY 2021 and can be found on PEs 644101A BR6 and 655205A BR7.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305232A / *RQ-11 UAV*	**Project (Number/Name)** RA7 / *RQ-11 Raven*

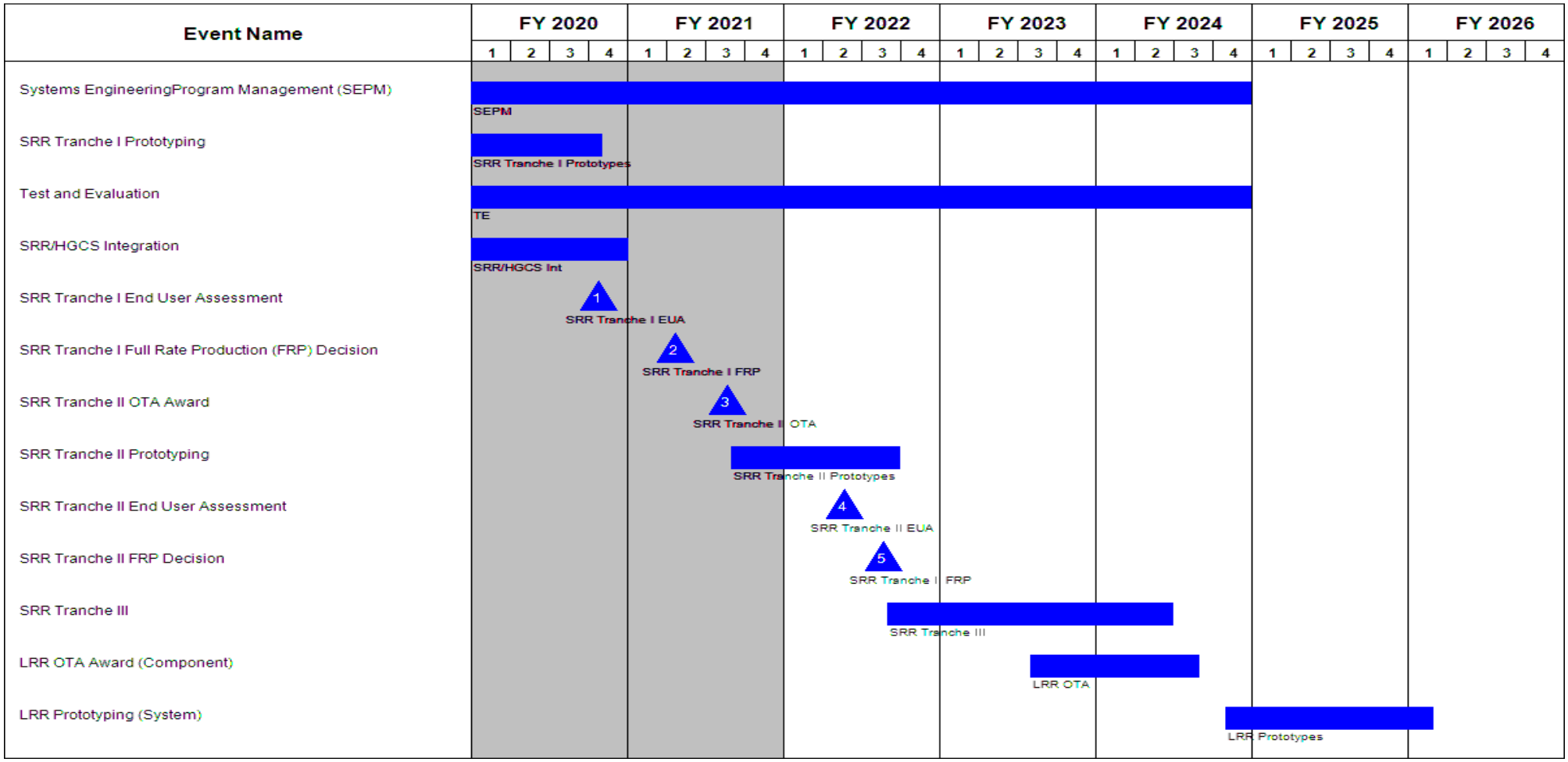
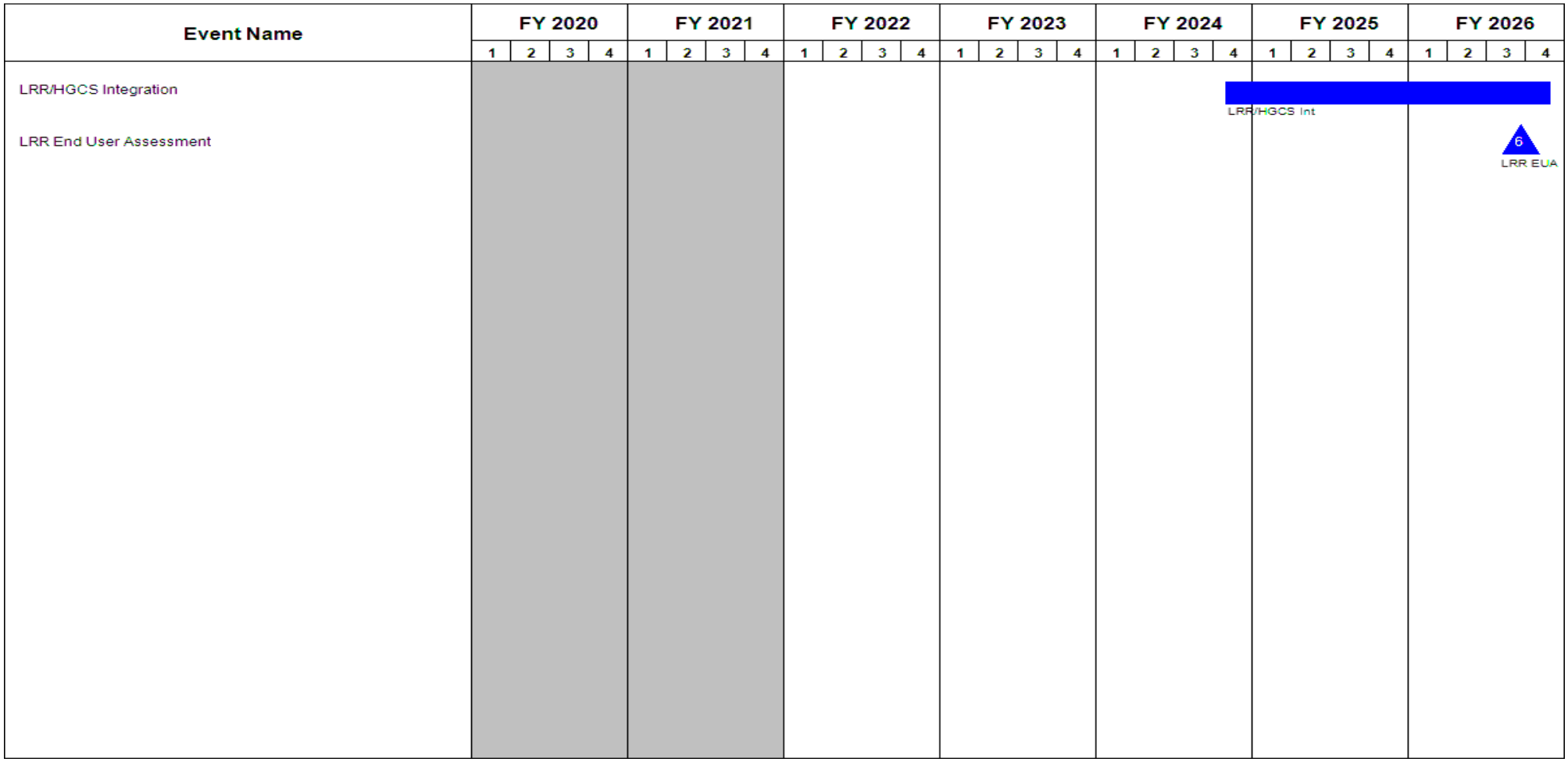


Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305232A / *RQ-11 UAV*	**Project (Number/Name)** RA7 / *RQ-11 Raven*



Note

Schedule data beyond FY 2020 is for informational purposes. Funding reprogrammed to APEs 644101A and 655205A starting in FY 2021.

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305232A / *RQ-11 UAV*	**Project (Number/Name)** RA7 / *RQ-11 Raven*

Schedule Details

	Start		End	
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 EngineeringProgram Management (SEPM)	2	2018	4	2024
SRR Tranche I OTA Award	3	2019	3	2019
SRR Tranche I Prototyping	3	2019	4	2020
Test and Evaluation	4	2018	4	2024
SRR/HGCS Integration	2	2018	4	2020
SRR Tranche I End User Assessment	4	2020	4	2020
SRR Tranche I Full Rate Production (FRP) Decision	2	2021	2	2021
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	2023	3	2024
LRR Prototyping (System)	4	2024	1	2026
LRR/HGCS Integration	4	2024	4	2026
LRR End User Assessment	3	2026	3	2026
LRR Full Rate Production (FRP) Decision	2	2027	2	2027

Note

All funding after FY 2020 has been removed from this PE and can be found on PEs 0604101A BR6 and 0605205A BR7. Scheduling detail after FY 2020 is for information purposes only.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0305233A / *RQ-7 UAV*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	7.817	-	-	-	-	-	-	-	-	-	-
RQ7: *RQ-7 Shadow UAV*	-	7.817	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The RQ-7Bv2 Shadow Tactical Unmanned Aircraft System (TUAS) provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA), and Force Protection. In line with the Army's Aviation Restructure Initiative (ARI) three Shadow Platoons are being integrated into the 11 Combat Aviation Brigade (CAB) Apache Reconnaissance Battalions. This provides the CABs with Manned- Unmanned-Teaming (MUM-T) and enhanced Aerial Scout capabilities. The RQ-7B Shadow has logged approximately 1,265,000 flight hours, most of which were flown in support of Overseas Contingency Operations (OCO).

The full Shadow system consists of four air vehicles with payload, two Universal Ground Control stations, two Universal Ground Data Terminals, one Portable Ground Control Station with Portable Ground Data Terminal, Ground Support Equipment, two launchers, ten High Mobility Multipurpose Wheeled Vehicles (HMMWVs) with trailer(s), and a Light Medium Tactical Vehicle. Each system is also equipped with one Maintenance Section Multifunctional (MSM) at the division level. The baseline fielded payload was the electro-optic infrared (EO/IR), but half of those have been replaced with a Laser Designator (LD) payload. An Improved Payload for Shadow was competitively selected by Product Manager Aerial Enhanced Radars Optics and Sensors (PdM AEROS). The PM integrated and qualified the new payload in FY 2019-2020. 110 of 115 Shadow systems required by the Army Acquisition Objective (AAO) have been resourced.

FY2022 Funding for RQ-7B UAV is zero ($0).

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	7.817	0.000	0.000	-	0.000
Current President's Budget	7.817	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-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / *RQ-7 UAV*	Project (Number/Name) RQ7 / *RQ-7 Shadow UAV*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
RQ7: *RQ-7 Shadow UAV*	-	7.817	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY2022 Funding for RQ-7B has decreased to $0.

A. Mission Description and Budget Item Justification

The RQ-7Bv2 Shadow Tactical Unmanned Aircraft System (TUAS) provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA), and Force Protection. In line with the Army's Aviation Restructure Initiative (ARI) three Shadow Platoons are being integrated into the 11 Combat Aviation Brigade (CAB) Apache Reconnaissance Battalions. This provides the CABs with Manned- Unmanned-Teaming (MUM-T) and enhanced Aerial Scout capabilities. The RQ-7B Shadow has logged approximately 1,265,000 flight hours, most of which were flown in support of Overseas Contingency Operations (OCO).

The RQ-7Bv2 completed Log demo and Follow-on Operational Test and Evaluation #2 (FOTE2) in October 2020 at Ft. Bliss, Texas. FOTE2 evaluated capability Block III from the 2017 update to the TUAS Objective Requirement Document. The RQ-7B v2 Block III System Modification includes Weatherization, Small Mission (SMC) Computer A-kit, Electro Optical / Infrared / Laser Designator (EO/IR/LD) Universal Interface Assembly, Block III Engine, Communications Relay Installation Kit, and Voice over Internet Protocol (VoIP). Weatherization modifications allow the AV to fly in low visibility conditions and in up to two inches of rain per hour. The SMC is an onboard computer that provides airborne processing power. The SMC addresses obsolescence concerns, features a dual processor, and provides 50x more processing power than the current computer.

The EO/ IR/LD Universal Interface Assembly eliminates reliance on a proprietary payload interface, introducing the capability to support payloads from multiple vendors. The Block III engine improves reliability over the current engine, increases thrust and reduces the noise signature of the Shadow system. The Communication Relay upgrade enables voice communications to additional users who utilize other waveforms in the VHF and UHF bands. The VoIP upgrade extends voice communications range from 85 km to 125 km, and provides a more reliable means of voice communications. The overall performance enhancements increase the Shadow's mission capability and survivability.

The Improved EO/IR/LD payload features a modular design that includes enhanced high-resolution HD imagery, improved geo-location precision and an extended long-range target designation capability.

FY2022 Funding for RQ-7B UAV is zero ($0).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Test and Evaluation ***Description:*** Test and Evaluation	3.427	-	-
Title: System Engineering/Program Management ***Description:*** System Engineering/Program Management	1.330	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305233A / *RQ-7 UAV*	**Project (Number/Name)** RQ7 / *RQ-7 Shadow UAV*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: One System Remote Video Terminal (OSRVT) ***Description:*** OSRVT	3.060	-	-
Accomplishments/Planned Programs Subtotals	7.817	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• A00018: *RQ-7 UAV MODS*	68.983	30.000	-	-	-	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The PM competitively awarded System Capability Demonstration (SCD) contracts to four vendors. The results from the SCD in conjunction with proposal evaluations resulted in the competitive down select of a Best Value TUAS. A successful Milestone II Army Systems Acquisition Review Council (ASARC) was conducted 21 Dec 99 and a Milestone III Decision was reached on 25 Sep 02. The PM awarded a full rate production contract was 27 Dec 02 and in FY 2009 the last of the authorized 104 systems was placed on contract. The PM accomplished continued development of the selected Tactical Unmanned Aircraft Vehicle (TUAV) system through a series of modifications and retrofits such as Shadow v2, Communications Relay, Laser Designator, Block III engine, and reliability upgrades. Development/ integration of these improved capabilities will be through individual efforts on a competitive technical services contract with Shadow contractors. The PM accomplished development of the Block III engine through a competitive process. Management responsibilities of the TUAV RQ-7B variant EO/IR/LD payload was transferred from Program Executive Office (PEO) Aviation to PEO Intelligence, Electronic Warfare and Sensors (IEW&S) on 14 Feb 17. This was done in accordance with (IAW) ASA(ALT) memorandum titled: Transfer of Army Office of Primary Responsibility and Program Management Responsibility for RQ-7B Shadow EO/IR/LD. An Improved Payload for Shadow, competitively selected by PEO IEW&S - Product Manager Aerial Enhanced Radars Optics and Sensors (PdM AEROS) The PM integrated and qualified the Improved Payload in FY 2019-2020.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / *RQ-7 UAV*	Project (Number/Name) RQ7 / *RQ-7 Shadow UAV*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Base: Program Management	RO	PM UAS : Redstone Arsenal, AL	4.793	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	4.793	-		-		-		-		-	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
OIF Improvements / Block Upgrades / Capability Improvements	SS/CPFF	AAI Corporation : Hunt Valley, MD	6.474	-		-		-		-		-	0.000	6.474	-
System Engineering / Reliability Solutions	SS/CPFF	AAI Corporation : Hunt Valley, MD	8.141	-		-		-		-		-	Continuing	Continuing	-
Ground Equipment Improvements	C/CPFF	TBD: Competitive in FY18 : TBD: Competitive in FY18	22.231	-		-		-		-		-	Continuing	Continuing	Continuing
Block III Engine Development	C/CPFF	LSF : Redstone Arsenal, AL	30.725	-		-		-		-		-	0.000	30.725	-
Other Air Vehicle Improvements	C/CPFF	TBD: Competitive in FY18 : TBD: Competitive in FY18	17.264	-		-		-		-		-	Continuing	Continuing	Continuing
Assured, Positioning, Navigation, and Timing (APNT)	C/CPFF	TBD: Competitive in FY18 : TBD: Competitive in FY18	11.510	-		-		-		-		-	Continuing	Continuing	-
Payload Improvements	SS/CPFF	Various : Various	4.750	-		-		-		-		-	0.000	4.750	-
One System Remote Video Terminal (OSRVT)	SS/CPFF	AAI Corporation, MD : AAI Corporation, MD	17.992	3.060		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	119.087	3.060		-		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / *RQ-7 UAV*	Project (Number/Name) RQ7 / *RQ-7 Shadow UAV*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	Various	Various : Various	3.474	0.685		-		-		-		-	Continuing	Continuing	Continuing
Base: Government Engineering and Logistic Support	MIPR	Various : Various	2.932	0.645		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	6.406	1.330		-		-		-		-	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RQ-7 Developmental Testing of Product Development	Various	Various : Various	8.331	-		-		-		-		-	Continuing	Continuing	Continuing
RQ-7 Operational Testing of Product Developments	MIPR	Various : Various	2.699	3.427		-		-		-		-	Continuing	Continuing	Continuing
OSRVT Developmental Testing	MIPR	Various : Various	0.100	-		-		-		-		-	0.000	0.100	-
OSRVT - Operational Testing	MIPR	Various : Various	2.033	-		-		-		-		-	0.000	2.033	-
		Subtotal	13.163	3.427		-		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	143.449	7.817		0.000		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305233A / *RQ-7 UAV*	**Project (Number/Name)** RQ7 / *RQ-7 Shadow UAV*

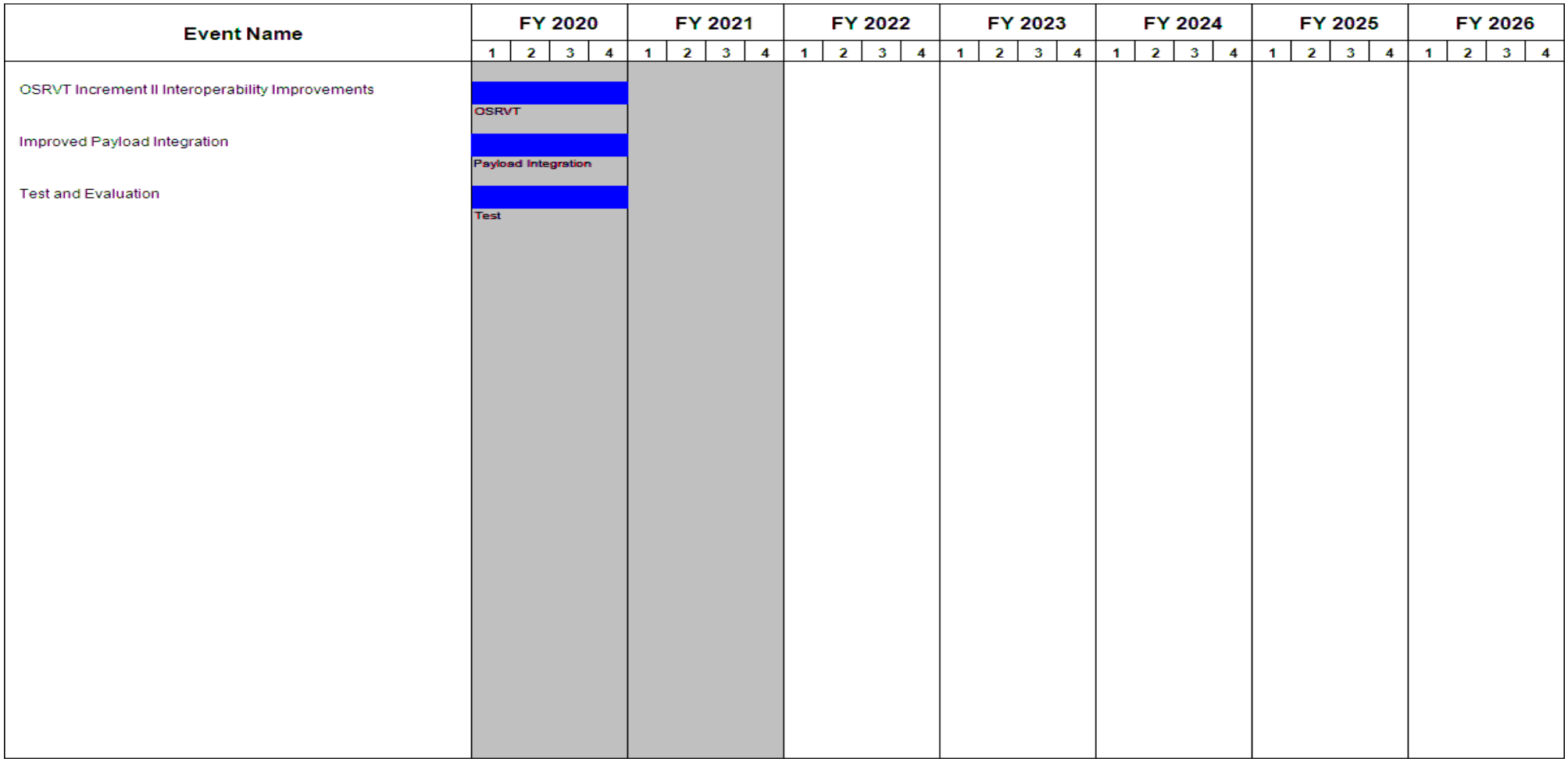


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0305233A / *RQ-7 UAV*	**Project (Number/Name)** RQ7 / *RQ-7 Shadow UAV*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Assured Positioning, Navigation, and Timing (APNT)	3	2016	4	2019
OSRVT Increment II Interoperability Improvements	1	2013	4	2020
Improved Payload Integration	2	2019	4	2020
Test and Evaluation	1	2020	4	2020

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0307665A *I Biometrics Enabled Intelligence*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	4.350	-	2.066	-	2.066	-	-	-	-	-	-
BI7: *Biometrics Enabled Intelligence*	-	2.214	-	2.066	-	2.066	-	-	-	-	-	-
FL5: *Next Gen Biometric Collection Capability*	-	2.136	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Next Generation Biometric Collection Capability (NXGBCC) is the replacement for the Biometrics Automated Toolset - Army (BAT-A) Program of Record (POR) which has been supporting overseas contingency operations for over 20 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC supports all three objectives of the National Defense Strategy to increase lethality, enhance International Cooperation, and improve business practices. NXGBCC initiates the data flow to the DoD Authoritative Biometrics Identification System (ABIS) and Military Intelligence systems. NXGBCC consists of an expeditionary biometric data management system called the Local Trusted Source (LTS), biometric static collection kits with palm and credential badge capability, and biometric mobile collection kits. NXGBCC will tactically collect, match, store, reference, and share biometric signatures and contextual data while providing data analysis capability at all echelons; enabling forces in competition, armed conflict, and re-competing in a Joint All Domain Operations (JADO) environment. NXGBCC processes Enemy Prisoners of War (EPWs), Displaced Persons, and Refugees. It also assists Operations in the Support in Consolidation Areas. NXGBCC enables commanders to protect their force, deny enemy movement, increase freedom of maneuver, protect civilian populations, manage detainees identities, and to defeat near-peer unconventional threats. FY 2020 funding for NXGBCC previously reflected in project BI7 was moved to project FL5.

Identity Intelligence Analytic Repository (I2AR) will serve as an analytical tool to produce, manage, and disseminate the DoD Biometrically Enabled Watchlist (BEWL) as well as extend opportunities for system and data integration with enhanced analytic data sharing across the Army and Intelligence Community (IC) partners. Analysts will use I2AR to conduct analysis and develop intelligence reports, in support of DoD and national community missions. I2AR will include the legacy Biometrics Identity Intelligence Resource (BI2R) functionality as well as elasticity, encryption, and open source software for enduring interoperability with DoD, IC, and external partners.

Justification:
The FY 2022 Direct War/Enduring Operations dollars in the amount of $2.059 million in BI7 will continue to support the development of new software code & associated testing to deliver the Identity Intelligence Analytic Repository (I2AR) a replacement for the Biometrics Identity Intelligence Repository (BI2R -the unique software-based analytic production system used by DoD's intelligence analysts to create products such as the Biometric Enabled Watchlist for Operation Freedom's Sentinel (OFS) and other worldwide missions) on cloud computing platforms.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army					Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*			R-1 Program Element (Number/Name) PE 0307665A / *Biometrics Enabled Intelligence*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	4.214	0.000	2.259	-	2.259
Current President's Budget	4.350	0.000	2.066	-	2.066
Total Adjustments	0.136	0.000	-0.193	-	-0.193
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.136	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.193	-	-0.193

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / *Biometrics Enabled Intelligence*	Project (Number/Name) BI7 / *Biometrics Enabled Intelligence*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BI7: *Biometrics Enabled Intelligence*	-	2.214	-	2.066	-	2.066	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Next Generation Biometric Collection Capability (NXGBCC) is the replacement for the Biometrics Automated Toolset - Army (BAT-A) Program of Record (POR) which has been supporting overseas contingency operations for over 20 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC supports all three objectives of the National Defense Strategy to increase lethality, enhance International Cooperation, and improve business practices. NXGBCC initiates the data flow to the DoD Authoritative Biometrics Identification System (ABIS) and Military Intelligence systems. NXGBCC consists of an expeditionary biometric data management system called the Local Trusted Source (LTS), biometric static collection kits with palm and credential badge capability, and biometric mobile collection kits. NXGBCC will tactically collect, match, store, reference, and share biometric signatures and contextual data while providing data analysis capability at all echelons; enabling forces in competition, armed conflict, and re-competing in a Joint All Domain Operations (JADO) environment. NXGBCC processes Enemy Prisoners of War (EPWs), Displaced Persons, and Refugees. It also assists Operations in the Support in Consolidation Areas. NXGBCC enables commanders to protect their force, deny enemy movement, increase freedom of maneuver, protect civilian populations, manage detainees identities, and to defeat near-peer unconventional threats. FY 2020 funding for NXGBCC previously reflected in project BI7 was moved to project FL5.

Identity Intelligence Analytic Repository (I2AR) will serve as an analytical tool to produce, manage, and disseminate the DoD Biometrically Enabled Watchlist (BEWL) as well as extend opportunities for system and data integration with enhanced analytic data sharing across the Army and Intelligence Community (IC) partners. Analysts will use I2AR to conduct analysis and develop intelligence reports, in support of DoD and national community missions. I2AR will include the legacy Biometrics Identity Intelligence Resource (BI2R) functionality as well as elasticity, encryption, and open source software for enduring interoperability with DoD, IC, and external partners.

Justification:
The FY 2022 Base dollars in the amount of $2.059 million in BI7 will continue to support the development of new software code & associated testing to deliver the Identity Intelligence Analytic Repository (I2AR) a replacement for the Biometrics Identity Intelligence Repository (BI2R) - a unique cloud-hosted analytic software system used by DoD's intelligence analysts to create products such as the Biometric Enabled Watchlist in support of worldwide missions.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Army G2 Projects - BI7	2.214	-	2.066
Description: Development of intelligence capabilities currently used to support Operation Freedom's Sentinel (OFS) and Operation Inherent Resolve (OIR) including Vigilant Pursuit Systems and the Biometrics Intelligence Information Repository (BI2R).			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0307665A / *Biometrics Enabled Intelligence*	**Project (Number/Name)** BI7 / *Biometrics Enabled Intelligence*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
FY 2022 Plans: FY2022 funding to complete prototype and New Equipment Training development. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in FY2022 funds to complete prototype and New Equipment Training development. FY2021 was a skip-year funding for this project as a result of funding elimination dollars supporting other Army requirements.			
Accomplishments/Planned Programs Subtotals	2.214	-	2.066

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The FY 2022 Base dollars in the amount of $2.059 million in BI7 will continue to support the development of new software code & associated testing to deliver the I2AR a replacement for the BI2R). The acquisition strategy will be to exercise a contract option which enables for continuation of a contractor to develop activities for the Army Requirements Oversight Council (AROC) approved Quick Reaction Capability (QRC).

The NXGBCC acquisition strategy is to leverage the limited development of mature commercial technology to meet NXGBCC's collect, store, match, analyze, and share requirements and interface with the Biometric Family of Systems, Military Intelligence Systems, and Detainee Management Systems. The program office is using the Other Transaction Agreement (OTA) competitive prototyping process to down-select to the best biometric prototype solution. Upon OTA completion, NXGBCC will conduct the Initial Operational Test, procurement, fielding, and sustainment of NXGBCC.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / *Biometrics Enabled Intelligence*	Project (Number/Name) BI7 / *Biometrics Enabled Intelligence*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PM Management Services	C/Various	TBD : TBD	12.921	-		-		-		-		-	0.000	12.921	-
		Subtotal	12.921	-		-		-		-		-	0.000	12.921	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Base Products Development	C/IDIQ	Various : TBD	57.248	2.214		-		2.066	Mar 2022	-		2.066	0.000	61.528	-
Product Development	C/FFP	ACC / Picatinny : New Jersey	6.847	-		-		-		-		-	0.000	6.847	-
		Subtotal	64.095	2.214		-		2.066		-		2.066	0.000	68.375	N/A

Remarks

Product Office used an Other Transaction Agreement (OTA) for product selection.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PM Civilian Personnel and Other Support Costs	Various	Various : Various	20.102	-		-		-		-		-	0.000	20.102	-
		Subtotal	20.102	-		-		-		-		-	0.000	20.102	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IA, T&E, Threat Assessment,	Various	Various : TBD	5.066	-		-		-		-		-	0.000	5.066	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / *Biometrics Enabled Intelligence*	Project (Number/Name) BI7 / *Biometrics Enabled Intelligence*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperabiity Certifications															
Subtotal			5.066	-		-		-		-		-	0.000	5.066	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	102.184	2.214		0.000		2.066		-		2.066	0.000	106.464	N/A

Remarks

Prior years are mostly associated with the termination of the Joint Personnel Identification Version 2 (JPIv2) project.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0307665A / *Biometrics Enabled Intelligence*	**Project (Number/Name)** BI7 / *Biometrics Enabled Intelligence*

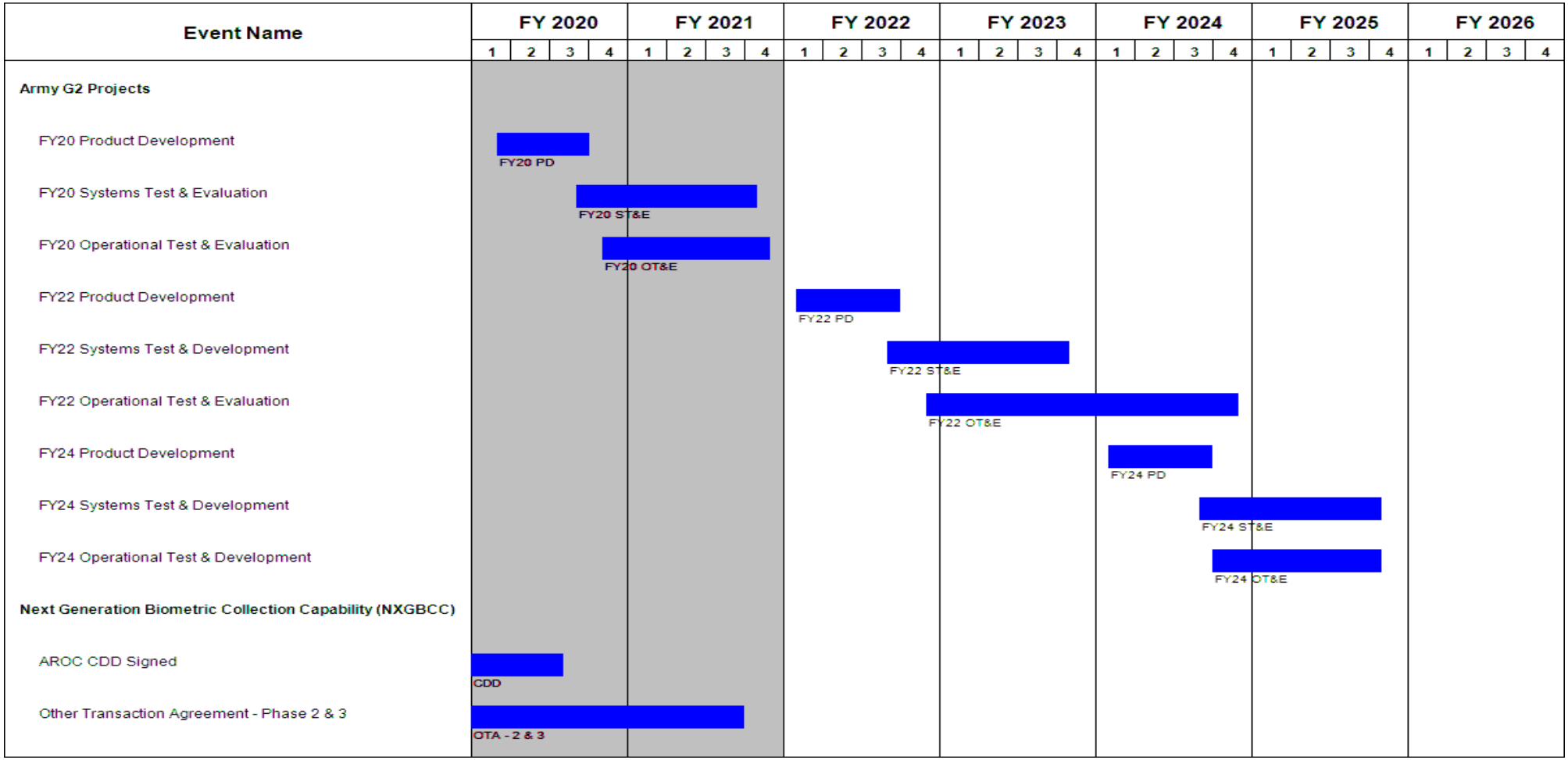


Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0307665A / *Biometrics Enabled Intelligence*	**Project (Number/Name)** BI7 / *Biometrics Enabled Intelligence*

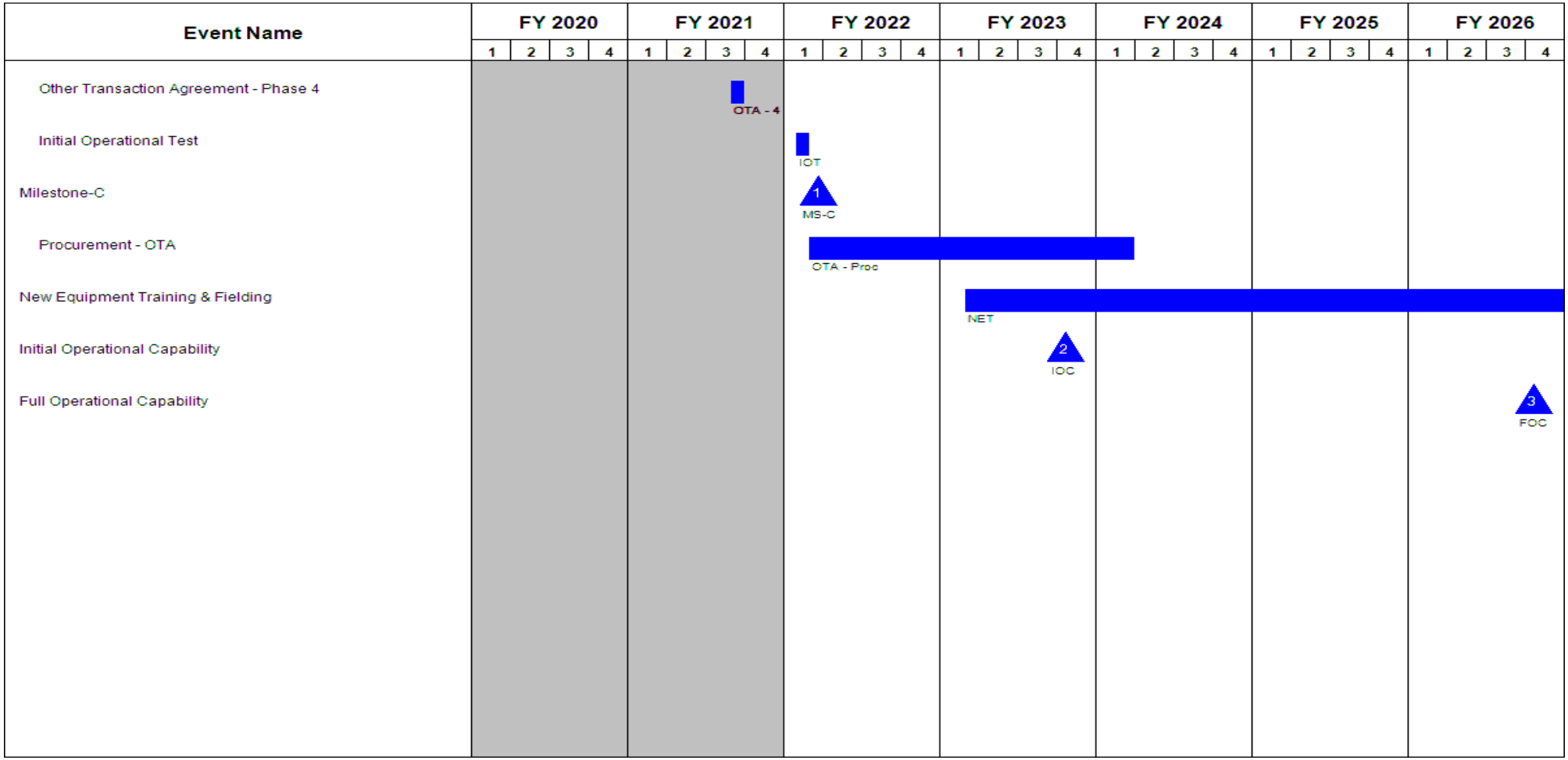


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0307665A / *Biometrics Enabled Intelligence*	**Project (Number/Name)** BI7 / *Biometrics Enabled Intelligence*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Acquisition Decision Memorandum	4	2015	4	2015
Systems Requirements Review	2	2013	2	2013
Technical Assessment	3	2014	3	2014
Operational Assessment (Technical Report)	1	2015	1	2015
Contract Closeout	2	2015	2	2015
PM JPIv2 Closeout	2	2015	1	2016
Army G2 Projects	1	2017	1	2025
Product Development	1	2017	3	2019
Systems Test & Evaluation	2	2017	4	2017
Operational Test & Evaluation	4	2017	1	2018
FY18 Product Development	1	2018	3	2018
FY18 Operational Test & Evaluation	4	2018	2	2019
FY20 Product Development	1	2020	3	2020
FY20 Systems Test & Evaluation	3	2020	4	2021
FY20 Operational Test & Evaluation	4	2020	4	2021
FY22 Product Development	1	2022	3	2022
FY22 Systems Test & Development	3	2022	4	2023
FY22 Operational Test & Evaluation	4	2022	4	2024
FY24 Product Development	1	2024	3	2024
FY24 Systems Test & Development	3	2024	4	2025
FY24 Operational Test & Development	4	2024	4	2025
Next Generation Biometric Collection Capability (NXGBCC)	1	2018	1	2032

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0307665A / *Biometrics Enabled Intelligence*	**Project (Number/Name)** BI7 / *Biometrics Enabled Intelligence*

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
NXGBCC Program Planning	1	2018	4	2019
MDD	4	2016	4	2016
AoA Report	1	2018	3	2018
AROC CDD Signed	3	2018	3	2020
Other Transaction Agreement - Phase 1	4	2018	1	2019
Other Transaction Agreement - Phase 2 & 3	2	2019	3	2021
Other Transaction Agreement - Phase 4	3	2021	3	2021
Initial Operational Test	1	2022	1	2022
Milestone-C	1	2022	1	2022
Procurement - OTA	1	2022	1	2024
New Equipment Training & Fielding	1	2023	4	2026
Initial Operational Capability	4	2023	4	2023
Full Operational Capability	4	2026	4	2026

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / *Biometrics Enabled Intelligence*	Project (Number/Name) FL5 / *Next Gen Biometric Collection Capability*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FL5: *Next Gen Biometric Collection Capability*	-	2.136	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Next Generation Biometric Collection Capability (NXGBCC) is the replacement for the Biometrics Automated Toolset - Army (BAT-A) Program of Record (POR) which has been supporting overseas contingency operations for over 20 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC supports all three objectives of the National Defense Strategy to increase lethality, enhance International Cooperation, and improve business practices. NXGBCC initiates the data flow to the DoD Authoritative Biometrics Identification System (ABIS) and Military Intelligence systems. NXGBCC consists of an expeditionary biometric data management system called the Local Trusted Source (LTS), biometric static collection kits with palm and credential badge capability, and biometric mobile collection kits. NXGBCC will tactically collect, match, store, reference, and share biometric signatures and contextual data while providing data analysis capability at all echelons; enabling forces in competition, armed conflict, and re-competing in a Joint All Domain Operations (JADO) environment. NXGBCC processes Enemy Prisoners of War (EPWs), Displaced Persons, and Refugees. It also assists Operations in the Support in Consolidation Areas. NXGBCC enables commanders to protect their force, deny enemy movement, increase freedom of maneuver, protect civilian populations, manage detainees identities, and to defeat near-peer unconventional threats. FY 2020 funding for NXGBCC previously reflected in project BI7 was moved to project FL5.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Next Generation Biometric Collection Capability	2.136	-	-
Description: NXGBCC is the replacement for BAT-A Program of Record (POR) for tactical biometrics collection capability.			
Accomplishments/Planned Programs Subtotals	2.136	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

N/A

D. Acquisition Strategy

The Next Generation Biometric Collection Capability (NXGBCC) acquisition strategy is to leverage the limited development of mature commercial technology to meet NXGBCC's collect, store, match, analyze, and share requirements and interface with the Biometric Family of Systems, Military Intelligence Systems, and Detainee Management Systems. The program office is using the Other Transaction Agreement (OTA) competitive prototyping process to down-select to the best biometric prototype solution. Upon OTA completion, NXGBCC will conduct the Initial Operational Test, procurement, fielding and sustainment of NXGBCC.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / *Biometrics Enabled Intelligence*	Project (Number/Name) FL5 / *Next Gen Biometric Collection Capability*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Field Prototype Development	C/FFP	ACC / Picatinny : New Jersey	-	2.136		-		-		-		-	0.000	2.136	-
		Subtotal	-	2.136		-		-		-		-	0.000	2.136	N/A

Remarks

FY20 funding will complete the Other Transaction Agreement started in FY18.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	2.136		0.000		-		-		-	0.000	2.136	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0307665A / *Biometrics Enabled Intelligence*	**Project (Number/Name)** FL5 / *Next Gen Biometric Collection Capability*

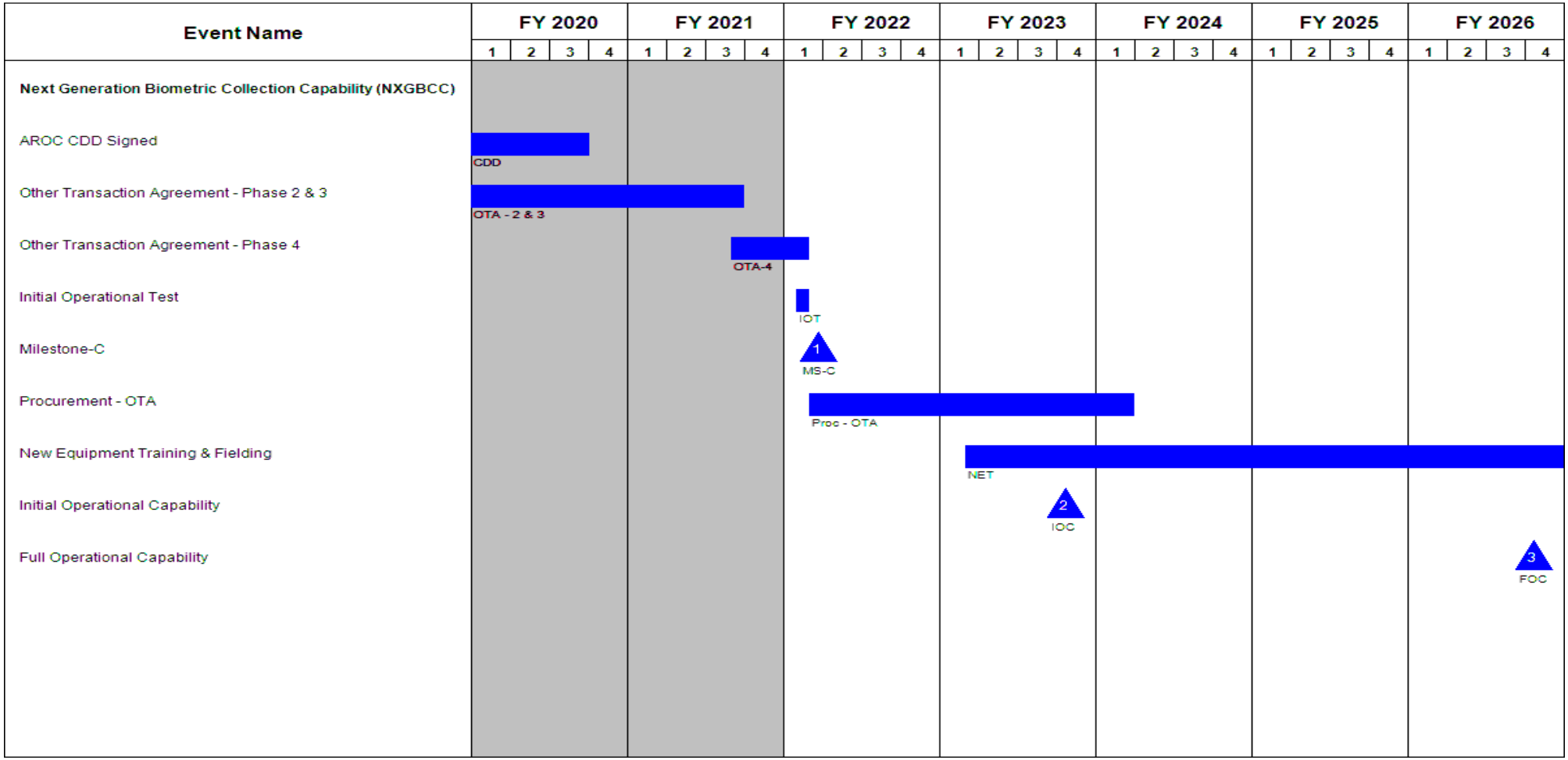


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0307665A / *Biometrics Enabled Intelligence*	**Project (Number/Name)** FL5 / *Next Gen Biometric Collection Capability*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Next Generation Biometric Collection Capability (NXGBCC)	1	2018	1	2032
NXGBCC Program Planning	1	2018	4	2019
AoA Report	1	2018	3	2018
AROC CDD Signed	3	2018	3	2020
Other Transaction Agreement - Phase 1	4	2018	1	2019
Other Transaction Agreement - Phase 2 & 3	2	2019	3	2021
Other Transaction Agreement - Phase 4	3	2021	1	2022
Initial Operational Test	1	2022	1	2022
Milestone-C	1	2022	1	2022
Procurement - OTA	1	2022	1	2024
New Equipment Training & Fielding	1	2023	4	2026
Initial Operational Capability	4	2023	4	2023
Full Operational Capability	4	2026	4	2026

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	105.885	130.785	61.720	-	61.720	-	-	-	-	-	-
E25: *Mfg Science & Tech*	-	105.885	58.785	61.720	-	61.720	-	-	-	-	-	-
EA2: *MANTECH INITIATIVES (CA)*	-	-	72.000	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

This Program Element (PE) develops, demonstrates, and transitions manufacturing technologies and processes that enable improvements in producibility and affordability of emerging and enabling components and subsystems of Army ground and air platforms, Soldier systems, weapons systems, air & missile defense systems, as well as sensors and electronics. Initiatives within the PE result in cost savings and reduced risk of transitioning military-unique manufacturing processes into production. Project E25 fosters the transfer of new/improved manufacturing technologies to the industrial base, including manufacturing efforts that have potential for high payoff across the spectrum of Army systems.

The cited work is consistent with the Under Secretary of Defense, Research and Engineering science and technology focus areas and the Army Modernization Strategy.

Work in this PE is performed by the United States (U.S.) Army laboratories and research centers, U.S. Army Program Executive Offices and Program Management Offices, and U.S. Army depots and arsenals.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	108.348	61.012	62.484	-	62.484
Current President's Budget	105.885	130.785	61.720	-	61.720
Total Adjustments	-2.463	69.773	-0.764	-	-0.764
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	72.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.463	-2.227			
• Adjustments to Budget Years	-	-	-0.764	-	-0.764

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: E25: *Mfg Science & Tech*		

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0708045A *I End Item Industrial Preparedness Activities*

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Congressional Add: *FY 2020 Congressional Add - Technical Textiles*	5.000	-
Congressional Add: *FY 2020 Congressional Add - Nanoscale Materials Manufacturing*	12.500	-
Congressional Add: *FY 2020 Congressional Add - Glass Separators for Lithium Batteries*	5.000	-
Congressional Add: *FY 2020 Congressional Add - Additive Manufacturing Technology Insertion*	5.000	-
Congressional Add: *FY 2020 Congressional Add - Power Take-off Hybridization*	7.000	-
Congressional Add: *FY 2020 Congressional Add - Tungsten Manufacturing Affordability Initiative for Armaments*	5.000	-
Congressional Add: *FY 2020 Congressional Add - Manufacturing Technology Program*	5.000	-
Congressional Add: *FY 2020 Congressional Add - Transparent Armor*	4.000	-
Congressional Add Subtotals for Project: E25	48.500	-
Project: EA2: *MANTECH INITIATIVES (CA)*		
Congressional Add: *Functional Fabrics and Smart Textiles- Continued*	-	10.000
Congressional Add: *Smart Manufacturing of Engineered Fabrics - Continued*	-	7.000
Congressional Add: *Scalability of Functional Fabric Manufacturing - Continued*	-	5.000
Congressional Add: *Nanoscale Materials Manufacturing- Continued*	-	10.000
Congressional Add: *Compact Efficient Rotary Engine*	-	10.000
Congressional Add: *Lightweight High Efficiency Generators*	-	10.000
Congressional Add: *Glass Separators for Lithium Bateries- Continued*	-	5.000
Congressional Add: *Advanced Manufacturing Cell for Missile Fins*	-	5.000
Congressional Add: *Advanced Manufacturing Technology*	-	5.000
Congressional Add: *Tungsten Manufacturing Affordability Initiative for Armaments - Continued*	-	5.000
Congressional Add Subtotals for Project: EA2	-	72.000
Congressional Add Totals for all Projects	48.500	72.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / *End Item Industrial Preparedness Activities*	Project (Number/Name) E25 / *Mfg Science & Tech*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
E25: *Mfg Science & Tech*	-	105.885	58.785	61.720	-	61.720	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and demonstrates manufacturing technologies and processes that enable improvements in producibility and affordability of emerging and enabling components and subsystems of Army ground and air platforms, Soldier systems, weapons systems, air & missile defense systems, and sensors and electronics. Work is performed to advance the state of the art in manufacturing processing and fabrication techniques for coatings, multifunctional materials, and structural elements for Army specific applications.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Long Range Precision Fires	5.289	2.962	7.744
Description: The effort funds manufacturing improvements to support areas that enable hypersonics, cannons, and missiles. Efforts focus on reduction in cost and time for manufacturing. ***FY 2021 Plans:*** Demonstrate reduced cost and time in manufacturing activities of advanced material, advanced processes, and new tooling to enable long range precision fires. Decrease the use of multiple tools and eliminate long lead times on repairing and replacing items for Long Range Precision Fires. ***FY 2022 Plans:*** Develop and advance manufacturing processes and capabilities supporting long range precision fires resulting in the affordability and producibility of advanced energetics, warheads, propulsion, guidance and navigation technology. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in FY22 is due to investments in efforts for enhanced explosives propellant manufacturing and hypersonic system/ component manufacturing.			
Title: Next Generation Combat Vehicle	24.731	19.953	6.005
Description: This effort funds manufacturing technology advances needed for more affordable and reliable components and subsystems for tactical and combat vehicles and weapons systems. This effort focuses on addressing challenges in areas such as			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** E25 / *Mfg Science & Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
advanced armor, protection systems, lighter weight components, insensitive propellants, armament systems, precision munitions, engines, sensor systems, and vehicle power devices for current and future systems. ***FY 2021 Plans:*** Use additive manufacturing advanced practices to reduce transition time and cost in replacement parts to increase in-theatre readiness. Develop manufacturing processes to produce lighter weight armor protection and evaluate advanced welding practices. ***FY 2022 Plans:*** Develop and advance manufacturing processes and capabilities supporting the ground vehicles that results in dependable technology with an emphasis on providing affordable and timely solutions. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease in FY22 is due to completion of manufacturing efforts supporting combat engines.			
Title: Future Vertical Lift ***Description:*** This effort funds manufacturing technology advances supporting future vertical lift platforms to increase operational reach and capabilities with a concentration on affordability and producibility through manufacturing solutions. ***FY 2021 Plans:*** Develop manufacturing processes to increase performance and increase process automation with more reliable materials; develop novel approaches to reduce acquisition cost of materials, reduce component costs and reduce weight of overall components. ***FY 2022 Plans:*** Develop and advance manufacturing processes and capabilities supporting future vertical lift platforms for future attack, reconnaissance and long range assault capabilities, and air launched effects. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in FY22 is due to increased investments in materials processing.	4.602	6.290	11.677
Title: Networks and Command, Control, Communications and Intelligence ***Description:*** This effort funds manufacturing technology advances needed for more affordable components and subsystems for communications; reconnaissance surveillance and target acquisition (RSTA) / intelligence, surveillance, and reconnaissance (ISR); positioning, navigation, and timing (PNT) systems; Cyber, Electronic Warfare, and Mission Command systems; and Command Post Survivability systems. ***FY 2021 Plans:***	12.917	12.440	10.918

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** E25 / *Mfg Science & Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Improve manufacturing processes for digital sensors for aviation and pilotage; will demonstrate manufacturing of high dynamic range digital pixel images for aviation; develop manufacturing processes of dual band optical coatings. ***FY 2022 Plans:*** Develop and advance manufacturing processes and capabilities supporting command and control systems/subsystems and position, navigation, and timing systems. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease in FY22 is due to completion of advanced manufacturing for digital sensors.			
Title: Air & Missile Defense ***Description:*** This effort funds advance manufacturing processes and capabilities supporting air and missile defense efforts. Efforts include manufacturing improvements to missile systems, directed energy systems, propulsion, and radar technologies. ***FY 2021 Plans:*** Develop high energy lasers that reduce manufacturing and supply chain costs and provide engagement capability against rockets, artillery, mortars and Unmanned Aerial Vehicles (UAVs); Produce manufacturing processes that adapt to eliminate co-site, jamming and other electromagnetic spectrum threats; optimize production processes to manufacture large precision optics. ***FY 2022 Plans:*** Develop and advance manufacturing processes and capabilities supporting air and missile defense efforts. This effort focuses on affordability and producibility of directed energy systems, advanced missiles and seekers, guidance and control, advanced aerostructures/propulsion, and air defense radar technologies. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in FY22 is due to increased investments in directed energy manufacturing.	3.767	8.000	12.784
Title: Soldier Lethality ***Description:*** This effort funds manufacturing technology and processes in support of individual Soldier weapons, provide Soldiers with enhanced capabilities, and increase their ability to respond to emerging situations through advanced manufacturing processes with a concentration affordability and producibility. Work focuses on addressing challenges in areas such as multifunctional fabrics for shelters, uniforms and portage equipment; lightweight materials for body armor; and medical technologies such as biotechnology. ***FY 2021 Plans:***	4.365	9.140	12.592

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** E25 / *Mfg Science & Tech*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Continue to develop manufacturing techniques for low next generation hand grenades and advance soldier protection with Chemical, Biological, Radiological, and Nuclear (CBRN) filters. ***FY 2022 Plans:*** Increase the capability of individual Soldier weapons, provide Soldiers with enhanced capabilities, and increase their protection and ability to respond to emerging situations through advanced manufacturing technology and processes. Efforts will result in greater affordability and producibility with a concentration on next generation squad weapons and ammunition, Soldier borne power, enhanced protective materials and systems, and sensor development. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in FY22 is due to increased investments in Soldier borne power.			
Title: Cross-cutting ***Description:*** This effort funds manufacturing technology advances with impact across processes or platforms of Army interest. Work focuses on addressing challenges in areas such as advanced additive manufacturing technologies for fabrication of weapons systems, platforms, and munitions; and novel manufacturing techniques for expedient and cost effective repair of worn or damaged platform components.	1.714	-	-
Accomplishments/Planned Programs Subtotals	57.385	58.785	61.720

	FY 2020	FY 2021
Congressional Add: FY 2020 Congressional Add - Technical Textiles ***FY 2020 Accomplishments:*** FY 2020 Congressional Add for Technical Textiles $5000K	5.000	-
Congressional Add: FY 2020 Congressional Add - Nanoscale Materials Manufacturing ***FY 2020 Accomplishments:*** FY 2020 Congressional Add for Nanoscale Materials Manufacturing $12500K	12.500	-
Congressional Add: FY 2020 Congressional Add - Glass Separators for Lithium Batteries ***FY 2020 Accomplishments:*** FY 2020 Congressional Add for Glass Separators for Lithium Batteries $5000K	5.000	-
Congressional Add: FY 2020 Congressional Add - Additive Manufacturing Technology Insertion ***FY 2020 Accomplishments:*** FY 2020 Congressional Add for Additive Manufacturing Technology Insertion $5000K	5.000	-
Congressional Add: FY 2020 Congressional Add - Power Take-off Hybridization	7.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** E25 / *Mfg Science & Tech*

	FY 2020	FY 2021
FY 2020 Accomplishments: FY 2020 Congressional Add for Power Take-Off Hybridization $7000K		
Congressional Add: FY 2020 Congressional Add - Tungsten Manufacturing Affordability Initiative for Armaments ***FY 2020 Accomplishments:*** FY 2020 Congressional Add for Tungsten Manufacturing Affordability Initiative for Armaments $5000K	5.000	-
Congressional Add: FY 2020 Congressional Add - Manufacturing Technology Program ***FY 2020 Accomplishments:*** FY 2020 Congressional Add for Manufacturing Technology Program $5000K	5.000	-
Congressional Add: FY 2020 Congressional Add - Transparent Armor ***FY 2020 Accomplishments:*** FY 2020 Congressional Add for Transparent Armor $4000K	4.000	-
Congressional Adds Subtotals	48.500	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Not applicable for this item.

D. Acquisition Strategy

Not applicable for this item.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / *End Item Industrial Preparedness Activities*	Project (Number/Name) E25 / *Mfg Science & Tech*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2018 NDAA SEC 825 MDAP Cost Overrun	Allot	N/A : N/A	0.037	-		-		-		-		-	0.000	0.037	-
		Subtotal	0.037	-		-		-		-		-	0.000	0.037	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mfg Science & Tech	Various	TBD : TBD	400.502	105.885		58.785		61.720		-		61.720	0.000	626.892	-
		Subtotal	400.502	105.885		58.785		61.720		-		61.720	0.000	626.892	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	400.539	105.885		58.785		61.720		-		61.720	0.000	626.929	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** E25 / *Mfg Science & Tech*

	FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019			
	1	2	3	4	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																												

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	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																												

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** E25 / *Mfg Science & Tech*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
N/A	1	2016	4	2019

Note

N/A

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / *End Item Industrial Preparedness Activities*	Project (Number/Name) EA2 / *MANTECH INITIATIVES (CA)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
EA2: *MANTECH INITIATIVES (CA)*	-	-	72.000	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This effort accelerates manufacturing technology for more affordable electronic warfare, communications and sensors systems components and subsystems to include radio frequency amplifiers, antennas, and focal plane arrays. This effort accelerates and supplements manufacturing technology for more affordable components and subsystems for tactical and combat vehicles and weapon systems. Work focuses benefit from working to develop and scale up the manufacturing process for nano-tungsten carbide powders and high-volume single-crystal tungsten rod manufacturing processes. This effort accelerates and supplements manufacturing technology for more advanced manufacturing and enterprise solutions. Work focuses on accelerating model based manufacturing to specific organic Army facilities and novel ways of applying additive manufacturing and monitoring material powder beds and process controls during additive manufacturing part build for weapon system components.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: Functional Fabrics and Smart Textiles- Continued ***FY 2021 Plans:*** Scale-up advanced fabric-based sensor manufacturing processes.	-	10.000
Congressional Add: Smart Manufacturing of Engineered Fabrics - Continued ***FY 2021 Plans:*** Integration of engineered fabrics into wearable soldier applications.	-	7.000
Congressional Add: Scalability of Functional Fabric Manufacturing - Continued ***FY 2021 Plans:*** Integrate fiber and fabric capabilities for fabric-based electronic devices and systems.	-	5.000
Congressional Add: Nanoscale Materials Manufacturing- Continued ***FY 2021 Plans:*** Mature processes for silver Ink provider to support flexible electronic printing.	-	10.000
Congressional Add: Compact Efficient Rotary Engine ***FY 2021 Plans:*** Advanced manufacturing for heavy-fuel rotary engine technology for next generation unmanned aircraft systems.	-	10.000
Congressional Add: Lightweight High Efficiency Generators ***FY 2021 Plans:*** Mature manufacturing of High Efficiency Hybrid thermodynamic Cycle (HEHC) engine to power a 1-3 kW electric generator.	-	10.000
Congressional Add: Glass Separators for Lithium Bateries- Continued	-	5.000

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** EA2 / *MANTECH INITIATIVES (CA)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
FY 2021 Plans: Advance the manufacturing technology and processes for battery materials to be integrated into these SL and Future Vertical Lift CFT systems.		
Congressional Add: Advanced Manufacturing Cell for Missile Fins ***FY 2021 Plans:*** Mature manufacturing cell for missile fins to improve performance, quality and throughput.	-	5.000
Congressional Add: Advanced Manufacturing Technology ***FY 2021 Plans:*** Mature advanced manufacturing processes for aluminum rolling mills, to include real time measurements of mill products and automated operations for improved cold mill processes, producibility and throughput for armor products.	-	5.000
Congressional Add: Tungsten Manufacturing Affordability Initiative for Armaments - Continued ***FY 2021 Plans:*** Provides new manufacturing source for to produce rocket nozzles and long rod penetrators.	-	5.000
Congressional Adds Subtotals	-	72.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / *End Item Industrial Preparedness Activities*	Project (Number/Name) EA2 / *MANTECH INITIATIVES (CA)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2018 NDAA SEC 825 MDAP Cost Overrun	TBD	N/A : N/A	0.039	-		-		-		-		-	0.000	0.039	-
		Subtotal	0.039	-		-		-		-		-	0.000	0.039	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Mfg Science & Tech	TBD	TBD : TBD	126.561	-		72.000		-		-		-	0.000	198.561	-
		Subtotal	126.561	-		72.000		-		-		-	0.000	198.561	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	126.600	-		72.000		-		-		-	0.000	198.600	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** EA2 / *MANTECH INITIATIVES (CA)*

	FY 2013				FY 2014				FY 2015				FY 2016				FY 2017				FY 2018				FY 2019			
	1	2	3	4	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																												

	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	1	2	3	4	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																												

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 0708045A / *End Item Industrial Preparedness Activities*	**Project (Number/Name)** EA2 / *MANTECH INITIATIVES (CA)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
N/A	1	2016	4	2016

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 1203142A *I SATCOM Ground Environment (SPACE)*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	32.764	-	-	-	-	-	-	-	-	-	-
FE1: *Dscs-Dcs (Phase II)*	-	4.085	-	-	-	-	-	-	-	-	-	-
FE2: *MILSATCOM System Engineering*	-	4.178	-	-	-	-	-	-	-	-	-	-
FI8: *Protected Anti-JAM Tactical SATCOM*	-	24.501	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The SATCOM Ground Environment (SPACE) funding line supports the Army's Network Modernization Strategy Line Of Effort (LOE) 1: Unified Network. Efforts are aligned to support the Network-Cross Functional Team (N-CFT) capability set approach to achieve the network modernization strategy.

FE1: Defense Satellite Communications System (DSCS)/Digital Communications System (DCS) (Phase II):
This project develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems (MCNS) requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future Force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations.

FE2: Military Satellite Communications (MILSATCOM) System Engineering (SE):
Military Satellite Communications (MILSATCOM) System Engineering (SE) assures that tactical Army Satellite Communications (SATCOM) and SATCOM On-The-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM SE shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM SE represents the Army's tactical interests within DoD, Commercial & International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts. MILSATCOM System Engineering also provides the technical and programmatic expertise to facilitate the Unified Network Capabilities and Integration (UNCI) integration mission of transport convergence, development new and emerging S&T projects in conjunction with the N-CFT, and integration of these solutions within the Tactical Network portfolio as part of future Capability Sets. MILSATCOM SE also provides the programmatic and technical expertise to coordinate the UNCI mission to align and integrate elements of the Tactical Network portfolio in support of the Expeditionary Signal Battalion (ESB) and Multi Domain Task Force (MDTF) missions.

Program funding has been realigned to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 1203142A *I SATCOM Ground Environment (SPACE)*

FE4 / Enroute Mission Command:
Mission Description and Budget Item Justification:
Enroute Mission Command (EMC) supports the Global Response Force (GRF) and other Army units with the requirement to conduct Airborne forced entry operations with the ability to conduct mission command, to include mission planning and rehearsal, while enroute on board US Air Force Air Mobility Command (AMC) aircraft. EMC provides a modernization to enroute communications to enable broadband reach-back data capability utilizing military or commercial networks with adequate bandwidth support required by Mission Command and Intelligence applications. EMC will provide commanders with the ability to obtain and share near real-time information regarding intelligence, situational awareness and command and control information while enroute to their objective. The ability to adjust plans and strategize utilizing the latest Intel data will give the GRF the information dominance needed to execute their mission once they arrive at their objective.

Due to rephasing of FY 2017 OPA funding into FY 2018/2019, program was restructured in Dec 2015. MDA addressed schedule issues (Oct 2016) by authorizing to field a Ku FISA FOC (4QFY17) and complete a Modification Word Order (MWO), adding Ka FISA capability, post Ku FISA FOC.

FI8: Protected Anti-jam Tactical SATCOM (Protected SATCOM) will fill a critical protected communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and protect against potentially catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the Tactical Army protection against interference that is either intentional or unintentional. The effort includes development of a critical Protected Tactical Waveform (PTW) modem which will be integrated into Army tactical SATCOM terminals to provide higher throughputs, protection (anti-jam) against Electronic Warfare (EW), and resiliency in a contested environment; development of a dual small form factor modem that can run the PTW and the current Network Centric Waveform (NCW) to Army tactical wideband SATCOM terminals at Expeditionary Signal Battalions - Enhanced (ESB-Es), Corps, Division, and Brigade Combat Teams; and development, testing and certification of the NCW - Resilient waveform, which serves as a bridging solution to the PTW. The PTW efforts are synchronized with the Air Force and DoD's plans for PTW on Wideband Global SATCOM (WGS) the Protected Tactical Satellite (PTS), and commercial SATCOM systems.

Program funding has been realigned to MILSATCOM System Engineering (0303142A/456) beginning in FY 2021 to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	34.169	0.000	0.000	-	0.000
Current President's Budget	32.764	0.000	0.000	-	0.000
Total Adjustments	-1.405	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.405	-			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) FE1 / *Dscs-Dcs (Phase II)*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FE1: *Dscs-Dcs (Phase II)*	-	4.085	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project FE1, Defense Satellite Communications System - Digital Communications System (DSCS-DCS) supports the Army's Network Modernization Strategy Line Of Effort (LOE) 1 - Unified Network. Efforts are aligned to support the Network-Cross Functional Team capability set approach to achieve the network modernization strategy.

This project develops Satellite Communication (SATCOM) ground subsystem equipment and software in support of Joint Chiefs of Staff (JCS) validated Mission Command Network and Systems requirements for the worldwide Defense Enterprise Wideband SATCOM System (DEWSS). DEWSS is composed of the Super High Frequency (SHF) Defense Satellite Communications System (DSCS) and Wideband Global SATCOM (WGS) programs, which are required to support legacy, interim and emerging communication space architectures and future force requirements. Expansion of the WGS constellation and upgrades to both DSCS and WGS are vital to support the Army's emerging power projection and rapid deployment role. DSCS and WGS provide multiple channels of tactical end-to-end connectivity and interoperability with strategic networks and national decision-makers, satisfying JCS network operations in support of the President, JCS, combatant commanders, military departments, Department of State and other government departments and agencies.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: SATCOM Terminal Digital Intermediate Frequency (IF) Implementation Analysis ***Description:*** SATCOM Terminal Digital Intermediate Frequency (IF) implementation analysis aimed at improving bandwidth efficiency of gateway terminals while providing an additional layer of resiliency through terminal redundancy. These analyses include various evaluations for digital terminal components to replace current, less efficient, analog components. These analyses also include assessment of terrestrial connectivity among SATCOM terminals to enable Continuity Of Operations (COOP) and failover scenarios required for resiliency.	2.536	-	-
Title: Electromagnetic Interference Mitigation Analysis ***Description:*** Assess multiple interference mitigation/cancellation technologies for effectiveness in improving reliability/resiliency of strategic and tactical communications. Mature technology to software/firmware that will improve protected SATCOM modem/terminal performance in a electro-magnetic interference contested environment. Technology will also improve terminal performance against adversary and friendly satellite link jamming resources.	1.549	-	-
Accomplishments/Planned Programs Subtotals	4.085	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FE1 / *Dscs-Dcs (Phase II)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BB8500: *Defense Enterprise Wideband Satcom Systems*	98.399	101.498	97.369	-	97.369	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

This finances Project Manager, Defense Communications and Army Transmission Systems (PM DCATS) netcentric systems engineering, modem risk mitigation, and risk management framework support. Funding provides for SATCOM terminal upgrades, enhancement of baseband throughput capabilities, technology insertion and upgrades which improves SATCOM gateway resiliency while allowing for full utilization of Wideband Global SATCOM (WGS) capabilities. Both the Wideband SATCOM Operational Management System (WSOMS) and the Enterprise Wideband SATCOM Terminal System (EWSTS) Capability Production Documents (CPDs) contain Netcentric-Ready Key Performance Parameters (NR-KPPs) as required by CJCSI 6212.01C. Netcentric efforts are required to facilitate the migration from the current trunk-based communications systems to Internet Protocol (IP) based systems and to engineer, test and integrate IP based capabilities into WSOMS and EWSTS systems. Studies, risk mitigation, system integration and advanced demonstrations for Netcentric baseband and policy based control will accommodate technology insertion, data sharing, remote operations, architecture efforts and use of commercial technology, thus ensuring the life of the Defense Enterprise Wideband Satellite System (DEWSS) terminal family beyond 2025 and reducing lifecycle costs and enterprise requirements on the WGS and Defense Satellite Communication System (DSCS) satellites in the future. Contracting approach for new technology is through the use of Broad Agency Announcements (BAA) and Other Transaction Authority (OTA) contracts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) FE1 / *Dscs-Dcs (Phase II)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	0.194		-		-		-		-	0.000	0.194	-
		Subtotal	-	0.194		-		-		-		-	0.000	0.194	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SATCOM Terminal Digital IF Implementation Analysis	MIPR	TBD : APG, MD	4.730	1.595		-		-		-		-	Continuing	Continuing	Continuing
Electromagnetic Interference Mitigation Analysis	MIPR	TBD : APG, MD	3.202	1.786		-		-		-		-	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	0.155	-		-		-		-		-	0.000	0.155	-
		Subtotal	8.087	3.381		-		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
In-house Support	Allot	PdM WESS : Ft. Belvoir, VA	1.653	0.006		-		-		-		-	Continuing	Continuing	Continuing
Contractor Support	C/CPFF	ACC, MD : APG, MD	0.864	0.504	Jan 2020	-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	2.517	0.510		-		-		-		-	Continuing	Continuing	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	10.604	4.085		0.000		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FE1 / *Dscs-Dcs (Phase II)*

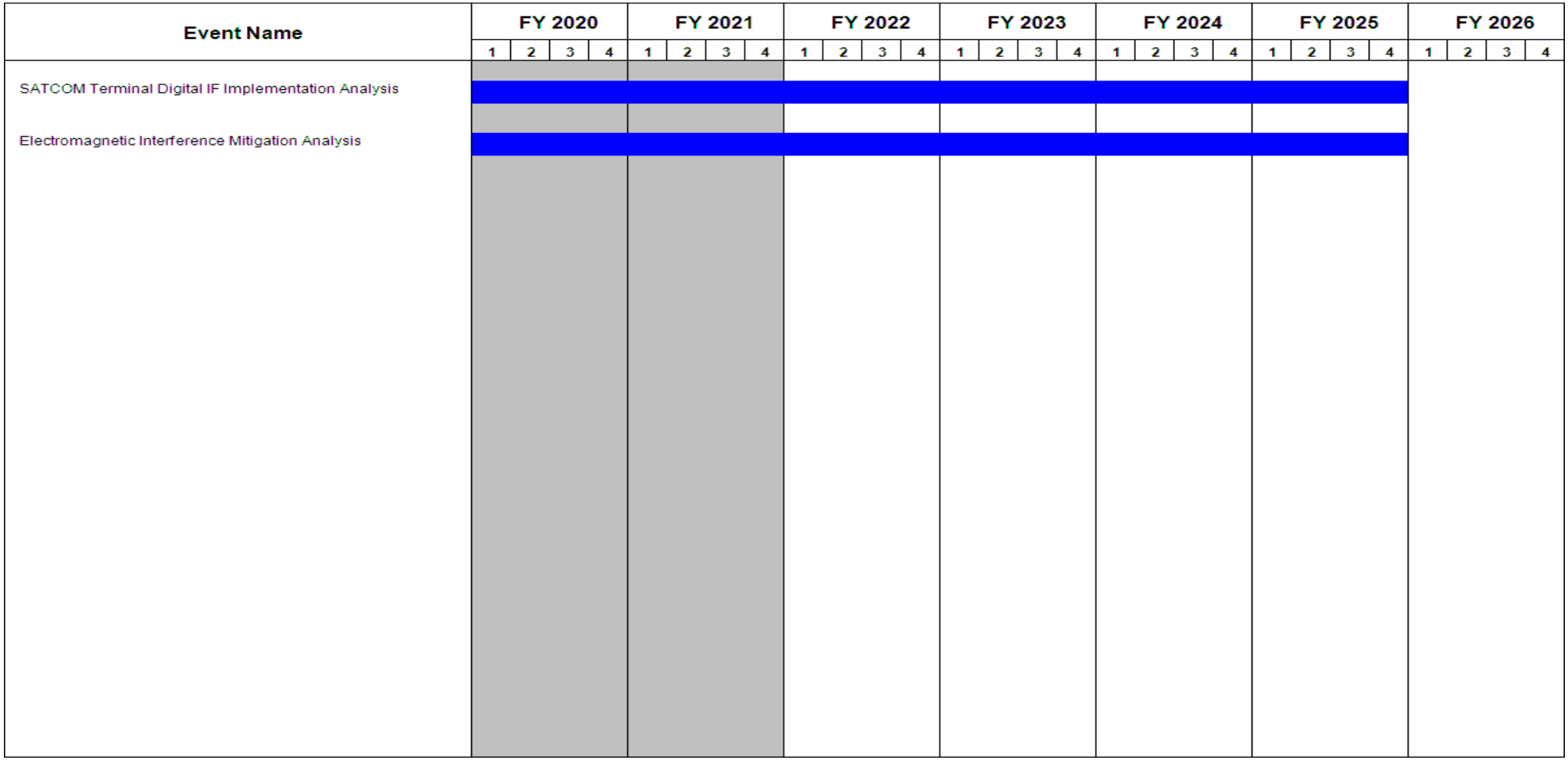


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FE1 / *Dscs-Dcs (Phase II)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
SATCOM Terminal Digital IF Implementation Analysis	1	2019	4	2025
Electromagnetic Interference Mitigation Analysis	1	2019	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) FE2 / *MILSATCOM System Engineering*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FE2: *MILSATCOM System Engineering*	-	4.178	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team (N-CFT) capability set approach to achieve the network modernization strategy.

FE2: Military Satellite Communications (MILSATCOM) System Engineering (SE) assures that tactical Army Satellite Communications (SATCOM) and SATCOM On-The-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM SE shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM SE represents the Army's tactical interests within DoD, Commercial & International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts. MILSATCOM System Engineering also provides the technical and programmatic expertise to facilitate the Unified Network Capabilities and Integration (UNCI) integration mission of transport convergence, developing new and emerging S&T projects in conjunction with the N-CFT, and integration of these solutions within the Tactical Network portfolio as part of future Capability Sets. MILSATCOM SE also provides the programmatic and technical expertise to coordinate the UNCI mission to align and integrate elements of the Tactical Network portfolio in support of the Expeditionary Signal Battalion (ESB) and Multi Domain Task Force (MDTF) missions.

FY 2019-2020 funds the systems engineering required to support technology maturation, systems analysis, and planning associated with joint SATCOM development efforts including complying with the implementation of the recommendations from the Protected SATCOM Communications Systems (PSCS) Analysis of Alternatives (AoA). This line continues to fund the systems architecture and analysis for current and future SATCOM efforts in both wideband and protected satellite communications. This effort includes collaborative work with the Air Force on the prototype Protected Tactical Service Field Demo (PTSFD) development and associated modem testing.

In addition, FY 2019-2020 funding covers the Narrowband Mobile User Objective System (MUOS) follow-on study efforts, Network Centric Waveform Tool (NCWT) Development and Testing and other efforts that have impact on tactical Army use of military and commercial satellite constellations. These efforts have a direct impact in reducing technical and programmatic risk for the acquisition efforts for tactical Army SATCOM systems using these constellations.

FY 2021 funding was realigned to 0303142A - SATCOM Ground Environment (SPACE) / 456 - MILSATCOM System Engineering.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Protected Communications System Engineering and WGS Communications	1.128	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FE2 / *MILSATCOM System Engineering*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Description: Systems engineering support relating to the technology maturation, development and planning associated with joint SATCOM development efforts including Network Centric Waveform Tool (NCWT), Protected Tactical Service Field Demo (PTSFD) and the implementation of the recommendations from the Protected SATCOM Communications Systems (PSCS) Analysis of Alternatives (AoA).			
Title: Systems Architecture and Analysis Support ***Description:*** Systems engineering support relating to the architecture and analysis of the Network Centric Waveform Tool (NCWT) and the collaborative SATCOM development Protected Tactical Service Field Demo (PTSFD) effort as well as other efforts, such as research, analysis, technical engineering and integration services for Analysis of Alternatives and future technology insertions, that have impact on tactical Army use of military and commercial satellite constellations and integration of enabling technologies. These efforts have a direct impact in reducing technical and programmatic risk for the acquisition efforts for tactical Army SATCOM systems using the WGS, commercial and military (Protected Tactical Satellites) constellations.	2.507	-	-
Title: Testing and certification of critical SATCOM and Satellite-On-The-Move (SOTM) communication and network technologies ***Description:*** Testing and certification of the prototype Protected Tactical Service Field Demo modem.	0.543	-	-
Accomplishments/Planned Programs Subtotals	4.178	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

FY 2017 and prior funding was aligned to 0303142A/456.

FY 2021 and future funding is realigned to 0303142A/456.

D. Acquisition Strategy

This project funds advanced systems engineering, research, development, test and evaluation, and integration of new and emerging technologies to optimize terminal performance and communications control. Once the technologies are mature and deemed feasible, funding and management responsibility for implementation and integration of the technology will transition to PM Tactical Network and related programs of record.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) FE2 / *MILSATCOM System Engineering*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Protected Communications and WGS Communications SE	TBD	Various : APG, MD	1.802	1.128	Jan 2020	-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	1.802	1.128		-		-		-		-	Continuing	Continuing	N/A

Remarks

FY 2019 funding was reduced by $161K to support FY 2019 SBIR/STTR funds transfers.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering (In House)	MIPR	PM WIN-T : APG, MD	1.848	1.151	Sep 2020	-		-		-		-	Continuing	Continuing	-
Engineering Contractors Support	C/CPFF	PM WIN-T : APG, MD	1.826	1.137	Mar 2020	-		-		-		-	Continuing	Continuing	-
System Architecture & Analysis	Various	CERDEC : APG, MD	0.348	0.218	Apr 2020	-		-		-		-	Continuing	Continuing	-
		Subtotal	4.022	2.506		-		-		-		-	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Terminal Testing and Evaluation System Engineering	FFRDC	PEO C3T : TBD	0.304	0.193	Dec 2019	-		-		-		-	0.000	0.497	-
Test Support	MIPR	Matrix : APG, MD	0.248	0.158	Apr 2020	-		-		-		-	0.000	0.406	-
Testing, Certification	MIPR	TBD : APG, MD	0.305	0.193	Jul 2020	-		-		-		-	0.000	0.498	-
		Subtotal	0.857	0.544		-		-		-		-	0.000	1.401	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) FE2 / *MILSATCOM System Engineering*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.681	4.178		0.000		-		-		-	Continuing	Continuing	N/A

Remarks

FY 2019 funding was reduced by $161K to support FY 2019 SBIR/STTR funds transfers.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FE2 / *MILSATCOM System Engineering*

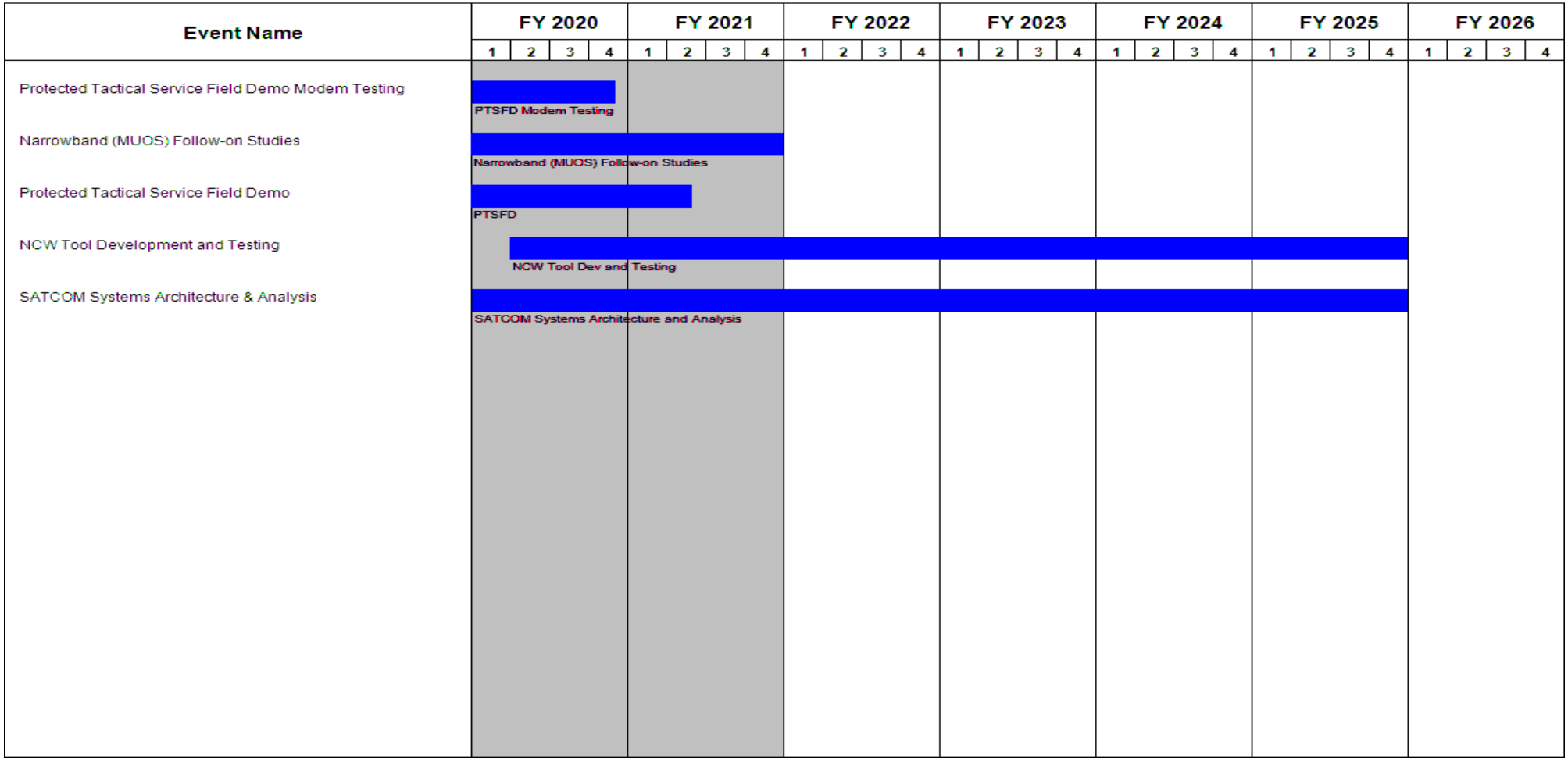


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FE2 / *MILSATCOM System Engineering*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Wideband AoA	4	2016	2	2018
Protected Tactical Service Field Demo Modem Testing	1	2018	4	2020
Narrowband (MUOS) Follow-on Studies	3	2019	4	2021
Protected Tactical Service Field Demo	4	2015	2	2021
NCW Tool Development and Testing	1	2015	4	2025
SATCOM Systems Architecture & Analysis	1	2018	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) FI8 / *Protected Anti-JAM Tactical SATCOM*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FI8: *Protected Anti-JAM Tactical SATCOM*	-	24.501	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This funding line supports the Army Network Modernization Strategy LOE 1, Unified Network. Efforts are aligned to support the Network Cross-Functional Team capability set approach to achieve the network modernization strategy.

FI8: Protected Anti-jam Tactical SATCOM (Protected SATCOM) will fill a critical protected communications gap for anti-jam SATCOM capability for mobile ground forces conducting expeditionary operations in electronically contested environments. It provides the ability for the tactical Army to be resilient in a contested environment and protect against potentially catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the Tactical Army protection against interference that is either intentional or unintentional. The effort includes development of a critical Protected Tactical Waveform (PTW) modem which will be integrated into Army tactical SATCOM terminals to provide higher throughputs, protection (anti-jam) against Electronic Warfare (EW), and resiliency in a contested environment; development of a dual small form factor modem that can run the PTW and the current Network Centric Waveform (NCW) to Army tactical wideband SATCOM terminals at Expeditionary Signal Battalions - Enhanced (ESB-Es), Corps, Division, and Brigade Combat Teams. The PTW efforts are synchronized with the Air Force and DoD's plans for PTW on Wideband Global SATCOM (WGS), the Protected Tactical Satellite (PTS), and commercial SATCOM systems.

FY 2020 funds will continue collaborative development, testing and certification with the US Air Force and Navy of a PTW modem and a Protected Tactical Satellite (PTS). The prototype of a protected modem and protected satellite were previously funded under the FE2 MILSATCOM Systems Engineering during the Protected Tactical Service Field Demo (PTSFD). The PTW modem and the accompanying satellite constellation continue the spiral development of critical protected communications capabilities. The funding on FI8 Protected SATCOM incorporates the Army specific requirements to be included in these efforts.

FY 2020 funds will support NCW-Resilient (NCW-R) software development, which serves as a bridging solution to PTW. The NCW-R software will increase resiliency of currently fielded NCW across Army SATCOM terminals which address critical protected communications gap for anti-jam SATCOM capability in electronically contested environments until PTW reaches FOC in FY33.

FY 2021 funding was realigned to 0303142A - SATCOM Ground Environment (SPACE) / 456 - MILSATCOM System Engineering to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Protected Tactical Waveform Modem Development	13.901	-	-
Description: Development of Protected Tactical Waveform modem incorporating tactical Army specific requirements.			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FI8 / *Protected Anti-JAM Tactical SATCOM*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: NCW-R Development ***Description:*** Development effort to provide bridging solution for Protected Anti-jam Tactical SATCOM. Software development to increase resiliency of fielded NCW waveforms and modems.	5.407	-	-
Title: COVID-19 Relief ***Description:*** Funding provided for COVID-19 relief efforts.	5.193	-	-
Accomplishments/Planned Programs Subtotals	24.501	-	-

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

This project funds advanced systems engineering, research, development, test and evaluation of emerging protected Satellite Communications technologies to provide resilience and anti-jam protection against Electronic Warfare (EW). The program will leverage contracts established by the Air Force for the development of Protected Tactical Waveform (PTW) modems, including development of a dual small form factor modem capable of running the PTW and Network Centric Waveform - Resilient (NCW-R), beginning in FY2020. Production and Fielding of the PTW modems will begin in FY2023 under the Protected Anti-JAM Tactical SATCOM procurement line (B34002).

This project also funds the development and testing of NCW-R software as a bridging solution to PTW. Funding supports the completion of development activities on existing contracts by 4QFY21, with software deployment beginning in 1QFY22.

Program funding was realigned to MILSATCOM System Engineering (0303142A/456) beginning in FY2021 to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / *SATCOM Ground Environment (SPACE)*	Project (Number/Name) FI8 / *Protected Anti-JAM Tactical SATCOM*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
COVID-19 Relief	TBD	PEO C3T : TBD	-	5.193		-		-		-		-	0.000	5.193	-
		Subtotal	-	5.193		-		-		-		-	0.000	5.193	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Protected Tactical Waveform Modem Development	C/IDIQ	Various : Various	-	13.901	Mar 2020	-		-		-		-	0.000	13.901	Continuing
NCW-R Development	SS/CPFF	PM WIN-T : Various	-	5.407	Aug 2020	-		-		-		-	0.000	5.407	-
		Subtotal	-	19.308		-		-		-		-	0.000	19.308	N/A

Remarks

Protected Tactical Satellite Development ($3,565K): Activity was not funded from this line in FY20. $3,565K was realigned to support PTW Modem development.

AEHF Protected SATCOM Terminal Prototype Development ($10,600K): Activity was not executed due to lack of requirements documentation. $5,407K re-allocated to provide funds for NCW-R Development. $5,193K re-allocated to provide funds for COVID-19 relief.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	24.501		0.000		-		-		-	0.000	24.501	N/A

Remarks

Program funding was realigned to 0303142A - SATCOM Ground Environment (SPACE) / 456 - MILSATCOM System Engineering to support Protected Anti-jam Tactical SATCOM development, engineering, test and evaluation beginning in FY2021.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FI8 / *Protected Anti-JAM Tactical SATCOM*

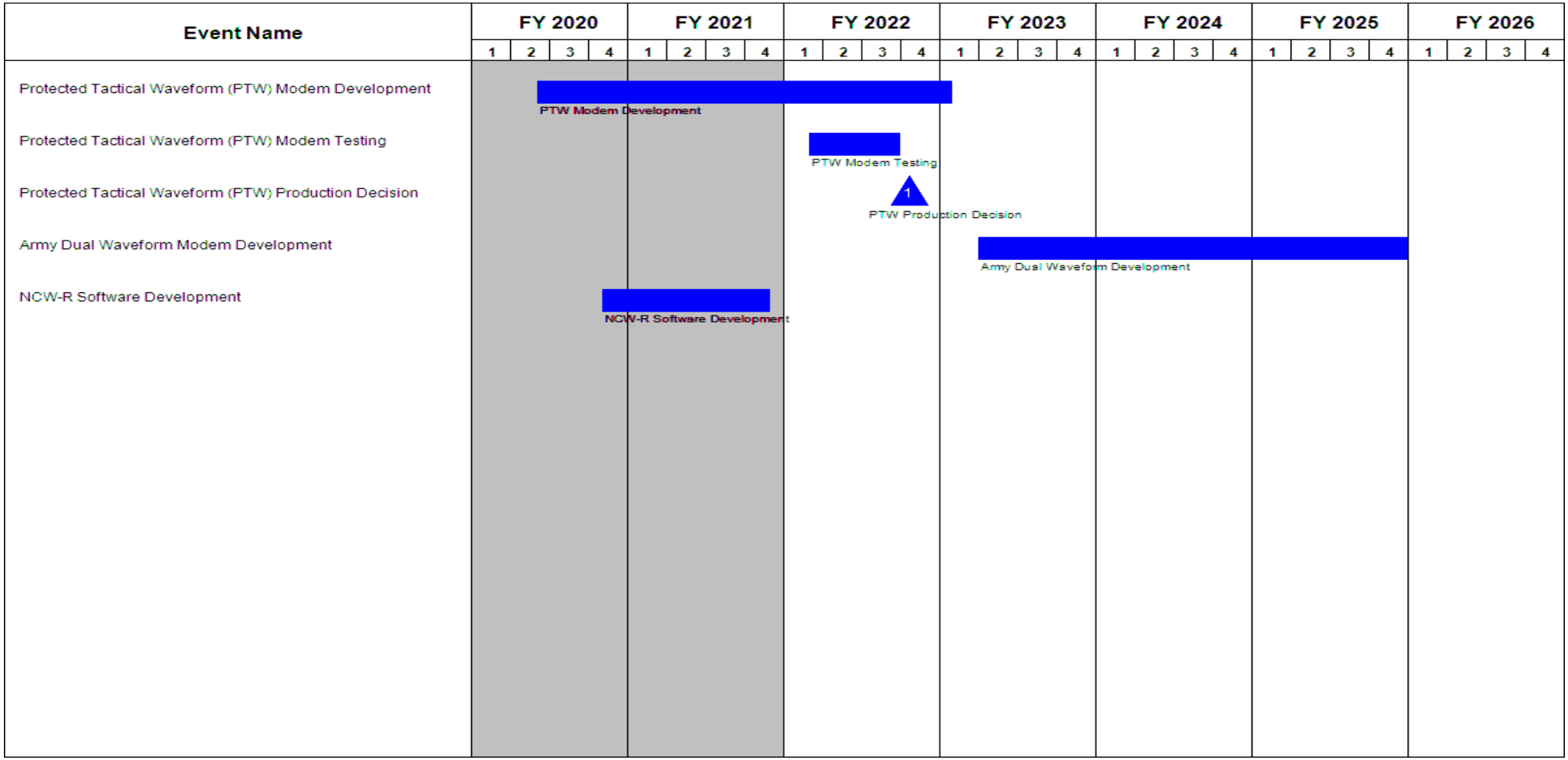


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1203142A / *SATCOM Ground Environment (SPACE)*	**Project (Number/Name)** FI8 / *Protected Anti-JAM Tactical SATCOM*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Protected Tactical Waveform (PTW) Modem Development	2	2020	1	2023
Protected Tactical Waveform (PTW) Modem Testing	1	2022	3	2022
Protected Tactical Waveform (PTW) Production Decision	4	2022	4	2022
Army Dual Waveform Modem Development	2	2023	4	2025
NCW-R Software Development	4	2020	4	2021

Note

PTW Modem Development dates updated based on current contract periods of performance from Mar 2020 - Oct 2022.

PTW Modem Test activities are scheduled to begin 2QFY22 through 4QFY22 to support a production decision in 4QFY22/1QFY23.

Protected Tactical Satellite (PTS) development activities were not funded under this line.

AEHF Development activities were not executed due to lack of requirements documentation.

NCW-R Development activities aligned with period of performance from Aug 2020 to Aug 2021.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 1208053A *I Joint Tactical Ground System*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	7.676	-	-	-	-	-	-	-	-	-	-
FE7: *Joint Tact Grd Station-P3I*	-	7.676	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Joint Tactical Ground Station (JTAGS) is a post-production, ACAT III program. JTAGS provides missile warning message data for the Air and Missile Defense (AMD) architecture and improves performance for Integrated Air and Missile Defense Fire Control Systems/Composite Army Air and Missile Defense Brigades. JTAGS disseminates near real time warning, alerting, and cueing information on ballistic missile launches and other tactical events of interest throughout the theater using existing communication networks, providing critical support to Combatant Commanders in their Areas of Responsibility (AOR). Four OCONUS deployed JTAGS units, which are deployed in three theaters (PACOM, CENTCOM, EUCOM), constitute DoD's only in-theater system providing space-based missile warning. The fifth CONUS system is used as an institutional trainer though is available as a deployable asset. JTAGS is designated as the in-theater element of the United States Strategic Command's Theater Event System (TES), supporting all Theater Missile Defense pillars, affording the shortest sensor to shooter connectivity. On 14 Jan 2016, the Army Acquisition Executive designated the JTAGS Pre-Planned Product Improvement (JTAGS P3I) program as a separate ACAT III modification program.

The JTAGS Program Element (PE) supports development and test to meet JTAGS Operational Requirement(s) Document (ORD) thresholds using improved sensors and algorithms as Pre-Planned Product Improvements (P3I). P3I Improvements upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improves warning tactical parameters and timeliness. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 1 is complete. JTAGS Block II Phase 2 activities are broken into three spirals to expedite delivering critical capabilities sooner. Developmental efforts to achieve JTAGS Block II CDD threshold requirements and implementation of M-Code GPS (IAW PL 111-383) continue through FY27.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	7.677	0.000	0.000	-	0.000
Current President's Budget	7.676	0.000	0.000	-	0.000
Total Adjustments	-0.001	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.001	-			
• SBIR/STTR Transfer	-	-			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1208053A / *Joint Tactical Ground Syst em*	Project (Number/Name) FE7 / *Joint Tact Grd Station-P3I*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FE7: *Joint Tact Grd Station-P3I*	-	7.676	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Tactical Ground Station (JTAGS) is a post-production, ACAT III program. JTAGS provides missile warning message data for the Air and Missile Defense (AMD) architecture and improves performance for Integrated Air and Missile Defense Fire Control Systems/Composite Army Air and Missile Defense Brigades. JTAGS disseminates near real time warning, alerting, and cueing information on ballistic missile launches and other tactical events of interest throughout the theater using existing communication networks, providing critical support to Combatant Commanders in their Areas of Responsibility (AOR). Four OCONUS deployed JTAGS units, which are deployed in three theaters (PACOM, CENTCOM, EUCOM), constitute DoD's only in-theater system providing space-based missile warning. The fifth CONUS system is used as an institutional trainer though is available as a deployable asset. JTAGS is designated as the in-theater element of the United States Strategic Command's Theater Event System (TES), supporting all Theater Missile Defense pillars, affording the shortest sensor to shooter connectivity. On 14 Jan 2016, the Army Acquisition Executive designated the JTAGS Pre-Planned Product Improvement (JTAGS P3I) program as a separate ACAT III modification program.

The JTAGS Program Element (PE) supports development and test to meet JTAGS Operational Requirement(s) Document (ORD) thresholds using improved sensors and algorithms as Pre-Planned Product Improvements (P3I). P3I Improvements upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improves warning tactical parameters and timeliness. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 1 is complete. JTAGS Block II Phase 2 activities are broken into three spirals to expedite delivering critical capabilities sooner. Developmental efforts to achieve JTAGS Block II CDD threshold requirements and implementation of M-Code GPS (IAW PL 111-383) continue through FY27.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: JTAGS Test and Evaluation Support ***Description:*** Test and evaluation support for the JTAGS P3I Block II program	0.504	-	-
Title: JTAGS Block II Phase 2 ***Description:*** JTAGS Block II Phase 2 activities are broken into three spirals to expedite getting critical capabilities fielded sooner. Spiral 1 delivers stereo SBIRS Geosynchronous staring sensor capabilities and SBIRS HEO Pseudo-Link 4 (P/L 4) data. Spiral 2 delivers Cobra Brass and emerging threats data and Missile Defense System Exerciser (MDSE) capabilities (FY 2018-2021). Spiral 3 delivers software tuning and testing to the Operational Requirements Document (ORD) (FY2019-23). JROC-Memos 197-12 and 113-13 supports the need to develop and field JTAGS Block II capabilities as soon as possible.	7.172	-	-
Accomplishments/Planned Programs Subtotals	7.676	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1208053A / *Joint Tactical Ground System*	**Project (Number/Name)** FE7 / *Joint Tact Grd Station-P3I*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• BZ8420: *JOINT TACTICAL GROUND STATION MODS (JTAGS)*	-	-	8.088	-	8.088	-	-	-	-	-	-
• 0208053A: *Joint Tactical Ground System*	-	9.510	13.379	-	13.379	-	-	-	-	-	-

Remarks

In FY 2021, funding has been moved from PE 1208053A to PE 0208053A to correctly align Major Force Program, National Security Space (MFP 12) resources.

D. Acquisition Strategy

This program element develops critical software intensive improvements, while continuing to make maximum use of Non-Developmental Items (NDI)/Commercial Off-The-Shelf (COTS) components and Government Furnished Equipment (GFE). After design and integration, the system will be subject to thorough developmental and validation/verification testing to verify performance, operational effectiveness and suitability. P3I Improvements will upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, improving warning tactical parameters and timeliness. The acquisition of the JTAGS Block II effort is being performed under contract W9113M-12-C-0055, awarded 23 Aug 2012. The contract's development efforts are Cost Plus Incentive Fee (CPIF), and the contract's production is Firm Fixed Price (FFP).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1208053A / *Joint Tactical Ground System*	Project (Number/Name) FE7 / *Joint Tact Grd Station-P3I*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Allot	Various : Redstone Arsenal AL	3.879	1.161	Oct 2019	-		-		-		-	Continuing	Continuing	-
		Subtotal	3.879	1.161		-		-		-		-	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
JTAGS P3I Block II Phase 2 Development	Option/ CPIF	Northrop Grumman : Colorado Springs Co	8.339	4.634	Dec 2019	-		-		-		-	Continuing	Continuing	-
		Subtotal	8.339	4.634		-		-		-		-	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	C/CPFF	TBD : Huntsville AL	2.711	1.377	Feb 2020	-		-		-		-	Continuing	Continuing	-
		Subtotal	2.711	1.377		-		-		-		-	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support (ATEC/AIC/ JITC)	Various	Various : Various	2.699	0.504	Dec 2019	-		-		-		-	Continuing	Continuing	-
		Subtotal	2.699	0.504		-		-		-		-	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1208053A / *Joint Tactical Ground System*	Project (Number/Name) FE7 / *Joint Tact Grd Station-P3I*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	17.628	7.676		0.000		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1208053A / *Joint Tactical Ground System*	**Project (Number/Name)** FE7 / *Joint Tact Grd Station-P3I*

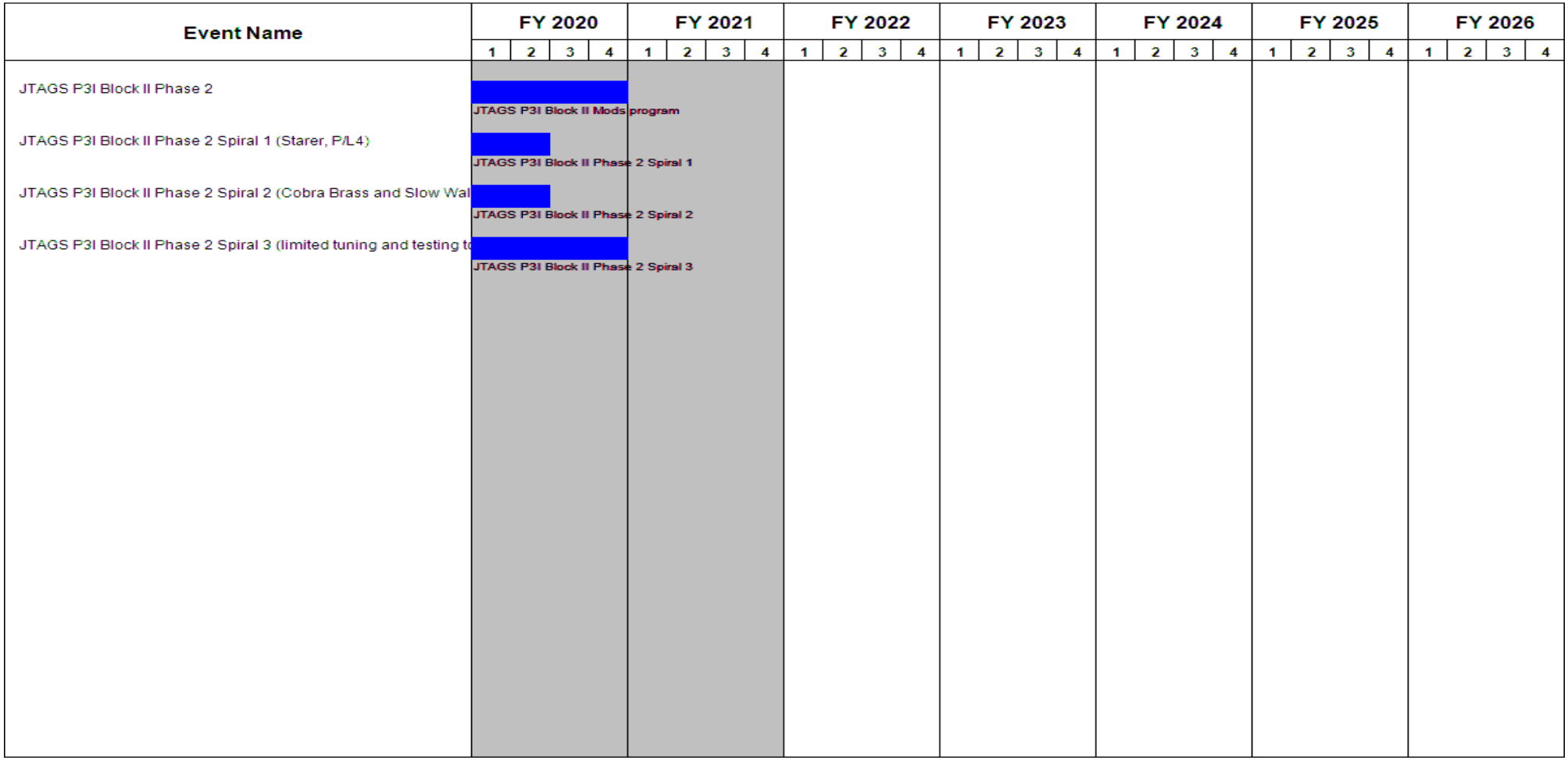


Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 7	**R-1 Program Element (Number/Name)** PE 1208053A / *Joint Tactical Ground System*	**Project (Number/Name)** FE7 / *Joint Tact Grd Station-P3I*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
JTAGS P3I Block II Phase 2	4	2015	4	2020
JTAGS P3I Block II Phase 2 Spiral 1 (Starer, P/L4)	4	2015	2	2020
JTAGS P3I Block II Phase 2 Spiral 2 (Cobra Brass and Slow Walkers)	4	2017	2	2020
JTAGS P3I Block II Phase 2 Spiral 3 (limited tuning and testing to ORD)	3	2018	4	2020

Note

JTAGS P3I program continues after FY20 under PE 0208053A