

UNCLASSIFIED

**Department of Defense
Fiscal Year (FY) 2020 Budget Estimates**

March 2019



Army

Justification Book of

Research, Development, Test & Evaluation, Army

RDT&E – Volume III, Budget Activity 7

UNCLASSIFIED

UNCLASSIFIED

Army • Budget Estimates FY 2020 • RDT&E Program

Table of Contents

Introduction and Explanation of Contents..... ii

Comptroller Exhibit R-1..... xiii

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

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

Exhibit R-2s..... 1

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, \$12,396,895,000.00 to remain available for obligation until September 30, 2021.

OCO for Direct War Costs (\$182,624,000.00): Direct War costs are those combat or direct combat support costs that will not continue to be expended once combat operations end at major contingency locations.

OCO for Enduring Requirements (\$21,500,000.00): OCO for Enduring Requirements are enduring in-theater and in-CONUS costs that will likely remain after combat operations cease, and have previously been funded in OCO.

COST STATEMENT

The following Justification Books were prepared at a cost of \$366,803: 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 6, and Budget Activity 7.

UNCLASSIFIED
FY 2020 RDT&E, ARMY PROGRAM ELEMENT DESCRIPTIVE SUMMARIES
Introduction and Explanation of Contents

1. **General.** The purpose of this document is to provide summary information concerning the Research, Development, Test and Evaluation, Army program. The descriptive summaries are comprised of R-2 (Army RDT&E Budget Item Justification – program element level), R-2A (Army RDT&E Budget Item Justification – project level), R-3 (Army RDT&E Cost Analysis), R-4 (Schedule Profile Detail) and R-5 (Termination Liability Funding for MDAPs) Exhibits, which provide narrative information on all RDT&E program elements and projects through FY 2020.

2. **Relationship of the FY 2020 Budget Submitted to Congress to the FY 2019 Budget Submitted to Congress.** This paragraph provides a list of program elements/projects that are major new starts, restructures, developmental transitions, and terminated programs. Explanations for these changes can be found in the narrative sections of the Program Element R-2A Exhibits.

New Start Programs:

<i>Budget Activity</i>	<i>OSDPE / Project</i>	<i>Project Title</i>
02	0602145A / BJ9	Autonomous Mobility Tech
02	0602145A / BK2	Virtual Prototyping Technology
02	0602145A / BK3	Next Gen Intelligent Fire Control (NG-IFC) Tech
02	0602145A / BK5	Adv Direct In-Direct Armament Sys (ADIDAS) Tech
03	0603002A / MM7	Enabling Med Cap to Support Dispersed OPS Adv Tech
04	0603619A / BU5	Standoff Volcano Obstacle (SAVO) Adv Tech
04	0603639A / EU3	.50 Caliber All-Purpose Tactical Cartridge (APTC)
04	0603774A / VT8	SOLDIER PRECISION TARGETING DEVICES - ADV DEV
04	0603827A / CF2	Integrated Soldier Systems Prototyping (SL CFT)
04	0604021A / AW7	Electronic Warfare Technology Maturation (MIP)
04	0604115A / AX8	Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)
04	0604115A / AX9	Adv Mobility Experimental Prototype Adv Tech
04	0604115A / AY1	MUM-T Platform Enabler
04	0604115A / AY2	Army Operational Fires
04	0604115A / AY3	Strategic Long Range Cannon
04	0604182A / HX1	Land-Based Hypersonic Missile

04	0604403A / FM3	Future Interceptor
04	0604541A / BT1	Interoperability
04	0604541A / BT2	Command Post Mobility/Survivability
04	0604541A / BT3	Common Operating Environment (COE)
04	0604541A / BT4	Network Technology Maturation Initiatives (NTMI)
04	0604541A / BT5	Integrated Tactical Network/Enterprise Network
04	0604644A / MR1	Mobile Medium Range Missile
05	0604601A / CF3	Integrated Soldier Systems (SL CFT)
05	0604802A / EP2	Shoulder-Launched Munitions
05	0604827A / FK4	Soldier Borne Sensor (SBS)
05	0604854A / HB6	Mobile Howitzer
05	0605041A / CY5	CYBER Situational Understanding
05	0605625A / CF6	Next Generation Combat Vehicle (NGCV)
07	0205778A / EG2	GMLRS Alternative Warheads
07	0607145A / FD5	Apache Product Improvement
07	1203142A / FI8	Protected Anti-JAM Tactical SATCOM

Program Element/Project Restructures:

<u>Budget Activity</u>	<u>Old OSDPE / Project: Title</u>	<u>New OSDPE / Project</u>
01	0601101A / 91A: ILIR-AMC	0601102A / AA1
01	0601101A / F16: ILIR-SMDC	0601102A / AA2
01	0601102A / 305: ATR Research	0601102A / AA9
01	0601102A / 31B: Infrared Optics Rsch	0601102A / AA8
01	0601102A / 52C: Mapping & Remote Sens	0601102A / AB2
01	0601102A / 53A: Battlefield Env & Sig	0601102A / AA7
01	0601102A / 74A: Human Engineering	0601102A / AA4
01	0601102A / 74F: Pers Perf & Training	0601102A / AA4

01	0601102A / ET6: BASIC RESCH IN CLINICAL & REHABILITATIVE MED	0601102A / AB1
01	0601102A / F20: Adv Propulsion Rsch	0601102A / AA6
01	0601102A / F22: Rsch In Veh Mobility	0601102A / AA6
01	0601102A / H42: Materials & Mechanics	0601102A / AA7
01	0601102A / H43: Research In Ballistics	0601102A / AA7
01	0601102A / H44: Adv Sensors Research	0601102A / AA5, AA7, & AA8
01	0601102A / H45: Air Mobility	0601102A / AA6
01	0601102A / H47: Applied Physics Rsch	0601102A / AA9
01	0601102A / H48: Battlespace Info & Comm Rsc	0601102A / AA9
01	0601102A / H52: Equip For The Soldier	0601102A / AA8
01	0601102A / H57: Single Investigator Basic Research	0601102A / AA3
01	0601102A / H66: Adv Structures Rsch	0601102A / AA6
01	0601102A / H67: Environmental Research	0601102A / AA7
01	0601102A / S13: Sci BS/Med Rsh Inf Dis	0601102A / AB1
01	0601102A / S14: Sci BS/Cbt Cas Care Rs	0601102A / AB1
01	0601102A / S15: Sci BS/Army Op Med Rsh	0601102A / AB1
01	0601102A / T22: Soil & Rock Mech	0601102A / AB2
01	0601102A / T23: Basic Res Mil Const	0601102A / AB2
01	0601102A / T24: Signature Physics And Terrain State Basic Research	0601102A / AB2
01	0601102A / T25: Environmental Science Basic Research	0601102A / AB2
01	0601102A / T63: Robotics Autonomy, Manipulation, & Portability Rsh	0601102A / AA6
01	0601102A / T64: Sci BS/System Biology And Network Science	0601102A / AB1
01	0601102A / VR9: Surface Science Research	0601102A / AA7
01	0601103A / D55: University Research Initiative	0601103A / AB3
01	0601104A / EA6: Cyber Collaborative Research Alliance	0601104A / AB7
01	0601104A / F17: Neuroergonomics Collaborative Technology Alliance	0601104A / AB7
01	0601104A / FF5: Distributed Collaborative Intelligent Systems CTA	0601104A / AB7
01	0601104A / FF7: Internet of Battlefield Things CTA	0601104A / AB7
01	0601104A / H04: HBCU/MI Programs	0601104A / AB4

01	0601104A / H05: Institute For Collaborative Biotechnologies	0601104A / AB7 & AB4
01	0601104A / H59: International Tech Centers	0601104A / AC6
01	0601104A / H73: Automotive Research Center (ARC)	0601104A / AB4
01	0601104A / J08: Institute For Creative Technologies (ICT)	0601104A / AB4
01	0601104A / J12: Institute For Soldier Nanotechnology (ISN)	0601104A / AB4
01	0601104A / J14: Army Educational Outreach Program	0601104A / AB8
01	0601104A / J15: Network Sciences ITA	0601104A / AB7
01	0601104A / J17: Vertical Lift Research Center Of Excellence	0601104A / AB4
01	0601104A / VS2: Multi-Scale Materials Modeling Centers	0601104A / AB7
01	0601104A / VS3: Center For Quantum Science Research	0601104A / AB7
02	0602105A / H84: Materials	0602141A / AH8, 0602143A / AZ5 & BE6, 0602145A / BI4
02	0602105A / XW4: Manufacturing Science	0602144A / BL1
02	0602120A / H16: S3I Technology	0602145A / BI2, 0602146A / AP5 & AR1, 0602148A / AL8, 0602150A / AD5
02	0602120A / TS1: Tactical Space Research	0602146A / AO5
02	0602120A / TS2: Robotics Technology	0602145A / BF8
02	0602211A / 47A: AERON & ACFT Wpns Tech	0602148A / AJ6, AJ4, AJ8, AM2, AI7, AK2, AL2, AI5, AJ2, AK1
02	0602211A / 47B: Veh Prop & Struct Tech	0602148A / AK9, AL5, AI9, AL4
02	0602270A / 906: Tactical Electronic Warfare Applied Research	0602146A / AN7, AO2, 0602148A / AK2
02	0602270A / CYB: Applied Offensive Cyber	0602146A / AQ3
02	0602303A / 214: Missile Technology	0602147A / AF8, AF3, AG2, AE7, AG1, AG9, AF9, AF5, AH2, AF6, AF7, 0602148A / AK4, 0602150A / AD3, AD7
02	0602307A / 042: High Energy Laser Technology	0602150A / AC9
02	0602308A / C90: Advanced Distributed Simulation	0602143A / BC3, BE8, 0602145A / BF6
02	0602308A / D02: Modeling & Simulation For Training And Design	0602143A / BE8
02	0602601A / C05: Armor Applied Research	0602145A / BG6, BH9
02	0602601A / H77: National Automotive Center	0602145A / BJ3, BI9
02	0602601A / H91: Ground Vehicle Technology	0602145A / BF1, BF3, BF6, BH7, BH5
02	0602618A / H80: Survivability And Lethality Technology	0602141A / AH5, AH6, AH7, 0602143A / AY6, 0602145A / BG6, 0602147A / AH4
02	0602622A / 552: Smoke/Novel Effect Mun	0602144A / BL2, 0602145A / BG8

02	0602623A / H21: Jt Svc Sa Prog (JSSAP)	0602143A / AY6
02	0602624A / H18: Weapons & Munitions Technologies	0602147A / AG6, AG4, BN4, 0602148A / AK6
02	0602624A / H28: Warheads/Energetics Technologies	0602145A / AH9, 0602147A / AG8, AG6, 0602148A / AK2
02	0602705A / EM8: High Power And Energy Component Technology	0602145A / BH7, 0602146A / AP4, AO2, 0602150A / AD2
02	0602705A / H11: Tactical And Component Power Technology	0602143A / BD8, 0602148A / AM4
02	0602705A / H94: Elec & Electronic Dev	0602144A / BL1, 0602146A / AV9, AO4, AV5, 0602148A / AK2
02	0602709A / H95: Night Vision And Electro-Optic Technology	0602143A / BD1, 0602145A / BH2, BF9, BJ2, 0602148A / AK2
02	0602712A / H24: Countermine Tech	0602143A / BD1, 0602144A / BL4, 0602145A / BJ7
02	0602712A / H35: Camouflage & Counter-Recon Tech	0602145A / BI2
02	0602716A / H70: Human Fact Eng Sys Dev	0602143A / AY6, BB7, BC3, BE8, 0602145A / BF6
02	0602720A / 048: Ind Oper Poll Ctrl Tec	0602144A / BK7
02	0602720A / 835: Mil Med Environ Crit	0602146A / AR5
02	0602720A / 896: Base Fac Environ Qual	0602146A / AR5
02	0602782A / 779: Command, Control And Platform Electronics Tech	0602146A / AV6, AW1, AQ9, AW3, AW5
02	0602782A / CY2: Applied Defensive Cyber	0602146A / AP1, AO8
02	0602782A / H92: Communications Technology	0602143A / AN1, 0602146A / AP7, AM6, AN3, AM8, AN5, AO2, AN9
02	0602783A / Y10: Computer/Info Sci Tech	0602146A / AP3
02	0602784A / 855: Topographical, Image Intel & Space	0602146A / AU5, AU3, AT7, AT9
02	0602784A / H71: Meteorological Research For Battle Command	0602146A / AV7
02	0602784A / T40: Mob/Wpns Eff Tech	0602144A / BL7, BL9, 0602145A / BF1, BG2, 0602146A / AR9, AT2, 0602150A / AE2
02	0602784A / T41: Mil Facilities Eng Tec	0602144A / BK7
02	0602784A / T42: Terrestrial Science Applied Research	0602146A / AT7
02	0602784A / T45: Energy Tec Apl Mil Fac	0602144A / BK7
02	0602786A / H98: Clothing & Equipm Tech	0602143A / AZ2, AZ9, BB4, BB5, BB9, BC2, BC6, BD6
02	0602786A / H99: Joint Service Combat Feeding Technology	0602143A / BE3
02	0602786A / XW5: Small Unit Expeditionary Maneuver Technology	0602143A / BE1, BE3, BR9
02	0602787A / 869: Warfighter Health Prot & Perf Stnds	0602787A / MK4
02	0602787A / 870: Dod Med Def Ag Inf Dis	0602787A / MM8
02	0602787A / 874: Cbt Casualty Care Tech	0602787A / MM4

02	0602787A / ET4: Appl Resch in Clinical and Rehabilitative Medicine	0602787A / MN1
02	0602787A / XV5: Medical Capabilities to Support Dispersed Ops	0602787A / MM6
03	0603001A / 242: Airdrop Equipment	0603118A / BE5
03	0603001A / C07: Joint Service Combat Feeding Tech Demo	0603118A / BE2
03	0603001A / FF6: Individual Protection	0603118A / AY9, AZ6, AZ8, BB3
03	0603001A / J50: Future Warrior Technology Integration	0603118A / BB6, BC1, BC4, BD7, BD9, BB8
03	0603001A / XW6: Small Unit Expeditionary Maneuver	0603118A / BE5
03	0603002A / 810: Ind Base Id Vacc&Drug	0603002A / MN8, MM9, MO9
03	0603002A / 840: Combat Injury Mgmt	0603002A / MO4, MN3, MO7, MN5, MM5, MO2
03	0603002A / MM3: Warfighter Medical Protection & Performance	0603002A / MN6, MO8, MN9, MO3, MN7, MG4
03	0603003A / 313: Adv Rotarywing Veh Tech	0603465A / AI4, AI6, AJ3, AJ5, AJ9, AK3, AK8, AL6 AL9, & AM3
03	0603003A / 436: Rotarywing MEP Integ	0603465A / AL1
03	0603003A / 447: ACFT Demo Engines	0603465A / AI8 & AJ1
03	0603004A / 232: Advanced Lethality & Survivability Demo	0603118A / AY7, 0603462A / BF5, BG5, BI1, BK4, BK6, 0603464A / AE6, AG3, AG5, AG7, 0603465A / AK7
03	0603004A / L96: High Energy Laser Technology Demo	0603466A / AD1
03	0603004A / L97: Smoke And Obscurants Advanced Technology	0603119A / BL3, 0603462A / BG7, BG9
03	0603005A / 221: Combat Veh Survivably	0603462A / BG7, BH1, BI1, BI5
03	0603005A / 441: Combat Vehicle Mobilty	0603119A / BK9, 0603462A / BF7, BG4, BH6, BI8, BJ1, BJ6
03	0603005A / 497: Combat Vehicle Electro	0603462A / BH8
03	0603005A / 515: Robotic Ground Systems	0603462A / BF2, BF4, BK1
03	0603006A / 592: Space Application Tech	0603463A / AO6
03	0603015A / S29: Modeling & Simulation - Adv Tech Dev	0603118A / BC8, BE9
03	0603015A / S31: Modeling And Simulation Infrastructure Technology	0603118A / BC4, BC8, BE9
03	0603125A / DF5: Agile Integration & Demonstration	0602145A / BH5, BI4
03	0603125A / DW4: Energy Technologies (Congressional Adds (CAs))	0602145A / BH5, BI4
03	0603270A / CY3: Offensive Cyber Operations Mirror Adv Tech	0603463A / AQ4
03	0603270A / K15: Advanced Comm Ecm Demo	0603463A / AN8, AO7, AO3, AO1
03	0603270A / K16: Non-Commo Ecm Tech Dem	0603465A / AK3, 0603462A / BG7, 0603463A / AO1
03	0603313A / 206: Missile Simulation	0603464A / AF4

03	0603313A / 263: Future Msl Tech Integr(FMTI)	0603464A / AE8, AE9, AH3, BS3, 0603462A / BG7
03	0603313A / 704: Advanced Missile Demo	0603466A / AC8 & AD4, 0603465A / AK5
03	0603606A / 608: Countermine & Bar Dev	0603118A / BC9, 0603462A / BJ8
03	0603606A / 683: Area Denial Sensors	0603462A / BG1
03	0603607A / 627: Jt Svc Sa Prog (JSSAP)	0603118A / AY5
03	0603710A / K70: Night Vision Adv Tech	0603118A / BC9, 0603462A / BI3, BG1, 0603463A / AQ5
03	0603710A / K86: Night Vision, Abn Sys	0603465A / AK3, AL6, AL7
03	0603728A / 002: Environmental Compliance Technology	0603119A / BK8
03	0603728A / 03E: Environmental Restoration Technology	0603119A / BM1, 0603463A / AR4, AR6
03	0603734A / T08: Combat Eng Systems	0603119A / BL6, BL8, BM1, 0603462A / BG3, 0603463A / AS9, AU6, AU4, AT8, AT3, AU1, 0603466A / AE3
03	0603772A / 101: Tactical Command and Control	0603462A / BH3, 0603463A / AW2, AW4, AR2, AV8
03	0603772A / 243: Sensors And Signals Processing	0603466A / AD6
03	0603794A / EL4: Tactical Comms and Networking Technology Int	0603463A / AP6, AP8, AM7, AP9, AN4, AN6, AO3, AQ1, AO1
03	0603794A / EL5: Secure Tactical Information Integration	0603463A / AP2, AO9
04	0603774A / VT7: Soldier Maneuver Sensors - Adv Dev	0603774A / BQ5
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	0604319A / DU3: IFPC2	0605052A / EY7
05	0604710A / L67: Soldier Night Vision Devices	0604710A / BQ6
05	0604798A / FG7: Emerging Technology Initiatives	0605054A / FI3
05	0605013A / 738: AcqBiz	0605013A / FL9
05	0605053A / FB8: Soldier Borne Sensor (SBS)	0604827A / FK4
06	0604256A / 976: Army Threat Sim (ATS)	0604759A / FF1
07	0205402A / EF2: Integrated Base Defense	0604785A / DS4

Program Terminations:

<u>Budget Activity</u>	<u>OSDPE / Project</u>	<u>OSDPE Title / Project Title</u>
01	0601103A / V72	University Research Initiatives / Minerva
01	0601104A / H09	University and Industry Research Centers / Robotics CTA
01	0601104A / H50	University and Industry Research Centers / Network Sciences Cta
02	0602105A / H7G	Materials Technology / Nanomaterials Applied Research
02	0602120A / SA2	Sensors and Electronic Survivability / Biotechnology Applied Research
02	0602624A / H19	Weapons and Munitions Technology / Asymmetric & Counter Measure Technologies
02	0602705A / H17	Electronics and Electronic Devices / Flexible Display Center
02	0602720A / 895	Environmental Quality Technology / Pollution Prevention
02	0602786A / 283	Warfighter Technology / Airdrop Adv Tech
02	0602786A / VT4	Warfighter Technology / Expeditionary Mobile Base Camp Technology
03	0603001A / 543	Warfighter Advanced Technology / Ammunition Logistics
03	0603001A / VT5	Warfighter Advanced Technology / Expeditionary Mobile Base Camp Demonstration
03	0603002A / ET5	Medical Advanced Technology / Adv Tech Dev in Clinical & Rehabilitative Medicine
03	0603728A / 025	Environmental Quality Technology Demonstrations / Pollution Prevention Technology
04	0603619A / 606	Landmine Warfare and Barrier - Adv Dev / Cntrmn/Barrier Adv Dev
04	0603639A / EL8	Tank and Medium Caliber Ammunition / LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER
04	0603804A / EW8	Logistics and Engineer Equipment - Adv Dev / Armored Engineer Vehicles
04	0603804A / K39	Logistics and Engineer Equipment - Adv Dev / Field Sustainment Support Ad
04	0603804A / K41	Logistics and Engineer Equipment - Adv Dev / Water And Petroleum Distribution - Ad
04	0603804A / VR8	Logistics and Engineer Equipment - Adv Dev / Combat Service Support Systems - Ad
04	0604020A / CF1	Cross Functional Team (CFT) Advanced Development & Prototyping / CFT Advanced Development & Prototyping
04	0604115A / DS3	Technology Maturation Initiatives / Technology Maturation Initiatives
04	1206308A / FE6	Army Space Systems Integration / Army Space System Enhancement/Integration
05	0210609A / ED8	Paladin Integrated Management (PIM) / Paladin Integrated Management (PIM)
05	0604321A / B41	All Source Analysis System / CI/HUMINT Software Products (MIP)
05	0604321A / B51	All Source Analysis System / Machine - Foreign Language Translation System
05	0604601A / S62	Infantry Support Weapons / Counter-Defilade Target Engagement - SDD

05	0604601A / S70	Infantry Support Weapons / Personnel Recovery Support System (PRSS)
05	0604622A / E50	Family of Heavy Tactical Vehicles / TRAILER DEVELOPMENT
05	0604713A / EL2	Combat Feeding, Clothing, and Equipment / Army Field Feeding Equipment
05	0604741A / FG5	Air Defense Command, Control and Intelligence - Eng Dev / Counter Unmanned Aerial Systems (UAS)
05	0604768A / P01	Brilliant Anti-Armor Submunition (BAT) / MULTI - MODE SEEKER DEVELOPMENT AND TEST
05	0604780A / 571	Combined Arms Tactical Trainer (CATT) Core / Close Cbt Tact Trainer
05	0604780A / 577	Combined Arms Tactical Trainer (CATT) Core / Gaming Technology In Support Of Army Training
05	0604780A / 585	Combined Arms Tactical Trainer (CATT) Core / Aviation Combined Arms Tactical Trainer
05	0604804A / EC9	Logistics and Engineer Equipment - Eng Dev / Contingency Basing Infrastructure
05	0604804A / H01	Logistics and Engineer Equipment - Eng Dev / Combat Engineer Eq Ed
05	0604804A / H14	Logistics and Engineer Equipment - Eng Dev / Materials Handling Equipment - Ed
05	0604804A / VR7	Logistics and Engineer Equipment - Eng Dev / Combat Service Support Systems
05	0604818A / 334	Army Tactical Command & Control Hardware & Software / Common Software
05	0604823A / L87	Firefinder / Hypervelocity Armament System (HAS)
05	0604827A / EY3	Soldier Systems - Warrior Dem/Val / Soldier Power Generator
05	0605013A / FE9	Information Technology Development / ALTESS (P&R Forms)
05	0605029A / EQ2	Integrated Ground Security Surveillance Response Capability (IGSSR-C) / IntegGrdSecSurvRespC(IGSSR-C)
05	0605037A / EQ6	Evidence Collection and Detainee Processing / Evidence Collection and Detainee Processing
05	0605380A / EG6	AMF Joint Tactical Radio System (JTRS) / Small Airborne Networking Radio (SANR)
06	0303260A / FA9	Defense Military Deception Initiative / Security Initiatives
06	0604759A / 986	Major T&E Investment / Major Operational Test Instrumentation
06	0604759A / FA4	Major T&E Investment / Warrior Injury Assessment Manikin (WIAMan)
06	0605803A / 720	Technical Information Activities / Tech Info Func Actv
06	0605803A / 730	Technical Information Activities / Pers & Trng Analys Act
06	0605803A / C16	Technical Information Activities / FAST
06	0605803A / C18	Technical Information Activities / BAST
07	0203735A / 431	Combat Vehicle Improvement Programs / M113 IMPROVEMENTS
07	0203735A / FD8	Combat Vehicle Improvement Programs / Light Armored Vehicle Improvement
07	0203740A / 484	Maneuver Control System / Maneuver Control System
07	0203801A / DT5	Missile/Air Defense Product Improvement Program / Stinger Product Improvement

07	0203802A / 788	Other Missile Product Improvement Programs / ATACMS PIP
07	0205410A / EE9	Materials Handling Equipment / Material Handling Equipment - Advance Development
07	0303140A / FF8	Information Systems Security Program / Unit Activity Monitoring (UAM)
07	0303150A / EA5	WWMCCS/Global Command and Control System / Strategic and Joint Mission Command
07	0305219A / MQ1	MQ-1 Gray Eagle UAV / MQ-1 Gray Eagle - Army UAV (MIP)
07	0607135A / ES2	Apache Product Improvement Program / Apache Product Improvement Program
07	0607140A / ES7	Emerging Technologies from NIE / Emerging Technologies from NIE
07	0607665A / DT2	Family of Biometrics / Non-MIP Biometrics

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

UNCLASSIFIED

Department of Defense
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

<u>Appropriation</u>	<u>FY 2018</u> <u>(Base + OCO)</u>	<u>FY 2019</u> <u>Base Enacted</u>	<u>FY 2019</u> <u>OCO Enacted</u>	<u>FY 2019</u> <u>Total Enacted</u>
Research, Development, Test & Eval, Army	11,633,461	11,074,556	300,604	11,375,160
Total Research, Development, Test & Evaluation	11,633,461	11,074,556	300,604	11,375,160

UNCLASSIFIED

Department of Defense
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

Appropriation	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
Research, Development, Test & Eval, Army	12,192,771		204,124	204,124	12,396,895
Total Research, Development, Test & Evaluation	12,192,771		204,124	204,124	12,396,895

UNCLASSIFIED

Department of Defense
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

<u>Summary Recap of Budget Activities</u>	<u>FY 2018 (Base + OCO)</u>	<u>FY 2019 Base Enacted</u>	<u>FY 2019 OCO Enacted</u>	<u>FY 2019 Total Enacted</u>
Basic Research	464,187	506,444		506,444
Applied Research	1,342,832	1,578,725		1,578,725
Advanced Technology Development	1,503,959	1,585,778		1,585,778
Advanced Component Development & Prototypes	1,563,615	1,264,647	4,000	1,268,647
System Development & Demonstration	3,349,488	2,965,361	236,863	3,202,224
RDT&E Management Support	1,579,102	1,438,536		1,438,536
Operational Systems Development	1,830,278	1,735,065	59,741	1,794,806
Total Research, Development, Test & Evaluation	11,633,461	11,074,556	300,604	11,375,160
<u>Summary Recap of FYDP Programs</u>				
General Purpose Forces	668,082	666,757	10,000	676,757
Intelligence and Communications	401,118	252,771	40,613	293,384
Research and Development	10,369,821	9,830,755	249,991	10,080,746
Central Supply and Maintenance	118,410	108,696		108,696
Administration and Associated Activities	654			
Space	68,222	209,622		209,622
Classified Programs	7,154	5,955		5,955
Total Research, Development, Test & Evaluation	11,633,461	11,074,556	300,604	11,375,160

UNCLASSIFIED

Department of Defense
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
<u>Summary Recap of Budget Activities</u>					
Basic Research	454,980				454,980
Applied Research	893,990				893,990
Advanced Technology Development	1,099,564				1,099,564
Advanced Component Development & Prototypes	2,929,355		17,114	17,114	2,946,469
System Development & Demonstration	3,549,431		111,917	111,917	3,661,348
RDT&E Management Support	1,286,625		1,875	1,875	1,288,500
Operational Systems Development	1,978,826		73,218	73,218	2,052,044
Total Research; Development, Test & Evaluation	12,192,771		204,124	204,124	12,396,895
<u>Summary Recap of FYDP Programs</u>					
General Purpose Forces	866,366				866,366
Intelligence and Communications	257,681		76,418	76,418	334,099
Research and Development	10,659,601		127,706	127,706	10,787,307
Central Supply and Maintenance	59,848				59,848
Administration and Associated Activities					
Space	342,002				342,002
Classified Programs	7,273				7,273
Total Research, Development, Test & Evaluation	12,192,771		204,124	204,124	12,396,895

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

<u>Summary Recap of Budget Activities</u>	<u>FY 2018</u> <u>(Base + OCO)</u>	<u>FY 2019</u> <u>Base Enacted</u>	<u>FY 2019</u> <u>OCO Enacted</u>	<u>FY 2019</u> <u>Total Enacted</u>
Basic Research	464,187	506,444		506,444
Applied Research	1,342,832	1,578,725		1,578,725
Advanced Technology Development	1,503,959	1,585,778		1,585,778
Advanced Component Development & Prototypes	1,563,615	1,264,647	4,000	1,268,647
System Development & Demonstration	3,349,488	2,965,361	236,863	3,202,224
RDT&E Management Support	1,579,102	1,438,536		1,438,536
Operational Systems Development	1,830,278	1,735,065	59,741	1,794,806
Total Research, Development, Test & Evaluation	11,633,461	11,074,556	300,604	11,375,160
<u>Summary Recap of FYDP Programs</u>				
General Purpose Forces	668,082	666,757	10,000	676,757
Intelligence and Communications	401,118	252,771	40,613	293,384
Research and Development	10,369,821	9,830,755	249,991	10,080,746
Central Supply and Maintenance	118,410	108,696		108,696
Administration and Associated Activities	654			
Space	68,222	209,622		209,622
Classified Programs	7,154	5,955		5,955
Total Research, Development, Test & Evaluation	11,633,461	11,074,556	300,604	11,375,160

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)
<u>Summary Recap of Budget Activities</u>					
Basic Research	454,980				454,980
Applied Research	893,990				893,990
Advanced Technology Development	1,099,564				1,099,564
Advanced Component Development & Prototypes	2,929,355		17,114	17,114	2,946,469
System Development & Demonstration	3,549,431		111,917	111,917	3,661,348
RDT&E Management Support	1,286,625		1,875	1,875	1,288,500
Operational Systems Development	1,978,826		73,218	73,218	2,052,044
Total Research, Development, Test & Evaluation	12,192,771		204,124	204,124	12,396,895
<u>Summary Recap of FYDP Programs</u>					
General Purpose Forces	866,366				866,366
Intelligence and Communications	257,681		76,418	76,418	334,099
Research and Development	10,659,601		127,706	127,706	10,787,307
Central Supply and Maintenance	59,848				59,848
Administration and Associated Activities					
Space	342,002				342,002
Classified Programs	7,273				7,273
Total Research, Development, Test & Evaluation	12,192,771		204,124	204,124	12,396,895

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
1	0601101A	In-House Laboratory Independent Research	01	11,783	11,579		11,579	U
2	0601102A	Defense Research Sciences	01	274,098	315,660		315,660	U
3	0601103A	University Research Initiatives	01	74,349	65,202		65,202	U
4	0601104A	University and Industry Research Centers	01	103,957	114,003		114,003	U
5	0601121A	Cyber Collaborative Research Alliance	01					U
		Basic Research		464,187	506,444		506,444	
6	0602105A	Materials Technology	02	73,136	83,586		83,586	U
7	0602120A	Sensors and Electronic Survivability	02	83,581	80,849		80,849	U
8	0602122A	TRACTOR HIP	02	8,627	8,674		8,674	U
9	0602126A	TRACTOR JACK	02		400		400	U
10	0602141A	Lethality Technology	02					U
11	0602142A	Army Applied Research	02					U
12	0602143A	Soldier Lethality Technology	02					U
13	0602144A	Ground Technology	02					U
14	0602145A	Next Generation Combat Vehicle Technology	02					U
15	0602146A	Network C3I Technology	02					U
16	0602147A	Long Range Precision Fires Technology	02					U
17	0602148A	Future Verticle Lift Technology	02					U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
1	0601101A	In-House Laboratory Research	01						U
2	0601102A	Defense Research Sciences	01	297,976				297,976	U
3	0601103A	University Research Initiatives	01	65,858				65,858	U
4	0601104A	University and Industry Research Centers	01	86,164				86,164	U
5	0601121A	Cyber Collaborative Research Alliance	01	4,982				4,982	U
		Basic Research		454,980				454,980	
6	0602105A	Materials Technology	02						U
7	0602120A	Sensors and Electronic Survivability	02						U
8	0602122A	TRACTOR HIP	02						U
9	0602126A	TRACTOR JACK	02						U
10	0602141A	Lethality Technology	02	26,961				26,961	U
11	0602142A	Army Applied Research	02	25,319				25,319	U
12	0602143A	Soldier Lethality Technology	02	115,274				115,274	U
13	0602144A	Ground Technology	02	35,199				35,199	U
14	0602145A	Next Generation Combat Vehicle Technology	02	219,047				219,047	U
15	0602146A	Network C3I Technology	02	114,516				114,516	U
16	0602147A	Long Range Precision Fires Technology	02	74,327				74,327	U
17	0602148A	Future Verticle Lift Technology	02	93,601				93,601	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
18	0602150A	Air and Missile Defense Technology	02					U
19	0602211A	Aviation Technology	02	72,170	81,805		81,805	U
20	0602213A	C3I Applied Cyber	02					U
21	0602270A	Electronic Warfare Technology	02	33,683	25,558		25,558	U
22	0602303A	Missile Technology	02	52,858	91,647		91,647	U
23	0602307A	Advanced Weapons Technology	02	36,959	44,468		44,468	U
24	0602308A	Advanced Concepts and Simulation	02	27,662	28,470		28,470	U
25	0602601A	Combat Vehicle and Automotive Technology	02	78,759	104,404		104,404	U
26	0602618A	Ballistics Technology	02	83,299	85,491		85,491	U
27	0602622A	Chemical, Smoke and Equipment Defeating Technology	02	3,895	5,027		5,027	U
28	0602623A	Joint Service Small Arms Program	02	6,473	12,380		12,380	U
29	0602624A	Weapons and Munitions Technology	02	241,344	383,410		383,410	U
30	0602705A	Electronics and Electronic Devices	02	90,613	96,760		96,760	U
31	0602709A	Night Vision Technology	02	38,243	33,573		33,573	U
32	0602712A	Countermine Systems	02	25,329	27,223		27,223	U
33	0602716A	Human Factors Engineering Technology	02	23,813	24,121		24,121	U
34	0602720A	Environmental Quality Technology	02	34,118	19,469		19,469	U
35	0602782A	Command, Control, Communications Technology	02	32,458	54,956		54,956	U
36	0602783A	Computer and Software Technology	02	13,707	14,948		14,948	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
18	0602150A	Air and Missile Defense Technology	02	50,771				50,771	U
19	0602211A	Aviation Technology	02						U
20	0602213A	C3I Applied Cyber	02	18,947				18,947	U
21	0602270A	Electronic Warfare Technology	02						U
22	0602303A	Missile Technology	02						U
23	0602307A	Advanced Weapons Technology	02						U
24	0602308A	Advanced Concepts and Simulation	02						U
25	0602601A	Combat Vehicle and Automotive Technology	02						U
26	0602618A	Ballistics Technology	02						U
27	0602622A	Chemical, Smoke and Equipment Defeating Technology	02						U
28	0602623A	Joint Service Small Arms Program	02						U
29	0602624A	Weapons and Munitions Technology	02						U
30	0602705A	Electronics and Electronic Devices	02						U
31	0602709A	Night Vision Technology	02						U
32	0602712A	Countermine Systems	02						U
33	0602716A	Human Factors Engineering Technology	02						U
34	0602720A	Environmental Quality Technology	02						U
35	0602782A	Command, Control, Communications Technology	02						U
36	0602783A	Computer and Software Technology	02						U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
37	0602784A	Military Engineering Technology	02	114,947	101,124		101,124	U
38	0602785A	Manpower/Personnel/Training Technology	02	19,791	21,847		21,847	U
39	0602786A	Warfighter Technology	02	58,476	56,532		56,532	U
40	0602787A	Medical Technology	02	88,891	92,003		92,003	U
		Applied Research		1,342,832	1,578,725		1,578,725	
41	0603001A	Warfighter Advanced Technology	03	53,763	41,795		41,795	U
42	0603002A	Medical Advanced Technology	03	103,908	101,442		101,442	U
43	0603003A	Aviation Advanced Technology	03	172,545	169,411		169,411	U
44	0603004A	Weapons and Munitions Advanced Technology	03	195,345	241,581		241,581	U
45	0603005A	Combat Vehicle and Automotive Advanced Technology	03	154,084	176,622		176,622	U
46	0603006A	Space Application Advanced Technology	03	39,277	48,985		48,985	U
47	0603007A	Manpower, Personnel and Training Advanced Technology	03	5,063	8,038		8,038	U
48	0603009A	TRACTOR HIKE	03	39,302	22,631		22,631	U
49	0603015A	Next Generation Training & Simulation Systems	03	15,778	28,650		28,650	U
50	0603117A	Army Advanced Technology Development	03					U
51	0603118A	Soldier Lethality Advanced Technology	03					U
52	0603119A	Ground Advanced Technology	03					U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Page A-4

xxiii

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se c
37	0602784A	Military Engineering Technology	02						U
38	0602785A	Manpower/Personnel/Training Technology	02	20,873				20,873	U
39	0602786A	Warfighter Technology	02						U
40	0602787A	Medical Technology	02	99,155				99,155	U
		Applied Research		893,990				893,990	
41	0603001A	Warfighter Advanced Technology	03						U
42	0603002A	Medical Advanced Technology	03	42,030				42,030	U
43	0603003A	Aviation Advanced Technology	03						U
44	0603004A	Weapons and Munitions Advanced Technology	03						U
45	0603005A	Combat Vehicle and Automotive Advanced Technology	03						U
46	0603006A	Space Application Advanced Technology	03						U
47	0603007A	Manpower, Personnel and Training Advanced Technology	03	11,038				11,038	U
48	0603009A	TRACTOR HIKE	03						U
49	0603015A	Next Generation Training & Simulation Systems	03						U
50	0603117A	Army Advanced Technology Development	03	63,338				63,338	U
51	0603118A	Soldier Lethality Advanced Technology	03	118,468				118,468	U
52	0603119A	Ground Advanced Technology	03	12,593				12,593	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
53	0603125A	Combating Terrorism - Technology Development	03	44,088	36,757		36,757	U
54	0603130A	TRACTOR NAIL	03	4,880	4,896		4,896	U
55	0603131A	TRACTOR EGGS	03	4,326	6,041		6,041	U
56	0603270A	Electronic Warfare Technology	03	33,249	41,458		41,458	U
57	0603313A	Missile and Rocket Advanced Technology	03	133,433	94,561		94,561	U
58	0603322A	TRACTOR CAGE	03	12,323	16,845		16,845	U
59	0603457A	C3I Cyber Advanced Development	03					U
60	0603461A	High Performance Computing Modernization Program	03	214,100	218,098		218,098	U
61	0603462A	Next Generation Combat Vehicle Advanced Technology	03					U
62	0603463A	Network C3I Advanced Technology	03					U
63	0603464A	Long Range Precision Fires Advanced Technology	03					U
64	0603465A	Future Vertical Lift Advanced Technology	03					U
65	0603466A	Air and Missile Defense Advanced Technology	03					U
66	0603606A	Landmine Warfare and Barrier Advanced Technology	03	18,473	17,097		17,097	U
67	0603607A	Joint Service Small Arms Program	03	5,628	22,799		22,799	U
68	0603710A	Night Vision Advanced Technology	03	45,617	61,313		61,313	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Page A-5

XXV

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
53	0603125A	Combating Terrorism - Technology Development	03						U
54	0603130A	TRACTOR NAIL	03						U
55	0603131A	TRACTOR EGGS	03						U
56	0603270A	Electronic Warfare Technology	03						U
57	0603313A	Missile and Rocket Advanced Technology	03						U
58	0603322A	TRACTOR CAGE	03						U
59	0603457A	C3I Cyber Advanced Development	03	13,769				13,769	U
60	0603461A	High Performance Computing Modernization Program	03	184,755				184,755	U
61	0603462A	Next Generation Combat Vehicle Advanced Technology	03	160,035				160,035	U
62	0603463A	Network C3I Advanced Technology	03	106,899				106,899	U
63	0603464A	Long Range Precision Fires Advanced Technology	03	174,386				174,386	U
64	0603465A	Future Vertical Lift Advanced Technology	03	151,640				151,640	U
65	0603466A	Air and Missile Defense Advanced Technology	03	60,613				60,613	U
66	0603606A	Landmine Warfare and Barrier Advanced Technology	03						U
67	0603607A	Joint Service Small Arms Program	03						U
68	0603710A	Night Vision Advanced Technology	03						U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
69	0603728A	Environmental Quality Technology Demonstrations	03	29,150	29,132		29,132	U
70	0603734A	Military Engineering Advanced Technology	03	96,586	101,438		101,438	U
71	0603772A	Advanced Tactical Computer Science and Sensor Technology	03	50,637	43,856		43,856	U
72	0603794A	C3 Advanced Technology	03	32,404	52,332		52,332	U
		Advanced Technology Development		1,503,959	1,585,778		1,585,778	
73	0603305A	Army Missile Defense Systems Integration	04	23,558	60,472		60,472	U
74	0603327A	Air and Missile Defense Systems Engineering	04	58,812	45,231	1,000	46,231	U
75	0603619A	Landmine Warfare and Barrier - Adv Dev	04	69,237	45,198		45,198	U
76	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	04	8,920	20,674		20,674	U
77	0603639A	Tank and Medium Caliber Ammunition	04	45,448	41,921		41,921	U
78	0603645A	Armored System Modernization - Adv Dev	04	41,431	84,297		84,297	U
79	0603747A	Soldier Support and Survivability	04	15,759	8,735	3,000	11,735	U
80	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	27,733	35,667		35,667	U
81	0603774A	Night Vision Systems Advanced Development	04	501,816	7,341		7,341	U
82	0603779A	Environmental Quality Technology - Dem/Val	04	15,039	14,731		14,731	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
69	0603728A	Environmental Quality Technology Demonstrations	03						U
70	0603734A	Military Engineering Advanced Technology	03						U
71	0603772A	Advanced Tactical Computer Science and Sensor Technology	03						U
72	0603794A	C3 Advanced Technology	03						U
		Advanced Technology Development		1,099,564				1,099,564	
73	0603305A	Army Missile Defense Systems Integration	04	10,987				10,987	U
74	0603327A	Air and Missile Defense Systems Engineering	04	15,148		500	500	15,648	U
75	0603619A	Landmine Warfare and Barrier - Adv Dev	04	92,915				92,915	U
76	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	04						U
77	0603639A	Tank and Medium Caliber Ammunition	04	82,146				82,146	U
78	0603645A	Armored System Modernization - Adv Dev	04	157,656				157,656	U
79	0603747A	Soldier Support and Survivability	04	6,514		3,000	3,000	9,514	U
80	0603766A	Tactical Electronic Surveillance System - Adv Dev	04	34,890				34,890	U
81	0603774A	Night Vision Systems Advanced Development	04	251,011				251,011	U
82	0603779A	Environmental Quality Technology - Dem/Val	04	15,132				15,132	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
83	0603790A	NATO Research and Development	04	2,485	3,682		3,682	U
84	0603801A	Aviation - Adv Dev	04	9,653	86,180		86,180	U
85	0603804A	Logistics and Engineer Equipment - Adv Dev	04	29,619	17,230		17,230	U
86	0603807A	Medical Systems - Adv Dev	04	36,279	39,244		39,244	U
87	0603827A	Soldier Systems - Advanced Development	04	60,774	31,022		31,022	U
88	0604017A	Robotics Development	04	38,051	74,368		74,368	U
89	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04		9,488		9,488	U
90	0604021A	Electronic Warfare Technology Maturation (MIP)	04					U
91	0604100A	Analysis Of Alternatives	04	7,307	9,753		9,753	U
92	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04		12,393		12,393	U
93	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	57,437	89,248		89,248	U
94	0604115A	Technology Maturation Initiatives	04	145,618	95,229		95,229	U
95	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	19,201	79,016		79,016	U
96	0604118A	TRACTOR BEAM	04	10,400	52,894		52,894	U
97	0604119A	Army Advanced Component Development & Prototyping	04					U
98	0604120A	Assured Positioning, Navigation and Timing (PNT)	04	132,810				U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Page A-7

xxix

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
83	0603790A	NATO Research and Development	04	5,406				5,406	U
84	0603801A	Aviation - Adv Dev	04	459,290				459,290	U
85	0603804A	Logistics and Engineer Equipment - Adv Dev	04	6,254		1,085	1,085	7,339	U
86	0603807A	Medical Systems - Adv Dev	04	31,175				31,175	U
87	0603827A	Soldier Systems - Advanced Development	04	22,113				22,113	U
88	0604017A	Robotics Development	04	115,222				115,222	U
89	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04						U
90	0604021A	Electronic Warfare Technology Maturation (MIP)	04	18,043				18,043	U
91	0604100A	Analysis Of Alternatives	04	10,023				10,023	U
92	0604113A	Future Tactical Unmanned Aircraft System (FTUAS)	04	40,745				40,745	U
93	0604114A	Lower Tier Air Missile Defense (LTAMD) Sensor	04	427,772				427,772	U
94	0604115A	Technology Maturation Initiatives	04	196,676				196,676	U
95	0604117A	Maneuver - Short Range Air Defense (M-SHORAD)	04	33,100		6,000	6,000	39,100	U
96	0604118A	TRACTOR BEAM	04						U
97	0604119A	Army Advanced Component Development & Prototyping	04	115,116		4,529	4,529	119,645	U
98	0604120A	Assured Positioning, Navigation and Timing (PNT)	04						U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
99	0604121A	Synthetic Training Environment Refinement & Prototyping	04	109,165	39,890		39,890	U
100	0604182A	Hypersonics	04					U
101	0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04	10,871	40,979		40,979	U
102	0604403A	Future Interceptor	04					U
103	0604541A	Unified Network Transport	04					U
104	0604644A	Mobile Medium Range Missile	04					U
105	0604785A	Integrated Base Defense (Budget Activity 4)	04					U
106	0305251A	Cyberspace Operations Forces and Force Support	04	56,071	52,817		52,817	U
107	1206120A	Assured Positioning, Navigation and Timing (PNT)	04		128,640		128,640	U
108	1206308A	Army Space Systems Integration	04	30,121	38,307		38,307	U
		Advanced Component Development & Prototypes		1,563,615	1,264,647	4,000	1,268,647	
109	0604201A	Aircraft Avionics	05	30,812	32,253		32,253	U
110	0604270A	Electronic Warfare Development	05	68,935	58,627		58,627	U
111	0604321A	All Source Analysis System	05	4,774				U
112	0604328A	TRACTOR CAGE	05	30,252	17,050	12,000	29,050	U
113	0604601A	Infantry Support Weapons	05	99,145	63,793		63,793	U
114	0604604A	Medium Tactical Vehicles	05	5,798	3,699		3,699	U
115	0604611A	JAVELIN	05	20,252	5,616		5,616	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Sequestration Code
99	0604121A	Synthetic Training Environment Refinement & Prototyping	04	136,761				136,761	U
100	0604182A	Hypersonics	04	228,000				228,000	U
101	0604319A	Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	04						U
102	0604403A	Future Interceptor	04	8,000				8,000	U
103	0604541A	Unified Network Transport	04	39,600				39,600	U
104	0604644A	Mobile Medium Range Missile	04	20,000				20,000	U
105	0604785A	Integrated Base Defense (Budget Activity 4)	04			2,000	2,000	2,000	U
106	0305251A	Cyberspace Operations Forces and Force Support	04	52,102				52,102	U
107	1206120A	Assured Positioning, Navigation and Timing (PNT)	04	192,562				192,562	U
108	1206308A	Army Space Systems Integration	04	104,996				104,996	U
		Advanced Component Development & Prototypes		2,929,355		17,114	17,114	2,946,469	
109	0604201A	Aircraft Avionics	05	29,164				29,164	U
110	0604270A	Electronic Warfare Development	05	70,539				70,539	U
111	0604321A	All Source Analysis System	05						U
112	0604328A	TRACTOR CAGE	05						U
113	0604601A	Infantry Support Weapons	05	106,121				106,121	U
114	0604604A	Medium Tactical Vehicles	05	2,152				2,152	U
115	0604611A	JAVELIN	05	17,897				17,897	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
116	0604622A	Family of Heavy Tactical Vehicles	05	10,086	11,935		11,935	U
117	0604633A	Air Traffic Control	05	3,433	12,332		12,332	U
118	0604642A	Light Tactical Wheeled Vehicles	05	3,619	1,276		1,276	U
119	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	34,794	373,337		373,337	U
120	0604710A	Night Vision Systems - Eng Dev	05	184,389	144,442		144,442	U
121	0604713A	Combat Feeding, Clothing, and Equipment	05	8,561	4,502		4,502	U
122	0604715A	Non-System Training Devices - Eng Dev	05	51,900	44,381		44,381	U
123	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	190,385	93,073	119,300	212,373	U
124	0604742A	Constructive Simulation Systems Development	05	17,921	22,600		22,600	U
125	0604746A	Automatic Test Equipment Development	05	7,054	11,782		11,782	U
126	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	10,890	9,134		9,134	U
127	0604768A	Brilliant Anti-Armor Submunition (BAT)	05	7,886	6,886		6,886	U
128	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	17,855	21,936		21,936	U
129	0604798A	Brigade Analysis, Integration and Evaluation	05	139,386	49,250		49,250	U
130	0604802A	Weapons and Munitions - Eng Dev	05	144,389	172,744		172,744	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Page A-9

xxxiii

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
116	0604622A	Family of Heavy Tactical Vehicles	05	16,745				16,745	U
117	0604633A	Air Traffic Control	05	6,989				6,989	U
118	0604642A	Light Tactical Wheeled Vehicles	05	10,465				10,465	U
119	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	310,152				310,152	U
120	0604710A	Night Vision Systems - Eng Dev	05	181,732				181,732	U
121	0604713A	Combat Feeding, Clothing, and Equipment	05	2,393				2,393	U
122	0604715A	Non-System Training Devices - Eng Dev	05	27,412				27,412	U
123	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	43,502				43,502	U
124	0604742A	Constructive Simulation Systems Development	05	11,636				11,636	U
125	0604746A	Automatic Test Equipment Development	05	10,915				10,915	U
126	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	7,801				7,801	U
127	0604768A	Brilliant Anti-Armor Submunition (BAT)	05	25,000				25,000	U
128	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	9,241				9,241	U
129	0604798A	Brigade Analysis, Integration and Evaluation	05	42,634				42,634	U
130	0604802A	Weapons and Munitions - Eng Dev	05	181,023				181,023	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
131	0604804A	Logistics and Engineer Equipment - Eng Dev	05	76,030	76,388		76,388	U
132	0604805A	Command, Control, Communications Systems - Eng Dev	05	9,559	15,950		15,950	U
133	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	36,685	44,495		44,495	U
134	0604808A	Landmine Warfare/Barrier - Eng Dev	05	26,188	43,064		43,064	U
135	0604818A	Army Tactical Command & Control Hardware & Software	05	157,852	169,607		169,607	U
136	0604820A	Radar Development	05	31,651	39,289		39,289	U
137	0604822A	General Fund Enterprise Business System (GFEBs)	05	47,575	36,810		36,810	U
138	0604823A	Firefinder	05	43,762	27,439		27,439	U
139	0604827A	Soldier Systems - Warrior Dem/Val	05	15,490	10,382		10,382	U
140	0604852A	Suite of Survivability Enhancement Systems - EMD	05	90,187	52,839		52,839	U
141	0604854A	Artillery Systems - EMD	05	3,892	1,779		1,779	U
142	0605013A	Information Technology Development	05	62,613	77,686		77,686	U
143	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	188,637	164,899		164,899	U
144	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	184,300	111,821		111,821	U
145	0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05	4,241	3,207		3,207	U
146	0605030A	Joint Tactical Network Center (JTNC)	05	15,242	15,869		15,869	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Page A 10

XXXV

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
131	0604804A	Logistics and Engineer Equipment - Eng Dev	05	103,226				103,226	U
132	0604805A	Command, Control, Communications Systems - Eng Dev	05	12,595				12,595	U
133	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev	05	48,264				48,264	U
134	0604808A	Landmine Warfare/Barrier - Eng Dev	05	39,208				39,208	U
135	0604818A	Army Tactical Command & Control Hardware & Software	05	140,637				140,637	U
136	0604820A	Radar Development	05	105,243				105,243	U
137	0604822A	General Fund Enterprise Business System (GFEBs)	05	46,683				46,683	U
138	0604823A	Firefinder	05	17,294				17,294	U
139	0604827A	Soldier Systems - Warrior Dem/Val	05	5,803				5,803	U
140	0604852A	Suite of Survivability Enhancement Systems - EMD	05	98,698				98,698	U
141	0604854A	Artillery Systems - EMD	05	15,832				15,832	U
142	0605013A	Information Technology Development	05	126,537				126,537	U
143	0605018A	Integrated Personnel and Pay System-Army (IPPS-A)	05	142,773				142,773	U
144	0605028A	Armored Multi-Purpose Vehicle (AMPV)	05	96,730				96,730	U
145	0605029A	Integrated Ground Security Surveillance Response Capability (IGSSR-C)	05	6,699				6,699	U
146	0605030A	Joint Tactical Network Center (JTNC)	05	15,882				15,882	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
147	0605031A	Joint Tactical Network (JTN)	05	46,051	41,920		41,920	U
148	0605032A	TRACTOR TIRE	05	118,570	41,166	66,760	107,926	U
149	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	20,661	5,169		5,169	U
150	0605034A	Tactical Security System (TSS)	05	3,998	4,490		4,490	U
151	0605035A	Common Infrared Countermeasures (CIRCM)	05	97,746	31,139	2,670	33,809	U
152	0605036A	Combating Weapons of Mass Destruction (CWMD)	05	6,650	11,297		11,297	U
153	0605037A	Evidence Collection and Detainee Processing	05	206				U
154	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	15,481	15,135		15,135	U
155	0605041A	Defensive CYBER Tool Development	05	41,441	33,796		33,796	U
156	0605042A	Tactical Network Radio Systems (Low-Tier)	05	8,845	3,825		3,825	U
157	0605047A	Contract Writing System	05	19,574	41,876		41,876	U
158	0605049A	Missile Warning System Modernization (MWSM)	05	12,480	8,266		8,266	U
159	0605051A	Aircraft Survivability Development	05	169,752	21,938	34,933	56,871	U
160	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	156,361	132,283		132,283	U
161	0605053A	Ground Robotics	05	60,530	71,435		71,435	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
147	0605031A	Joint Tactical Network (JTN)	05	40,808				40,808	U
148	0605032A	TRACTOR TIRE	05						U
149	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	3,847				3,847	U
150	0605034A	Tactical Security System (TSS)	05	6,928				6,928	U
151	0605035A	Common Infrared Countermeasures (CIRCM)	05	34,488		11,770	11,770	46,258	U
152	0605036A	Combating Weapons of Mass Destruction (CWMD)	05	10,000				10,000	U
153	0605037A	Evidence Collection and Detainee Processing	05						U
154	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	6,054				6,054	U
155	0605041A	Defensive CYBER Tool Development	05	62,262				62,262	U
156	0605042A	Tactical Network Radio Systems (Low-Tier)	05	35,654				35,654	U
157	0605047A	Contract Writing System	05	19,682				19,682	U
158	0605049A	Missile Warning System Modernization (MWSM)	05	1,539				1,539	U
159	0605051A	Aircraft Survivability Development	05	64,557		77,420	77,420	141,977	U
160	0605052A	Indirect Fire Protection Capability Inc 2 - Block 1	05	243,228				243,228	U
161	0605053A	Ground Robotics	05	41,308				41,308	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
162	0605054A	Emerging Technology Initiatives	05		42,813		42,813	U
163	0605203A	Army System Development & Demonstration	05					U
164	0605380A	AMF Joint Tactical Radio System (JTRS)	05	18,639	15,964		15,964	U
165	0605450A	Joint Air-to-Ground Missile (JAGM)	05	28,539	11,758		11,758	U
166	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	339,051	322,263		322,263	U
167	0605625A	Manned Ground Vehicle	05					U
168	0605766A	National Capabilities Integration (MIP)	05	9,382	12,340		12,340	U
169	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	22,530				U
170	0605830A	Aviation Ground Support Equipment	05	6,653	7,703		7,703	U
171	0210609A	Paladin Integrated Management (PIM)	05	5,868				U
172	0303032A	TROJAN - RH12	05	5,631	4,521	1,200	5,721	U
173	0303267A	Auctioned Spectrum Relocation Fund	05	15,885				U
174	0304270A	Electronic Warfare Development	05	14,616	8,922		8,922	U
175	1205117A	Tractor Bears	05	17,928	23,170		23,170	U
		System Development & Demonstration		3,349,488	2,965,361	236,863	3,202,224	
176	0604256A	Threat Simulator Development	06	31,401	47,322		47,322	U
177	0604258A	Target Systems Development	06	13,467	32,120		32,120	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
162	0605054A	Emerging Technology Initiatives	05	45,896				45,896	U
163	0605203A	Army System Development & Demonstration	05	164,883		19,527	19,527	184,410	U
164	0605380A	AMF Joint Tactical Radio System (JTRS)	05						U
165	0605450A	Joint Air-to-Ground Missile (JAGM)	05	9,500				9,500	U
166	0605457A	Army Integrated Air and Missile Defense (AIAMD)	05	208,938				208,938	U
167	0605625A	Manned Ground Vehicle	05	378,400				378,400	U
168	0605766A	National Capabilities Integration (MIP)	05	7,835				7,835	U
169	0605812A	Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph	05	2,732				2,732	U
170	0605830A	Aviation Ground Support Equipment	05	1,664				1,664	U
171	0210609A	Paladin Integrated Management (PIM)	05						U
172	0303032A	TROJAN - RH12	05	3,936				3,936	U
173	0303267A	Auctioned Spectrum Relocation Fund	05						U
174	0304270A	Electronic Warfare Development	05	19,675		3,200	3,200	22,875	U
175	1205117A	Tractor Bears	05						U
		System Development & Demonstration		3,549,431		111,917	111,917	3,661,348	
176	0604256A	Threat Simulator Development	06	14,117				14,117	U
177	0604258A	Target Systems Development	06	8,327				8,327	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
178	0604759A	Major T&E Investment	06	113,516	82,893		82,893	U
179	0605103A	Rand Arroyo Center	06	19,336	19,796		19,796	U
180	0605301A	Army Kwajalein Atoll	06	234,010	246,275		246,275	U
181	0605326A	Concepts Experimentation Program	06	28,701	30,394		30,394	U
182	0605502A	Small Business Innovative Research	06	284,080				U
183	0605601A	Army Test Ranges and Facilities	06	313,589	315,634		315,634	U
184	0605602A	Army Technical Test Instrumentation and Targets	06	57,395	84,805		84,805	U
185	0605604A	Survivability/Lethality Analysis	06	41,296	40,480		40,480	U
186	0605606A	Aircraft Certification	06	4,612	3,936		3,936	U
187	0605702A	Meteorological Support to RDT&E Activities	06	7,070	9,759		9,759	U
188	0605706A	Materiel Systems Analysis	06	21,694	21,223		21,223	U
189	0605709A	Exploitation of Foreign Items	06	12,684	13,026		13,026	U
190	0605712A	Support of Operational Testing	06	50,723	52,705		52,705	U
191	0605716A	Army Evaluation Center	06	56,003	57,039		57,039	U
192	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	1,756	2,798		2,798	U
193	0605801A	Programwide Activities	06	54,383	60,921		60,921	U
194	0605803A	Technical Information Activities	06	39,613	29,024		29,024	U
195	0605805A	Munitions Standardization, Effectiveness and Safety	06	65,709	72,279		72,279	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
178	0604759A	Major T&E Investment	06	136,565				136,565	U
179	0605103A	Rand Arroyo Center	06	13,113				13,113	U
180	0605301A	Army Kwajalein Atoll	06	238,691				238,691	U
181	0605326A	Concepts Experimentation Program	06	42,922				42,922	U
182	0605502A	Small Business Innovative Research	06						U
183	0605601A	Army Test Ranges and Facilities	06	334,468				334,468	U
184	0605602A	Army Technical Test Instrumentation and Targets	06	46,974				46,974	U
185	0605604A	Survivability/Lethality Analysis	06	35,075				35,075	U
186	0605606A	Aircraft Certification	06	3,461				3,461	U
187	0605702A	Meteorological Support to RDT&E Activities	06	6,233				6,233	U
188	0605706A	Materiel Systems Analysis	06	21,342				21,342	U
189	0605709A	Exploitation of Foreign Items	06	11,168				11,168	U
190	0605712A	Support of Operational Testing	06	52,723				52,723	U
191	0605716A	Army Evaluation Center	06	60,815				60,815	U
192	0605718A	Army Modeling & Sim X-Cmd Collaboration & Integ	06	2,527				2,527	U
193	0605801A	Programwide Activities	06	58,175				58,175	U
194	0605803A	Technical Information Activities	06	25,060				25,060	U
195	0605805A	Munitions Standardization, Effectiveness and Safety	06	44,458				44,458	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
196	0605857A	Environmental Quality Technology Mgmt Support	06	4,883	3,211		3,211	U
197	0605898A	Army Direct Report Headquarters - R&D - MHA	06	54,177	54,130		54,130	U
198	0606001A	Military Ground-Based CREW Technology	06	7,600	4,890		4,890	U
199	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	59,042	62,940		62,940	U
200	0606003A	CounterIntel and Human Intel Modernization	06		2,636		2,636	U
201	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06		88,300		88,300	U
202	0303260A	Defense Military Deception Initiative	06	1,708				U
203	0909999A	Financing for Cancelled Account Adjustments	06	654				U
		RDT&E Management Support		1,579,102	1,438,536		1,438,536	
204	0603778A	MLRS Product Improvement Program	07	10,286	6,877		6,877	U
205	0603813A	TRACTOR PULL	07	4,014	4,067		4,067	U
206	0605024A	Anti-Tamper Technology Support	07	4,009	7,251		7,251	U
207	0607131A	Weapons and Munitions Product Improvement Programs	07	16,302	16,003	2,548	18,551	U
208	0607133A	TRACTOR SMOKE	07	12,143	4,577	7,780	12,357	U
209	0607134A	Long Range Precision Fires (LRPF)	07	80,690	159,278		159,278	U
210	0607135A	Apache Product Improvement Program	07	55,565	24,019		24,019	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	\$ e c
196	0605857A	Environmental Quality Technology Mgmt Support	06	4,681				4,681	U
197	0605898A	Army Direct Report Headquarters - R&D - MHA	06	53,820				53,820	U
198	0606001A	Military Ground-Based CREW Technology	06	4,291				4,291	U
199	0606002A	Ronald Reagan Ballistic Missile Defense Test Site	06	62,069				62,069	U
200	0606003A	CounterIntel and Human Intel Modernization	06	1,050		1,875	1,875	2,925	U
201	0606942A	Assessments and Evaluations Cyber Vulnerabilities	06	4,500				4,500	U
202	0303260A	Defense Military Deception Initiative	06						U
203	0909999A	Financing for Cancelled Account Adjustments	06						U
	RDT&E	Management Support		1,286,625		1,875	1,875	1,288,500	
204	0603778A	MLRS Product Improvement Program	07	22,877				22,877	U
205	0603813A	TRACTOR PULL	07						U
206	0605024A	Anti-Tamper Technology Support	07	8,491				8,491	U
207	0607131A	Weapons and Munitions Product Improvement Programs	07	15,645				15,645	U
208	0607133A	TRACTOR SMOKE	07						U
209	0607134A	Long Range Precision Fires (LRPF)	07	164,182				164,182	U
210	0607135A	Apache Product Improvement Program	07						U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
211	0607136A	Blackhawk Product Improvement Program	07	48,241	35,196		35,196	U
212	0607137A	Chinook Product Improvement Program	07	155,433	144,722		144,722	U
213	0607138A	Fixed Wing Product Improvement Program	07	7,782	2,280		2,280	U
214	0607139A	Improved Turbine Engine Program	07	167,532	188,903		188,903	U
215	0607140A	Emerging Technologies from NIE	07	26,112				U
216	0607142A	Aviation Rocket System Product Improvement and Development	07	9,662	38,452		38,452	U
217	0607143A	Unmanned Aircraft System Universal Products	07	36,926	38,331		38,331	U
218	0607145A	Apache Future Development	07					U
219	0607312A	Army Operational Systems Development	07					U
220	0607665A	Family of Biometrics	07	3,032	2,397		2,397	U
221	0607865A	Patriot Product Improvement	07	77,391	75,288		75,288	U
222	0203728A	Joint Automated Deep Operation Coordination System (JADOCS)	07	32,256	30,915		30,915	U
223	0203735A	Combat Vehicle Improvement Programs	07	293,921	336,063		336,063	U
224	0203740A	Maneuver Control System	07	6,443				U
225	0203743A	155mm Self-Propelled Howitzer Improvements	07	39,154	37,155		37,155	U
226	0203744A	Aircraft Modifications/Product Improvement Programs	07	34,228	17,684		17,684	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
211	0607136A	Blackhawk Product Improvement Program	07	13,039				13,039	U
212	0607137A	Chinook Product Improvement Program	07	174,371				174,371	U
213	0607138A	Fixed Wing Product Improvement Program	07	4,545				4,545	U
214	0607139A	Improved Turbine Engine Program	07	206,434				206,434	U
215	0607140A	Emerging Technologies from NIE	07						U
216	0607142A	Aviation Rocket System Product Improvement and Development	07	24,221				24,221	U
217	0607143A	Unmanned Aircraft System Universal Products	07	32,016				32,016	U
218	0607145A	Apache Future Development	07	5,448				5,448	U
219	0607312A	Army Operational Systems Development	07	49,526				49,526	U
220	0607665A	Family of Biometrics	07	1,702				1,702	U
221	0607865A	Patriot Product Improvement	07	96,430				96,430	U
222	0203728A	Joint Automated Deep Operation Coordination System (JADOCs)	07	47,398				47,398	U
223	0203735A	Combat Vehicle Improvement Programs	07	334,463				334,463	U
224	0203740A	Maneuver Control System	07						U
225	0203743A	155mm Self-Propelled Howitzer Improvements	07	214,246				214,246	U
226	0203744A	Aircraft Modifications/Product Improvement Programs	07	16,486				16,486	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e c
227	0203752A	Aircraft Engine Component Improvement Program	07	139	146		146	U
228	0203758A	Digitization	07	4,611	6,308		6,308	U
229	0203801A	Missile/Air Defense Product Improvement Program	07	43,615	1,641	2,000	3,641	U
230	0203802A	Other Missile Product Improvement Programs	07	4,800	4,941		4,941	U
231	0203808A	TRACTOR CARD	07	37,883	34,050		34,050	U
232	0205402A	Integrated Base Defense - Operational System Dev	07			8,000	8,000	U
233	0205410A	Materials Handling Equipment	07	1,519	1,462		1,462	U
234	0205412A	Environmental Quality Technology - Operational System Dev	07	187	249		249	U
235	0205456A	Lower Tier Air and Missile Defense (AMD) System	07	69,558	77,188		77,188	U
236	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	93,900	118,955		118,955	U
238	0303028A	Security and Intelligence Activities	07	35,652	12,277	23,199	35,476	U
239	0303140A	Information Systems Security Program	07	108,755	42,520		42,520	U
240	0303141A	Global Combat Support System	07	45,372	53,855		53,855	U
241	0303150A	WWMCCS/Global Command and Control System	07	10,055	2,031		2,031	U
244	0305172A	Combined Advanced Applications	07	1,100	1,500		1,500	U
245	0305179A	Integrated Broadcast Service (IBS)	07		450		450	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
227	0203752A	Aircraft Engine Component Improvement Program	07	144				144	U
228	0203758A	Digitization	07	5,270				5,270	U
229	0203801A	Missile/Air Defense Product Improvement Program	07	1,287				1,287	U
230	0203802A	Other Missile Product Improvement Programs	07						U
231	0203808A	TRACTOR CARD	07						U
232	0205402A	Integrated Base Defense - Operational System Dev	07						U
233	0205410A	Materials Handling Equipment	07						U
234	0205412A	Environmental Quality Technology - Operational System Dev	07	732				732	U
235	0205456A	Lower Tier Air and Missile Defense (AMD) System	07	107,746				107,746	U
236	0205778A	Guided Multiple-Launch Rocket System (GMLRS)	07	138,594				138,594	U
238	0303028A	Security and Intelligence Activities	07	13,845		22,904	22,904	36,749	U
239	0303140A	Information Systems Security Program	07	29,185				29,185	U
240	0303141A	Global Combat Support System	07	68,976				68,976	U
241	0303150A	WWMCCS/Global Command and Control System	07	2,073				2,073	U
244	0305172A	Combined Advanced Applications	07						U
245	0305179A	Integrated Broadcast Service (IBS)	07	459				459	U

R-120PB: FY 2020 President's Budget (Published Version), as of February 12, 2019 at 09:49:12

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
246	0305204A	Tactical Unmanned Aerial Vehicles	07	16,925	6,000		6,000	U
247	0305206A	Airborne Reconnaissance Systems	07	20,080	12,416	14,000	26,416	U
248	0305208A	Distributed Common Ground/Surface Systems	07	24,700	27,109		27,109	U
249	0305219A	MQ-1C Gray Eagle UAS	07	10,531				U
250	0305232A	RQ-11 UAV	07	12,691	6,180		6,180	U
251	0305233A	RQ-7 UAV	07	12,773	17,863		17,863	U
252	0307665A	Biometrics Enabled Intelligence	07	8,573	4,310	2,214	6,524	U
253	0708045A	End Item Industrial Preparedness Activities	07	118,410	108,696		108,696	U
254	1203142A	SATCOM Ground Environment (SPACE)	07	9,945	12,105		12,105	U
255	1208053A	Joint Tactical Ground System	07	10,228	7,400		7,400	U
9999	9999999999	Classified Programs		7,154	5,955		5,955	U
		Operational Systems Development		1,830,278	1,735,065	59,741	1,794,806	
Total Research, Development, Test & Eval, Army				11,633,461	11,074,556	300,604	11,375,160	

UNCLASSIFIED

Department of the Army
 FY 2020 President's Budget
 Exhibit R-1 FY 2020 President's Budget
 Total Obligational Authority
 (Dollars in Thousands)

12 Feb 2019

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Se
246	0305204A	Tactical Unmanned Aerial Vehicles	07	5,097		34,100	34,100	39,197	U
247	0305206A	Airborne Reconnaissance Systems	07	11,177		14,000	14,000	25,177	U
248	0305208A	Distributed Common Ground/Surface Systems	07	38,121				38,121	U
249	0305219A	MQ-1C Gray Eagle UAS	07						U
250	0305232A	RQ-11 UAV	07	3,218				3,218	U
251	0305233A	RQ-7 UAV	07	7,817				7,817	U
252	0307665A	Biometrics Enabled Intelligence	07	2,000		2,214	2,214	4,214	U
253	0708045A	End Item Industrial Preparedness Activities	07	59,848				59,848	U
254	1203142A	SATCOM Ground Environment (SPACE)	07	34,169				34,169	U
255	1208053A	Joint Tactical Ground System	07	10,275				10,275	U
9999	9999999999	Classified Programs		7,273				7,273	U
		Operational Systems Development		1,978,826		73,218	73,218	2,052,044	
Total Research, Development, Test & Eval, Army				12,192,771		204,124	204,124	12,396,895	

UNCLASSIFIED

Army • Budget Estimates FY 2020 • RDT&E Program

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

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

Line #	Budget Activity	Program Element Number	Program Element Title	Page
204	07	0603778A	MLRS Product Improvement Program.....	1
205	07	0603813A	TRACTOR PULL.....	18
206	07	0605024A	Anti-Tamper Technology Support.....	19
207	07	0607131A	Weapons and Munitions Product Improvement Programs.....	27
208	07	0607133A	TRACTOR SMOKE.....	68
209	07	0607134A	Long Range Precision Fires (LRPF).....	69
210	07	0607135A	Apache Product Improvement Program.....	79
211	07	0607136A	Blackhawk Product Improvement Program.....	87
212	07	0607137A	Chinook Product Improvement Program.....	99
213	07	0607138A	Fixed Wing Product Improvement Program.....	112
214	07	0607139A	Improved Turbine Engine Program.....	120
215	07	0607140A	Emerging Technologies from NIE.....	131
216	07	0607142A	Aviation Rocket System Product Improvement and Development.....	136
217	07	0607143A	Unmanned Aircraft System Universal Products.....	146
218	07	0607145A	Apache Future Development.....	154
219	07	0607312A	Army Operational Systems Development.....	160

UNCLASSIFIED

UNCLASSIFIED

Army • Budget Estimates FY 2020 • RDT&E Program

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

Line #	Budget Activity	Program Element Number	Program Element Title	Page
220	07	0607665A	Family of Biometrics.....	161
221	07	0607865A	Patriot Product Improvement.....	174
222	07	0203728A	Joint Automated Deep Operation Coordination System (JADOCS).....	184
223	07	0203735A	Combat Vehicle Improvement Programs.....	202
224	07	0203740A	Maneuver Control System.....	252
225	07	0203743A	155mm Self-Propelled Howitzer Improvements.....	260
226	07	0203744A	Aircraft Modifications/Product Improvement Programs.....	270
227	07	0203752A	Aircraft Engine Component Improvement Program.....	279
228	07	0203758A	Digitization.....	286
229	07	0203801A	Missile/Air Defense Product Improvement Program.....	295
230	07	0203802A	Other Missile Product Improvement Programs.....	309
231	07	0203808A	TRACTOR CARD.....	316
232	07	0205402A	Integrated Base Defense - Operational System Dev.....	320
233	07	0205410A	Materials Handling Equipment.....	327
234	07	0205412A	Environmental Quality Technology - Operational System Dev.....	335
235	07	0205456A	Lower Tier Air and Missile Defense (AMD) System.....	341
236	07	0205778A	Guided Multiple-Launch Rocket System (GMLRS).....	351
238	07	0303028A	Security and Intelligence Activities.....	369

UNCLASSIFIED

UNCLASSIFIED

Army • Budget Estimates FY 2020 • RDT&E Program

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

Line #	Budget Activity	Program Element Number	Program Element Title	Page
239	07	0303140A	Information Systems Security Program.....	382
240	07	0303141A	Global Combat Support System.....	417
241	07	0303150A	WWMCCS/Global Command and Control System.....	436
242	07	0305172A	Combined Advanced Applications.....	450
243	07	0305179A	Integrated Broadcast Service (IBS).....	451
244	07	0305204A	Tactical Unmanned Aerial Vehicles.....	457
245	07	0305206A	Airborne Reconnaissance Systems.....	479
246	07	0305208A	Distributed Common Ground/Surface Systems.....	504
247	07	0305219A	MQ-1 Gray Eagle UAV.....	515
248	07	0305232A	RQ-11 UAV.....	522
249	07	0305233A	RQ-7 UAV.....	531
250	07	0307665A	Biometrics Enabled Intelligence.....	540
251	07	0708045A	End Item Industrial Preparedness Activities.....	557
252	07	1203142A	SATCOM Ground Environment (SPACE).....	573
253	07	1208053A	Joint Tactical Ground System.....	600

UNCLASSIFIED

Army • Budget Estimates FY 2020 • RDT&E Program

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	225	07.....	260
Airborne Reconnaissance Systems	0305206A	245	07.....	479
Aircraft Engine Component Improvement Program	0203752A	227	07.....	279
Aircraft Modifications/Product Improvement Programs	0203744A	226	07.....	270
Anti-Tamper Technology Support	0605024A	206	07.....	19
Apache Future Development	0607145A	218	07.....	154
Apache Product Improvement Program	0607135A	210	07.....	79
Army Operational Systems Development	0607312A	219	07.....	160
Aviation Rocket System Product Improvement and Development	0607142A	216	07.....	136
Biometrics Enabled Intelligence	0307665A	250	07.....	540
Blackhawk Product Improvement Program	0607136A	211	07.....	87
Chinook Product Improvement Program	0607137A	212	07.....	99
Combat Vehicle Improvement Programs	0203735A	223	07.....	202
Combined Advanced Applications	0305172A	242	07.....	450
Digitization	0203758A	228	07.....	286
Distributed Common Ground/Surface Systems	0305208A	246	07.....	504
Emerging Technologies from NIE	0607140A	215	07.....	131

UNCLASSIFIED

UNCLASSIFIED

Army • Budget Estimates FY 2020 • RDT&E Program

Program Element Title	Program Element Number	Line #	BA	Page
End Item Industrial Preparedness Activities	0708045A	251	07.....	557
Environmental Quality Technology - Operational System Dev	0205412A	234	07.....	335
Family of Biometrics	0607665A	220	07.....	161
Fixed Wing Product Improvement Program	0607138A	213	07.....	112
Global Combat Support System	0303141A	240	07.....	417
Guided Multiple-Launch Rocket System (GMLRS)	0205778A	236	07.....	351
Improved Turbine Engine Program	0607139A	214	07.....	120
Information Systems Security Program	0303140A	239	07.....	382
Integrated Base Defense - Operational System Dev	0205402A	232	07.....	320
Integrated Broadcast Service (IBS)	0305179A	243	07.....	451
Joint Automated Deep Operation Coordination System (JADOCS)	0203728A	222	07.....	184
Joint Tactical Ground System	1208053A	253	07.....	600
Long Range Precision Fires (LRPF)	0607134A	209	07.....	69
Lower Tier Air and Missile Defense (AMD) System	0205456A	235	07.....	341
MLRS Product Improvement Program	0603778A	204	07.....	1
MQ-1 Gray Eagle UAV	0305219A	247	07.....	515
Maneuver Control System	0203740A	224	07.....	252
Materials Handling Equipment	0205410A	233	07.....	327
Missile/Air Defense Product Improvement Program	0203801A	229	07.....	295

UNCLASSIFIED

UNCLASSIFIED

Army • Budget Estimates FY 2020 • RDT&E Program

Program Element Title	Program Element Number	Line #	BA	Page
Other Missile Product Improvement Programs	0203802A	230	07.....	309
Patriot Product Improvement	0607865A	221	07.....	174
RQ-11 UAV	0305232A	248	07.....	522
RQ-7 UAV	0305233A	249	07.....	531
SATCOM Ground Environment (SPACE)	1203142A	252	07.....	573
Security and Intelligence Activities	0303028A	238	07.....	369
TRACTOR CARD	0203808A	231	07.....	316
TRACTOR PULL	0603813A	205	07.....	18
TRACTOR SMOKE	0607133A	208	07.....	68
Tactical Unmanned Aerial Vehicles	0305204A	244	07.....	457
Unmanned Aircraft System Universal Products	0607143A	217	07.....	146
WWMCCS/Global Command and Control System	0303150A	241	07.....	436
Weapons and Munitions Product Improvement Programs	0607131A	207	07.....	27

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	10.286	6.877	22.877	-	22.877	10.167	12.479	53.296	87.717	0.000	203.699
093: Multi-Launch Rocket System (MLRS)	-	5.760	3.943	9.563	-	9.563	5.041	5.040	31.506	65.580	0.000	126.433
789: Guided MLRS (GMLRS) Rocket P3I*	-	0.000	0.000	0.000	-	0.000	0.000	0.000	17.748	17.927	0.000	35.675
DX8: HIMARS Product Improvement Program	-	4.526	2.934	13.314	-	13.314	5.126	7.439	4.042	4.210	0.000	41.591

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2020

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 developmental munitions such as the Precision Strike Missile (PrSM) and Extended Range (ER) Guided Multiple Launch Rocket System (GMLRS).

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 and emerging Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM), to include the Extended Range (ER) Guided Multiple Launch Rocket System (GMLRS), the Army Tactical Missile System (ATACMS), and the Precision Strike Missile (PrSM). These munitions are capable of engaging targets with precision at ranges in excess of 400 kilometers. Project 093 funds software development, training updates, Assured Positioning, Navigation and Timing (APNT) technology implementation, and integration of satellite communications for the MLRS launcher.

Justification:

FY 2020 Base funding in the amount of \$9.563 million for Project 093 continues tactical launcher software development and testing to support the Fire Control System (FCS) obsolescence mitigation hardware upgrade required to operate a MLRS launcher. The tactical software is a critical developmental item required to field additional launchers, maintain backward compatibility for current fleet sustainment, and is the first release of government developed software common to both the MLRS and HIMARS launcher. The increase from FY2019 funds additional research and development related to Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications, allowing the MLRS to continue to effectively operate in near peer threat environments. Conducts delta testing of the Improved Armored Cab (IAC) with the new vendor.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0603778A / <i>MLRS Product Improvement Program</i>
---	---

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 Extended Range (ER) Guided Multiple Launch Rocket System (GMLRS), the Army Tactical Missile System (ATACMS), and the Precision Strike Missile (PrSM). These munitions are capable of engaging targets with precision at ranges in excess of 400 kilometers. Project DX8 funds software development, training updates, and Assured Positioning, Navigation and Timing (APNT) technology implementation for the HIMARS launcher.

Justification:
FY 2020 Base funding in the amount of \$13.314 million for Project DX8 continues tactical launcher software development and testing to support the Fire Control System (FCS) 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. The increase from FY2019 funds additional research and development related to Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications, allowing the HIMARS to continue to effectively operate in near peer threat environments.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	8.929	8.886	8.877	-	8.877
Current President's Budget	10.286	6.877	22.877	-	22.877
Total Adjustments	1.357	-2.009	14.000	-	14.000
• Congressional General Reductions	-0.007	-0.009			
• Congressional Directed Reductions	-	-2.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.714	-			
• SBIR/STTR Transfer	-0.350	-			
• Adjustments to Budget Years	-	-	14.000	-	14.000

Change Summary Explanation

FY18: The \$1.357 million increase in base funding is a result of a decrease of \$0.350 million for SBIR/STTR funding and increased funding by \$1.714 million to support development and testing of software for the Fire Control System.

FY19: The \$2.312 decrease in base funding is a result of Army realignment of funds to higher priority programs.

FY20: The \$14.000 million increase in base funding is a result of the increased amount of development and testing with Assured Positioning, Navigation and Timing (APNT) and multiple Fire Control System (FCS) software versions in support of both the MLRS and HIMARS launcher fleets.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
093: Multi-Launch Rocket System (MLRS)	-	5.760	3.943	9.563	-	9.563	5.041	5.040	31.506	65.580	0.000	126.433
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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 and emerging Multiple Launch Rocket System (MLRS) Family of Munitions (MFOM), to include the Extended Range (ER) Guided Multiple Launch Rocket System (GMLRS), the Army Tactical Missile System (ATACMS), and the Precision Strike Missile (PrSM). These munitions are capable of engaging targets with precision at ranges in excess of 400 kilometers. Project 093 funds software development, training updates, Assured Positioning, Navigation and Timing (APNT) technology implementation, and integration of satellite communications for the MLRS launcher.

Justification:

FY 2020 Base funding in the amount of \$9.563 million for Project 093 continues tactical launcher software development and testing to support the Fire Control System (FCS) obsolescence mitigation hardware upgrade required to operate a MLRS launcher. The tactical software is a critical developmental item required to field additional launchers, maintain backward compatibility for current fleet sustainment, and is the first release of government developed software common to both the MLRS and HIMARS launcher. The increase from FY 2019 funds additional research and development related to Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications, allowing the MLRS to continue to effectively operate in near peer threat environments. Conducts delta testing of the Improved Armored Cab (IAC) with the new vendor.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MLRS Product Improvement Program	5.760	3.784	9.563	-	9.563
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 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 Information Assurance compliance certification and network interoperability testing. Perform technical assessments and concept studies for the					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>following: obsolescence mitigation, Assured Positioning, Navigation and Timing (APNT), crew protection, automotive and hardware/software enhancements, improving operational timelines and risk reduction.</p> <p>FY 2019 Plans: Continue tactical launcher software development to support the Fire Control System obsolescence mitigation hardware upgrade required to operate a MLRS launcher and support upgrade and improvements to munitions.</p> <p>FY 2020 Base Plans: Will continue tactical launcher software development and testing to support the Fire Control System (FCS) obsolescence mitigation hardware upgrade required to operate a MLRS launcher. Conduct research and development of Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications. Conduct delta testing of the Improved Armored Cab (IAC) with the new vendor.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increased funding of \$5.779 million funds additional research and development of Global Positioning System (GPS) Anti-Jam and Anti-Spoofing capabilities, and integration of satellite communications. This development allows the MLRS Launcher to continue effective operations in near-peer threat environments. Conducts delta testing of the Improved Armored Cab (IAC) with the new vendor.</p>					
<p>Title: FY 2019 SIBR/STTR Transfer</p> <p>Description: Account for the FY2019 SBIR / STTR Adjustment</p> <p>FY 2019 Plans: FY 2019 SBIR / STTR Adjustment</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in FY 2020 due to SBIR / STTR transfer in FY 2019</p>	-	0.159	-	-	-
Accomplishments/Planned Programs Subtotals	5.760	3.943	9.563	-	9.563

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• C67500: MLRS Mods	138.235	478.998	0.000	387.019	387.019	384.859	277.928	207.388	34.518	Continuing	Continuing

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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)

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

Remarks

C67500 is Budget Line Item Number (BLIN) 22 funded in the Missiles Procurement Army (MIPA or MSLS) 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 of the launcher organic version 8.x software, reacting to system changes driven by policy and emerging requirements, and maintaining architectural compatibility. Update software and hardware for communications and munitions to maintain compatibility and operational viability against a near-peer adversary.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	Various	PFRMS Project Office : Redstone Arsenal, AL	8.955	-		-		-		-		-	0.000	8.955	-
FY 2019 SBIR / STTR	Various	Various : Various	-	-		0.159		-		-		-	0.000	0.159	-
Subtotal			8.955	-		0.159		-		-		-	0.000	9.114	N/A

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

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Other Government Agencies OGA	MIPR	FT SILL OK, CECOM-NJ AMRDEC-RSA AL, : various	17.108	-		-		-		-		-	0.000	17.108	-
MLRS IAC	C/CPFF	Lockheed Martin : Grand Prairie, TX	30.498	-		-		-		-		-	0.000	30.498	-
MLRS FCS Development	SS/CR	Lockheed Martin : Grand Prairie, TX	70.200	-		-		-		-		-	0.000	70.200	-
Organic Software Development	MIPR	AMRDEC : Redstone Arsenal, AL	-	5.760	Apr 2018	3.784	May 2019	8.314	Dec 2019	-		8.314	Continuing	Continuing	Continuing
Risk Reduction Effort: Common Fire Control System	SS/CR	Lockheed Martin : Grand Prairie, TX	21.900	-		-		-		-		-	0.000	21.900	-
Risk Reduction Effort: Hulls	MIPR	Red River Army Depot : Red River Army Depot, TX	3.200	-		-		-		-		-	0.000	3.200	-
Subtotal			142.906	5.760		3.784		8.314		-		8.314	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 7				PE 0603778A / MLRS Product Improvement Program				093 / Multi-Launch Rocket System (MLRS)								
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				
Remarks																
Organic (government developed, maintained, and owned) software development includes additional research and development related to Fire Control System obsolescence, Assured Position, Navigation and Timing (A/PNT) activities such as Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications.																
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				
Support Contract	Various	Multiple : Multiple	4.834	-		-		-		-		-	0.000	4.834	-	
Subtotal			4.834	-		-		-		-		-	0.000	4.834	N/A	
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total		Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost				
Test Support, Joint Interoperability Test Certificate	MIPR	CTSF, Ft. Hood : Texas	10.712	-		-		-		-		-	0.000	10.712	-	
Test Support	MIPR	Ft Hood, TX, ATEC, APG, MD, WSMR, RTC, : RSA: Various	-	-		-		1.249	Nov 2019	-		1.249	Continuing	Continuing	Continuing	
Subtotal			10.712	-		-		1.249		-		1.249	Continuing	Continuing	N/A	
Remarks																
Test support includes two items. First is to validate Improved Armored Cab (IAC) design modifications to address limitations found during original live fire testing and validate the new manufacturer. Second test item is software qualification testing for the Fire Control System.																
Project Cost Totals			167.407	5.760		3.943		9.563		-		9.563	Continuing	Continuing	N/A	

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army							Date: March 2019			
Appropriation/Budget Activity 2040 / 7			R-1 Program Element (Number/Name) PE 0603778A / <i>MLRS Product Improvement Program</i>			Project (Number/Name) 093 / <i>Multi-Launch Rocket System (MLRS)</i>				
	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks
 Acronyms:
 AMRDEC - Aviation and Missile Research Development and Engineering Center;
 PFRMS - Precision Fires 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

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019	
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)	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Software Development	[Redacted]																											
Software Qualification Test	[Redacted]																											
Delta Live Fire Testing for Improved Armored Cab (IAC)	[Redacted]																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0603778A / <i>MLRS Product Improvement Program</i>	Project (Number/Name) 093 / <i>Multi-Launch Rocket System (MLRS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Software Development	1	2018	4	2024
Software Qualification Test	3	2020	3	2020
Delta Live Fire Testing for Improved Armored Cab (IAC)	1	2020	1	2020

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DX8: HIMARS Product Improvement Program	-	4.526	2.934	13.314	-	13.314	5.126	7.439	4.042	4.210	0.000	41.591
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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 Extended Range (ER) Guided Multiple Launch Rocket System (GMLRS), the Army Tactical Missile System (ATACMS), and the Precision Strike Missile (PrSM). These munitions are capable of engaging targets with precision at ranges in excess of 400 kilometers. Project DX8 funds software development, training updates, and Assured Positioning, Navigation and Timing (APNT) technology implementation for the HIMARS launcher.

Justification:

FY 2020 Base funding in the amount of \$13.314 million for Project DX8 continues tactical launcher software development and testing to support the Fire Control System (FCS) 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. The increase from FY 2019 funds additional research and development related to Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications, allowing the HIMARS to continue to effectively operate in near peer threat environments.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MLRS Production Improvement Program (PIP)-HIMARS PIP	4.526	2.790	13.314	-	13.314
Description: The HIMARS Product Improvement Program provides the preservation of platform viability and readiness to accept technology insertion as capability enhancements are developed and to mitigate obsolescence. Support efforts include: obsolescence mitigation and enhancements for the truck, Fire Control System, Launcher Loader Module and Enhanced Command and Control; development and updating the Fire Control System software to keep pace with changes to the munitions; and performing Command, Control, Communications, Computers and Intelligence (C4I)/interoperability and Information Assurance compliance certification and network interoperability testing. Perform technical assessments and concept studies for the following: obsolescence mitigation, Assured Positioning, Navigation and Timing (APNT), crew protection, automotive and hardware/software enhancements, improving operational timelines and risk reduction.					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>FY 2019 Plans: Continue tactical launcher software development to support the Fire Control System obsolescence mitigation hardware upgrade required to operate a HIMARS launcher and support upgrade and improvements to munitions.</p> <p>FY 2020 Base Plans: Will continue tactical launcher software development and testing to support the Fire Control System (FCS) obsolescence mitigation hardware upgrade required to operate a HIMARS launcher. Conduct research and development of Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increased funding of \$10.524 million funds additional research and development of Global Positioning System (GPS) Anti-Jam and Anti-Spoofing capabilities, and integration of satellite communications. This development allows the HIMARS Launcher to continue effective operations in near-peer threat environments.</p>					
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>Description: Account for the FY 2019 SBIR / STTR Adjustment</p> <p>FY 2019 Plans: FY 2019 SBIR / STTR Adjustment</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in FY 2020 due to SBIR / STTR transfer in FY 2019</p>	-	0.144	-	-	-
Accomplishments/Planned Programs Subtotals	4.526	2.934	13.314	-	13.314

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• C67501: HIMARS Modifications	9.566	10.196	0.000	12.483	12.483	6.089	7.300	9.711	17.421	Continuing	Continuing
• C02901: High Mobility Artillery Rocket System (HIMARS)	238.000	171.138	0.000	-	0.000	-	89.077	41.274	-	0.000	539.489

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0603778A / <i>MLRS Product Improvement Program</i>	Project (Number/Name) DX8 / <i>HIMARS Product Improvement Program</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

Remarks
C67501 (Budget Line Item Number 23) and C02091 (Budget Line Item Number 13) are funded in the Missiles Procurement Army (MIPA or MSLS) 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 requirements, and maintaining architectural compatibility. Update software and hardware for communications and munitions to maintain compatibility and operational viability against a near-peer adversary.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	Various	PFRMS Project Office : Redstone Arsenal, AL	0.817	-		-		-		-		-	0.000	0.817	-
FY 2019 SBIR / STTR	Various	Various : Various	-	-		0.144		-		-		-	0.000	0.144	-
Subtotal			0.817	-		0.144		-		-		-	0.000	0.961	N/A

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

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Other Government Agencies (OGA)	MIPR	AMCOM, GSA, RSA : Various	3.318	-		-		-		-		-	0.000	3.318	-
Organic Software Development	MIPR	AMRDEC : Redstone Arsenal, AL	6.863	4.526	Apr 2018	2.690	Apr 2019	12.065	Apr 2020	-		12.065	Continuing	Continuing	Continuing
Subtotal			10.181	4.526		2.690		12.065		-		12.065	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 Position, Navigation and Timing (A/PNT) activities such as Global Positioning System (GPS) Anti-Jam, Anti-Spoofing capabilities, and integration of satellite communications.

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support	MIPR	Ft Hood, TX, ATEC, APG, MD, WSMR, RTC, RSA : Various	3.459	-		0.100	Jun 2019	1.249	Jun 2020	-		1.249	Continuing	Continuing	Continuing
Subtotal			3.459	-		0.100		1.249		-		1.249	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			



Remarks
Test support includes software qualification testing for the Fire Control System.

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	14.457	4.526	2.934	13.314	-	13.314	Continuing	Continuing	N/A

Remarks
 AMRDEC - Aviation and Missile Research Development and Engineering Center;
 PFRMS - Precision Fires 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

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Software Development					Software Development																							
Software Qualification Test									 Software Qualification Test																			
Improved Crew Protection (ICP) Cab Live Fire Testing (Coupon Testing)									 Coupon Testing																			

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0603778A / <i>MLRS Product Improvement Program</i>	Project (Number/Name) DX8 / <i>HIMARS Product Improvement Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Software Development	1	2019	4	2024
Software Qualification Test	3	2020	3	2020
Improved Crew Protection (ICP) Cab Live Fire Testing (Coupon Testing)	4	2019	4	2019

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	4.014	4.067	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.081
ET1: <i>Tractor Peel</i>	-	4.014	4.067	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.081

A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)

	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	4.014	4.067	4.333	-	4.333
Current President's Budget	4.014	4.067	0.000	-	0.000
Total Adjustments	0.000	0.000	-4.333	-	-4.333
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-4.333	-	-4.333

Change Summary Explanation

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	4.009	7.251	8.491	-	8.491	8.691	8.985	9.081	7.249	Continuing	Continuing
FB1: Anti-Tamper Technology Support	-	4.009	7.251	8.491	-	8.491	8.691	8.985	9.081	7.249	Continuing	Continuing

Note

Prior to FY17, the Anti-Tamper Technology Support program was funded under APE 0605801A M46.

A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)

	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	4.094	4.254	7.017	-	7.017
Current President's Budget	4.009	7.251	8.491	-	8.491
Total Adjustments	-0.085	2.997	1.474	-	1.474
• Congressional General Reductions	-0.002	-0.003			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	3.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.083	-			
• Adjustments to Budget Years	-	-	1.474	-	1.474

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

Project: FB1: Anti-Tamper Technology Support

Congressional Add: Anti-Tamper (AT) Congressional Add

	FY 2018	FY 2019
	-	3.000
Congressional Add Subtotals for Project: FB1	-	3.000
Congressional Add Totals for all Projects	-	3.000

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0605024A / <i>Anti-Tamper Technology Support</i>	
<u>Change Summary Explanation</u> FY 2019 - Congressional general reduction of \$.003 million and Congressional Add funds of \$3.00 million to allow acceleration of current AT efforts. FY 2020 increase of \$1.474 million supports additional Army directed AT efforts.		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0605024A / <i>Anti-Tamper Technology Support</i>				Project (Number/Name) FB1 / <i>Anti-Tamper Technology Support</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FB1: <i>Anti-Tamper Technology Support</i>	-	4.009	7.251	8.491	-	8.491	8.691	8.985	9.081	7.249	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

	FY 2018	FY 2019	FY 2020
Title: Anti-Tamper (AT) Technology Support	4.009	4.159	8.491
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 2019 Plans: Build and maintain the PT core team of subject matter experts (SMEs) available for this mission to support the development of and evaluate the AT designs for Army programs. In support of that primary mission, continue to build state-of-the-art RE capabilities to facilitate technical assessments of micro-electronic parts used in the electronic designs of critical Army weapons systems.			
FY 2020 Plans: Will continue to build and maintain the PT core team of subject matter experts (SMEs) available for this ongoing mission to support the development of Army programs and evaluating their AT architectures. In support of that primary mission, PT must and will continue to build and maintain state-of-the-art RE capabilities to facilitate technical assessments to evaluate the vulnerabilities of micro-electronic components used in the electronic designs of Army weapons systems with critical program information (CPI) that requires protection.			
FY 2019 to FY 2020 Increase/Decrease Statement: Funding change supports increased requirement to provide subject matter expertise and systems engineering activities to evaluate and support efforts to prevent or deter reverse engineering of Anti-Tamper architectures on additional Army Acquisition Programs.			
Title: FY2019 SBIR/STTR Transfer	-	0.092	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0605024A / <i>Anti-Tamper Technology Support</i>	Project (Number/Name) FB1 / <i>Anti-Tamper Technology Support</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Description: FY2019 SBIR/STTR Transfer			
FY 2019 Plans: FY2019 SBIR/STTR Transfer			
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR/STTR Transfer			
Accomplishments/Planned Programs Subtotals	4.009	4.251	8.491

	FY 2018	FY 2019
Congressional Add: Anti-Tamper (AT) Congressional Add	-	3.000
FY 2019 Plans: Anti-Tamper (AT) Congressional Add		
Congressional Adds Subtotals	-	3.000

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0605024A / <i>Anti-Tamper Technology Support</i>	Project (Number/Name) FB1 / <i>Anti-Tamper Technology Support</i>
--	---	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AT CA - Accelerate new Novel Tech Solutions	TBD	AMRDEC ; , Redstone Arsenal AL	-	-		3.000	Jan 2019	-		-		-	0.000	3.000	-
Subtotal			-	-		3.000		-		-		-	0.000	3.000	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AT V&V Activities	Various	Redstone Arsenal & Prime Contract locations : Redstone Arsenal	-	1.492	Jul 2018	1.945	Oct 2018	2.947	Oct 2019	-		2.947	0.000	6.384	-
FY2019 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.092	Oct 2018	-		-		-	0.000	0.092	-
Subtotal			-	1.492		2.037		2.947		-		2.947	0.000	6.476	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AT/RE Lab Facilities & Equipment	Various	Redstone Arsenal, AL : Redstone Arsenal, AL	-	1.713	Jul 2018	1.352	Oct 2018	3.696	Oct 2019	-		3.696	0.000	6.761	-
Subtotal			-	1.713		1.352		3.696		-		3.696	0.000	6.761	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0605024A / <i>Anti-Tamper Technology Support</i>	Project (Number/Name) FB1 / <i>Anti-Tamper Technology Support</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
AT V&V Activities	[Redacted]																											
AT/RE Lab Facilities and Equipment	[Redacted]																											
AT/RE Laboratory Assessments	[Redacted]																											
AT Congressional Add - New Novel Tech Solutions	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0605024A / <i>Anti-Tamper Technology Support</i>	Project (Number/Name) FB1 / <i>Anti-Tamper Technology Support</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
AT V&V Activities	1	2017	4	2024
AT/RE Lab Facilities and Equipment	1	2017	4	2024
AT/RE Laboratory Assessments	1	2017	4	2024
AT Congressional Add - New Novel Tech Solutions	2	2019	4	2019

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	16.302	18.551	15.645	-	15.645	10.197	8.833	8.721	2.989	Continuing	Continuing
ER2: <i>Close Combat Technology</i>	-	4.408	3.143	2.056	-	2.056	0.000	0.000	0.000	0.000	Continuing	Continuing
ER5: <i>Indirect Fire and Fuze Technology</i>	-	3.540	2.817	5.064	-	5.064	4.468	2.241	2.308	0.000	Continuing	Continuing
ER6: <i>Direct Fire Technology</i>	-	8.354	12.591	8.525	-	8.525	5.729	6.592	6.413	2.989	Continuing	Continuing

A. Mission Description and Budget Item Justification

Project ER2: The Close Combat Technology program 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.

FY 2020 funds resource improvements to XM111 Offensive Hand Grenade.

Project ER5: The Indirect Fire and Fuze Technology Project includes product improvement development efforts to upgrade indirect fire weapon systems and munitions that have already been fielded and/or are in production. Initiatives 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 through introduction of new and alternative technology and materiel solutions, improvement of manufacturing methods and their associated production and life cycle support processes, new capabilities in response to the evolving and emerging threats and countermeasures, and reduction/elimination of potential environmental and health risks associated with these products. FY 2020 funds will support engineering testing and evaluation on replacement electronic transceiver prototypes for indirect and direct fire proximity fuzes, testing on optimized impact switches for use in mortar and medium caliber fuzes that will improve producibility, testing of the medium caliber fuze safety design modifications, analysis of prototype low cost electronic safe and arm devices, analysis on hand grenade fuzes to reduce the number of critical defects that will improve producibility and increase safety, and evaluations on the next generation microcontroller to replace a one-time programmable component due to part obsolescence for mortar proximity fuzes. FY 2020 funds will also support qualification of Hexachloroethane Titanium Oxide (HX) smoke fill formulation into the 81mm smoke family of ammunitions. Engineering efforts will identify the formulation percentage of constituents and identify the production processes required to promote effective smoke production that is less toxic and ultimately provides effective smoke screening and burn time performance. FY 2020 funds will also support reliability improvements and increased range within current fielded Artillery and Mortar Conventional Ammunition.

Project ER6: The Direct Fire Technology funding will be used to support direct fire ammunition from small caliber ammunition, 40mm grenade, medium caliber cannon ammunition and large caliber ammunition enhancements to lethality, effectiveness, survivability, accuracy and general product improvements. FY 2020 funds are used for a more lethal and safer design for 40mm grenades that will be built and tested. Warhead improvement and primer improvement for 30mm ammunition are also

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>
---	---

under development. A number of improvements for training ammunition, environmentally friendly primers, and lightweight small caliber ammunition will continue to be developed. Potential improvements to 105mm and 120mm ammunition will be examined.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	15.738	18.570	12.740	-	12.740
Current President's Budget	16.302	18.551	15.645	-	15.645
Total Adjustments	0.564	-0.019	2.905	-	2.905
• Congressional General Reductions	-0.013	-0.019			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.187	-			
• SBIR/STTR Transfer	-0.610	-			
• Adjustments to Budget Years	-	-	2.905	-	2.905

Change Summary Explanation

FY 2020 increase of \$2.905 million includes the following budget adjustments:
 \$0.323 million decrease to Project ER5: Indirect Fire and Fuze Technology.
 \$3.228 million increase to Project ER6: Direct Fire Technology.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ER2: Close Combat Technology	-	4.408	3.143	2.056	-	2.056	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This 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 Project will identify, characterize, study, analyze, test and develop technologies to resolve close combat munition reliability, safety, environmental, storage, standardization, obsolescence and manufacturing/producibility issues.

FY 2020 funds will resource improvements to XM111 Offensive Hand Grenade.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: MK3A2 Replacement, XM111 Offensive Hand Grenade</p> <p>Description: The current MK3A2 Offensive Hand Grenade can expose the Warfighter to toxic levels of asbestos and is restricted for use in Continental United States and Outside Continental United State (CONUS/OCONUS). The warfighter cannot safely employ this grenade. Alternate munitions do not satisfy user requirements for incapacitating the enemy. This effort incorporates modern materials and insensitive explosives to provide a safer, producible offensive grenade and its associated training device, XM112.</p> <p>FY 2019 Plans: Complete Type Classification/Full Material Release (TC/FMR) documentation.</p> <p>FY 2020 Base Plans: Build and test prototypes for qualification of alternate explosive fill.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funds are needed to build and test prototypes for the qualification of an alternate fill (based on obsolescence risk against current fill).</p>	2.617	1.157	2.056	-	2.056
<p>Title: Countermeasure Flare Decoy Formulations</p> <p>Description: Improve the producibility of countermeasure (CM) decoy formulations in order to increase the production safety and functional reliability to protect aircraft against multiple threat systems.</p>	1.570	-	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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
--	---	---

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: AN-M8A1 Obscuration Grenade</p> <p>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-M8. Soldiers must use two or three M8 grenades to produce obscuration effects comparable to a single AN-M8 grenade.</p> <p>FY 2019 Plans: Complete Inhalation and Ecological Toxicity Assessments of new Hexachloroethane Titanium Oxide (HX) smoke formulation. Review and revalidate User requirements. Complete Phase-I Technical Data Package (TDP) scrub. Conduct performance tests and final adjustments to smoke formulation. Initiate starter cup development and conduct fuze assessment. Coordinate with Pine Bluff Arsenal (PBA) to ensure PBA programs for required production facility upgrades in synchronization with Project Manager Close Combat Systems (PM CCS) program objectives to establish an AN-M8A1 production capability that currently does not exist.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: No funding allotted for this effort.</p>	0.161	1.266	-	-	-
<p>Title: M82 Simulant Smoke Practice Grenade</p> <p>Description: The M82 encountered performance issues during the last production as a result of the less than optimal design for the base. Developing a new base design that minimizes any leak paths and facilitates the metal clip contact surface with the launcher will greatly improve the producibility and reliability of the grenade. This effort consists of the development and prove out of the base design.</p> <p>FY 2019 Plans: Develop base design, procure mold and parts for testing.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Effort complete.</p>	-	0.619	-	-	-
<p>Title: Family of Scatterable Mines (FASCAM)</p>	0.060	-	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER2 / <i>Close Combat Technology</i>
--	---	--

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: This effort supports the development of a new Deep Terrain Shaping Obstacle (DTSO). The current Deep Terrain Shaping Obstacle in the U.S. inventory has a life expectancy of 36 years (losing capability in 2025). The methods used to make this determination are unknown. Testing effort is to determine the actual life expectancy and effectiveness of the current Deep Terrain Shaping Obstacle system in order to decide when a replacement capability needs to be fielded. In parallel, evaluation the technical data package and determining the cost of producing additional units of the current Deep Terrain Shaping Obstacle.					
Title: FY 2019 SBIR / STTR Transfer	-	0.101	-	-	-
FY 2019 Plans: FY 2019 SBIR / STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	4.408	3.143	2.056	-	2.056

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• E33010: <i>GRENADE, Hand, Offensive, XM111</i>	-	-	0.000	2.310	2.310	5.700	13.570	12.120	13.834	0.000	47.534

Remarks

D. Acquisition Strategy

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

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

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

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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
--	---	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
M82 Simulant Smoke Practice Grenade Improved Propellant Retainer	TBD	PM CCS : Picatinny Arsenal, NJ	-	-		0.028	Mar 2019	-		-		-	0.000	0.028	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	TBD	PM CCS : Picatinny Arseanl, NJ	-	-		0.507	Sep 2019	-		-		-	0.000	0.507	-
Subtotal			-	-		0.535		-		-		-	0.000	0.535	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Claymore Force-on-Force TADSS Trainer - Design, Develop and Deliver a Production Prototype	MIPR	ARDEC : Picatinny Arsenal, NJ	1.267	-		-		-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	C/FFP	Battelle Memorial Institute : Columbus, OH	0.548	-		-		0.450	Feb 2020	-		0.450	Continuing	Continuing	-
M82 Simulant Smoke Practice Grenade Improved Propellant Retainer	MIPR	DoD Ordnance Technology consortium (DOTC)- TBD : Various	-	-		0.100	Jun 2019	-		-		-	0.000	0.100	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.101		-		-		-	0.000	0.101	-
Subtotal			1.815	-		0.201		0.450		-		0.450	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER2 / <i>Close Combat Technology</i>
--	---	--

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	ARDEC : Picatinny Arsenal, NJ	1.227	1.668	May 2018	0.485	Feb 2019	1.162	Jan 2020	-		1.162	Continuing	Continuing	-
Countermeasure Flare Decoy Formulations	MIPR	ARDEC : Picatinny Arsenal, NJ	0.269	1.098	Jun 2018	-		-		-		-	Continuing	Continuing	-
AN-M8A1 Enhanced Obscuration Grenade	MIPR	ARDEC : Picatinny Arsenal, NJ	0.125	0.020	Apr 2018	0.521	Mar 2019	-		-		-	Continuing	Continuing	-
AN-M8A1 Enhanced Obscuration Grenade	MIPR	ECBC : Edgewood, MD	-	0.141	Jun 2018	0.745	Mar 2019	-		-		-	Continuing	Continuing	-
AN-M8A1 Enhanced Obscuration Grenade	MIPR	Pine Bluff : Pine Bluff Arsenal	0.067	-		-		-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Defense Information Technical Center : Fort Belvoir, VA	0.008	-		-		-		-		-	Continuing	Continuing	-
M82 Simulant Smoke Practice Grenade Improved Propellant Retainer	MIPR	ECBC : Edgewood, MD	-	-		0.095	Feb 2019	-		-		-	Continuing	Continuing	-
M82 Simulant Smoke Practice Grenade Improved Propellant Retainer	MIPR	Pine Bluff Arsenal : PBA, AR	-	-		0.099	Dec 2019	-		-		-	Continuing	Continuing	-
FASCAM Study - Mine Design and Producibility Review	C/CPFF	Savit : Rockaway, NJ	0.401	-		-		-		-		-	Continuing	Continuing	-
FASCAM Study - Gator Landmine System Reliability Review	MIPR	ARDEC : Picatinny Arsenal, NJ	0.440	-		-		-		-		-	Continuing	Continuing	-
FASCAM Study - GATOR Drop Test	MIPR	ARDEC : Picatinny Arsenal, NJ	0.160	-		-		-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Nova Tech : NJ	0.104	-		-		-		-		-	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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
--	---	---

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FASCAM Study - YPG Gator Component Testing	MIPR	Yuma Proving Ground (YPG) : Yuma, AZ	0.383	0.060	Aug 2018	-		-		-		-	Continuing	Continuing	-
FASCAM Study - ARDEC Gator Component Testing	MIPR	ARDEC : Picatinny Arsenal, NJ	0.290	-		-		-		-		-	Continuing	Continuing	-
FASCAM Study - ARDEC Gator Component Testing	MIPR	ARDEC : Picatinny Arsenal, NJ	0.227	-		-		-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Various : Various locations	-	0.031	May 2018	0.028	Apr 2019	0.030	Mar 2020	-		0.030	0.000	0.089	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Batelle : Ohio	-	0.118	Aug 2018	-		-		-		-	0.000	0.118	-
M82 Simulant Smoke Practice Grenade Improved Propellant Retainer	MIPR	ARDEC : Picatinny Arsenal, NJ	-	-		0.297	Jan 2019	-		-		-	Continuing	Continuing	-
Subtotal			3.701	3.136		2.270		1.192		-		1.192	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Army Test and Evaluation Command : Aberdeen Proving Grounds, MD	0.626	-		-		-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Redstone Tech Test Center : Redstone Test Center	-	0.037	Apr 2018	-		0.414	Jul 2020	-		0.414	Continuing	Continuing	-
Countermeasure Flare Decoy Formulations	MIPR	Naval Air Warfare Center Aircraft	0.150	0.472		-		-		-		-	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
		Division : Patuxent River, MD													
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	ATC : Aberdeen Proving Grounds, NJ	0.147	0.204	Apr 2018	-		-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Dugway Proving Grounds : UT	0.024	-		-		-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Yuma Proving Ground : Yuma, AZ	0.116	0.452	Jul 2018	0.137	Mar 2019	-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111 Offensive Hand Grenade	MIPR	Public Health Command : MD	0.040	-		-		-		-		-	Continuing	Continuing	-
MK3A2 Replacement, XM111, Offensive Hand Grenade	MIPR	Maneuver Center of Excellence : Ft. Benning, GA	-	0.107	Aug 2018	-		-		-		-	0.000	0.107	-
Subtotal			1.103	1.272		0.137		0.414		-		0.414	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.619	4.408	3.143	2.056	-	2.056	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER2 / <i>Close Combat Technology</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
MK3A2 Replacement, XM111 Offensive Hand Grenade Effort																																				
Produce Test Quantity																																				
Production Qualification Testing																																				
Testing (Insensitive Munitions (IM), E3)																																				
Limited User Assessment (LUA)																																				
Type Classification (TC) Documentation																																				
Type Classification MK3A2																																				
DoD Ordnance Technology Consortium (DOTC) contract award																																				
Prototype build for qualification testing																																				
Qualification testing																																				
Full Materiel Release (FMR)																																				
Countermeasure Flare Decoy Formulations																																				
Developmental Testing & Analysis																																				

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER2 / <i>Close Combat Technology</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Hardware Contract Award	▲ 1 Contract Award																											
Economic Change Proposal (ECP) Tech Data Package				▲ 2 ECP																								
Countermeasure Flare Flight Testing	■																											
AN-M8A1 Obscuration Grenade																												
Hexachloroethane Titanium Oxide (HX) Toxicity Study	■																											
AN-M8A1 Ecological Study				■																								
Phase 1 Technical Data Package (TDP) Scrub				■																								
Fuze Assessment								■																				
Trade Analysis & Requirements Validation								■																				
Starter Cup Development				■																								
Grenade Producibility Study								■																				
Facilitization Contract Prep												■																
Technical Data Package (TDP) Scrub (phase II)																■												

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER2 / <i>Close Combat Technology</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024																																																																																																																																																																																																																																																															
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																																																																																																																																																																																																																																																												
Award Grenade Facility Equipment Contract																													5																																																																																																																																																																																																																																																											
Grenade Qualification Tests																																																									[Bar]																																																																																																																																																																																																																															
Type Classification Standard AN-M8A1																																																																																					7 TC																																																																																																																																																																																																			
Full Materiel Release																																																																																																																	8 FMR																																																																																																																																																																							
M82 Simulant Smoke Grenade Propellant Retainer Effort																																																																																																																																																																																																																																																																																								
Propellant Retainer Development																																																																																																																																																																																																																																																																																								
Prototype Mold and Parts																																																																																																																																																																																																																																																																																								
Family of Scatterable Mines (FASCAM) Study																																																																																																																																																																																																																																																																																								
Mine Design and Producibility Review																																																																																																																																																																																																																																																																																								
Gator Landmine System Dynamic Reliability Review																																																																																																																																																																																																																																																																																								
Gator Laboratory Reliability Testing																																																																																																																																																																																																																																																																																								

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER2 / <i>Close Combat Technology</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MK3A2 Replacement, XM111 Offensive Hand Grenade Effort	1	2017	4	2020
Produce Test Quantity	4	2017	4	2018
Production Qualification Testing	2	2018	4	2018
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 MK3A2	4	2019	4	2019
DoD Ordnance Technology Consortium (DOTC) contract award	2	2020	2	2020
Prototype build for qualification testing	2	2020	3	2020
Qualification testing	4	2020	1	2021
Full Materiel Release (FMR)	3	2022	3	2022
Countermeasure Flare Decoy Formulations	1	2017	4	2020
Developmental Testing & Analysis	1	2017	2	2018
Hardware Contract Award	2	2018	2	2018
Economic Change Proposal (ECP) Tech Data Package	4	2018	4	2018
Countermeasure Flare Flight Testing	2	2018	2	2018
AN-M8A1 Obscuration Grenade	1	2017	4	2020
Hexachloroethane Titanium Oxide (HX) Toxicity Study	1	2017	1	2019
AN-M8A1 Ecological Study	4	2018	1	2019
Phase 1 Technical Data Package (TDP) Scrub	1	2019	1	2019
Fuze Assessment	2	2019	3	2019
Trade Analysis & Requirements. Validation	2	2019	4	2019

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER2 / <i>Close Combat Technology</i>
--	---	--

Events	Start		End	
	Quarter	Year	Quarter	Year
Starter Cup Development	2	2018	3	2019
Grenade Producibility Study	2	2019	1	2020
Facilitization Contract Prep	3	2020	3	2021
Technical Data Package (TDP) Scrub (phase II)	2	2021	3	2021
Award Grenade Facility Equipment Contract	4	2021	4	2021
Grenade Qualification Tests	2	2023	3	2023
Type Classification Standard AN-M8A1	2	2024	2	2024
Full Materiel Release	2	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	1	2020
Family of Scatterable Mines (FASCAM) Study	3	2017	3	2018
Mine Design and Producibility Review	4	2017	3	2018
Gator Landmine System Dynamic Reliability Review	1	2018	2	2018
Gator Laboratory Reliability Testing	3	2017	1	2018

Note

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

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>				Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ER5: <i>Indirect Fire and Fuze Technology</i>	-	3.540	2.817	5.064	-	5.064	4.468	2.241	2.308	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Indirect Fire and Fuze Technology Project includes product improvement development efforts to upgrade indirect fire weapon systems and munitions that have already been fielded and/or are in production. Indirect Fire Weapons and Munitions Product Improvement Projects 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 through introduction of new and alternative technology and materiel solutions, improvement of manufacturing methods and their associated production and life cycle support processes, new capabilities in response to the evolving and emerging threats and countermeasures, and reduction/elimination of potential environmental and health risks associated with these products.

This Project supports the identification, study, analysis, and development of fuzing technologies and safe arm devices in production and in the field. This Project will implement 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 by providing competition, and maintain production when sources or parts are no longer available. It will also allow for the performance enhancement of current ammunition items by conducting studies of major fuze components to detect and identify latent defects. The second major area is block upgrades, which will identify and perform studies on improvements to fuzes, increase commonality of fuze components and requirements. Block upgrades will enable the introduction of the latest technologies into fuzing, keep the fuzing design current to avoid obsolescence issues, and add capabilities. FY 2020 funds will support the engineering tests and evaluations on the prototype replacement electronic transceiver prototypes for indirect fire and direct fire proximity fuzes, will conduct engineering tests on optimized impact switches for use in mortar and medium caliber fuzes that will improve producibility, will conduct engineering tests of the medium caliber fuze safety design modifications, will support the analysis of the prototype low cost electronic safe and arm devices, will support the analysis on the hand grenade fuzes to reduce the number of critical defects that will improve producibility and increase safety, and will conduct evaluations on the next generation microcontroller to replace a one-time programmable component due to part obsolescence for mortar proximity fuzes.

This Project also supports the incorporation of the new Hexachloroethane Titanium Oxide (HX) smoke fill formulation while utilizing the existing illumination shell body configuration to support mortar smoke training for US Army Europe (USAREUR). The HX smoke fill formulation is less toxic and less incendiary than the current Mortar Red Phosphorus (RP) or White Phosphorous (WP) Smoke rounds and will reduce risk of unintended collateral damage or environmentally hazardous waste. USAREUR has yearly requirements for procurement of smoke mortar cartridges across all calibers to be used for training, but is prohibited from training with the current WP or RP smoke munitions in Europe due to environmental restrictions. FY 2020 funds support qualification of HX smoke fill formulation into the 81mm smoke family of ammunitions. Engineering efforts will identify the formulation percentage of constituents and identify the production processes required to promote effective smoke production that is less toxic and ultimately provides effective smoke screening and burn time performance.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>
--	---	--

This Project also supports artillery and mortar conventional ammunition enhancements to lethality, effectiveness, survivability, accuracy and general product improvements. FY 2020 funding will support reliability improvements and increased range within current fielded Artillery and Mortar Conventional Ammunition.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Fuze Technology Improvements (FTI)</p> <p>Description: This project implements new, mature, technologies into fuzing systems to preclude obsolescence, maximize standardization, enhance performance, and improve the safety and exportability of existing munitions. The Fuze Technology Improvements (FTI) project addresses two major areas: (1) analysis and (2) block upgrades. Analysis efforts will identify second sources for fuzing systems that may reduce costs by providing competition, and maintain production when sources or parts are no longer available. It will also allow for the performance enhancement of current ammunition items by conducting studies of major fuze components to detect and identify latent defects. The second major area is block upgrades, which will identify and perform studies on improvements to fuzes, increase commonality of fuze components and requirements. Block upgrades will enable the introduction of the latest technologies into fuzing, keep the fuzing design current to avoid obsolescence issues, and add capabilities.</p> <p>FY 2019 Plans: Block Upgrades: Conduct modeling and simulation on medium caliber Safe and Arm (S&A) design modifications, evaluate medium caliber prototype modifications against performance requirements, conduct studies on hand grenade fuze to reduce the number of critical defects that will improve producibility and increase safety, conduct studies on artillery fuze electronic safe and arm designs for low cost Safe and Arm performance enhancements.</p> <p>Analysis / Risk Mitigation: Conduct engineering tests to prove-out electronic transceiver replacement prototypes for indirect fire and direct fire proximity fuzes, evaluate optimized impact switch prototypes, conduct studies on mortar fuze design architecture with the latest fuze safety guidelines to preclude component obsolescence.</p> <p>FY 2020 Base Plans: Block Upgrades: Will conduct engineering tests of the medium caliber fuze safety design modifications, will conduct analysis of the prototype low cost electronic safe and arm devices, will conduct on analysis on the hand grenade fuzes to reduce the number of critical defects that will improve producibility and increase safety, and will conduct studies on power sources for increased producibility and higher throughput.</p> <p>Analysis / Risk Mitigation: Will support the engineering tests and evaluations on the prototype replacement electronic transceiver prototypes for indirect fire and direct fire proximity fuzes, will conduct engineering tests on the optimized impact switches for use in mortar and medium caliber fuzes, and will conduct evaluations on the</p>	1.787	2.727	2.196	-	2.196

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
next generation microcontroller to replace a one time programmable component due to part obsolescence for mortar proximity fuzes. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding from FY 2019 to FY 2020 due to past FTI tasks that have been executed and successfully transitioned into production efforts.					
Title: Mortar Smoke Development Description: The initial phase of this project will focus on validating smoke canister and mortar cartridge designs for the 120mm caliber culminating in a technology demonstration. Qualification, and safety testing will follow to work towards a full Type Classification. The second and third phase of this project will identify similar solutions for the 81mm and 60mm caliber respectively. FY 2020 Base Plans: Phase 1 - 120mm qualification and safety testing will follow to work towards a full Type Classification. Phase 2 - 81mm caliber design qualification: Activities will focus on engineering efforts to identify the formulation percentage of constants that provides effective smoke screening and burn time performance. Analysis of results for smoke performance will be conducted to identify the production processes required to provide consistent results during both mixing and pressing operations. Engineering efforts will focus 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 2019 to FY 2020 Increase/Decrease Statement: The FY 2020 effort is tied to 81mm Mortar caliber design qualification with Hexachloroethane Titanium Oxide (HX) Smoke and coincides with the continuation of the 2018 and 2019 efforts.	1.322	-	1.668	-	1.668
Title: 81mm M821A3E1 HE IM Mortar Program Description: Activities include the maturation of the lethality through modeling and simulation as well as testing to ensure the 81mm will meet all user requirements. Activities also include ballistic testing to ensure safe and effective firing of the 81mm Mortar. This will also include modeling to ensure the contour of the round will ensure stable interior and exterior ballistics. Activities will also focus on maturation of the manufacturability of the round to ensure unit cost is as low as possible, this will be executed through loading studies and other Design of Experiments (DOE).	0.431	-	-	-	-
Title: Conventional Ammunition Range and Reliability Improvements	-	-	1.200	-	1.200

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: This project explores possibilities of increasing range, enhancing reliability, and increasing performance of Artillery and Mortar ammunition through multiple avenues. Conventional Ammunition Range and Reliability Improvements project will conduct analysis efforts to identify improvement areas to key parameters through modeling and simulation.</p> <p>FY 2020 Base Plans: Studies and analysis (Key Parameter Development and Management (KPDM) and Model Based Systems Engineering (MBSE)) will be conducted. The outcomes of these activities will identify areas of possible improvement.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in FY 2020 required for enhancement studies and analysis on Mortar and Artillery ammunition. Studies and analysis conducted will aim to increase performance through modeling and simulation.</p>					
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 Plans: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer</p>	-	0.090	-	-	-
Accomplishments/Planned Programs Subtotals	3.540	2.817	5.064	-	5.064

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

N/A

Remarks

D. Acquisition Strategy

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

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>
<p>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.</p> <p>The Hexachloroethane Titanium Oxide (HX) smoke mortar cartridge project will use existing production process and technologies at Government Owned Government Operated (GOGO) facilities that currently produce 60mm/81mm/120mm smoke and illumination munitions. Crane Army Ammunition Activity (CAAA) Pyro will be responsible for mixing and pressing HX smoke compositions for all testing and development, and CAAA fabrication shop will produce smoke canisters. Pine Bluff Arsenal (PBA) will conduct body load and Load Assemble and Pack (LAP) of all cartridge test samples for qualification and validation testing. All other components will use standard parts currently in inventory or can be purchased through existing component contracts.</p> <p>E. Performance Metrics N/A</p>		

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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
--	---	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		-		0.005	Oct 2019	-		0.005	0.000	0.005	-
Subtotal			-	-		-		0.005		-		0.005	0.000	0.005	N/A

Remarks
Program Management support includes travel and documentation support.

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
40mm Fuze Improvements	SS/FFP	AMTEC Corporation : Janesville, WI	-	0.234	Feb 2018	-		-		-		-	0.000	0.234	0.100
Fuze Technology Development	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	0.352	0.946	Oct 2017	1.662	Oct 2018	1.000	Oct 2019	-		1.000	0.000	3.960	-
Mortar Smoke Development	MIPR	Government Owned Government Operated (GOGO) Facilities : Various	-	0.357	Oct 2018	-		0.800	Feb 2020	-		0.800	0.000	1.157	-
81mm M821A3E1 HE IM Mortar Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	1.040	-		-		-		-		-	0.000	1.040	-
Conventional Ammunition Range and Lethality Improvements	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	-	-		-		0.840	Oct 2019	-		0.840	0.000	0.840	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607131A / Weapons and Munitions Product Improvement Programs				ER5 / Indirect Fire and Fuze Technology							
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.090		-		-		-	0.000	0.090	-
Subtotal			1.392	1.537		1.752		2.640		-		2.640	0.000	7.321	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Fuze Technology Integration Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	1.609	0.608	Oct 2017	1.065	Oct 2018	1.096	Oct 2019	-		1.096	0.000	4.378	-
Mortar Smoke Development	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.553	Aug 2018	-		0.275	Oct 2019	-		0.275	0.000	0.828	-
Mortar Smoke Development	MIPR	Edgewood Chemical Biological Center (ECBC) : Army Research Laboratory, MD	-	0.212	Aug 2018	-		0.170	Oct 2019	-		0.170	0.000	0.382	-
M821A3E1 Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	0.491	-		-		-		-		-	0.000	0.491	-
M821A3E1 Engineering Support	MIPR	Army Research Lab (ARL) : Adelphi, MD	-	0.024	Jul 2018	-		-		-		-	0.000	0.024	-
Conventional Ammunition Range and Lethality Improvements	MIPR	Armament Research, Development and Engineering Center	-	-		-		0.355	Oct 2019	-		0.355	0.000	0.355	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
		(ARDEC) : Picatinny Arsenal, NJ													
Subtotal			2.100	1.397		1.065		1.896		-		1.896	0.000	6.458	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FTI Ballistic Testing	MIPR	Army Test and Evaluation Command (ATEC) : Yuma Proving Ground, AZ	0.100	-		-		0.100	Mar 2020	-		0.100	0.000	0.200	-
Mortar Smoke Deveelopment	MIPR	Army Test and Evaluation Command (ATEC) : Yuma Proving Ground, AZ	-	0.199	Aug 2018	-		0.423	Feb 2020	-		0.423	0.000	0.622	-
M821A3E1 Full Arena Testing and Analysis	MIPR	Army Research Lab : Aberdeen Proving Ground, MD	-	0.407	May 2018	-		-		-		-	0.000	0.407	-
M821A3E1 HE IM Mortar Testing	MIPR	Army Test and Evaluation Command (ATEC) : Yuma Proving Ground, AZ	0.369	-		-		-		-		-	0.000	0.369	-
Subtotal			0.469	0.606		-		0.523		-		0.523	0.000	1.598	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.961	3.540	2.817	5.064	-	5.064	0.000	15.382	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Fuze Technology Improvement																												
M734A1 Electronics Upgrade																												
Replacement of Obsolete Prox Electronic Component for Direct																												
MEMS G-Switch Producibility Improvements																												
40mm Fuze Safety Improvements																												
Electronic Safe and Arm Indirect Fire Enhancements																												
Hand Grenade Fuze Improvements																												
Mortar Fuze Microcontroller Replacement																												
Power Source Improvements																												
M783 Mortar Training Fuze Project Improvement																												
Airburst Fuze Technologies for Medium and Large Caliber Munitions																												
Alternate Suppliers for Critical Fuzing Components																												
Mortars Smoke Development																												

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
120MM Smoke Design Pahse				█																								
120MM Smoke Ballistic Test I, II, & III					█	█	█	█																				
120MM Smoke Design Review												▲																
120MM Smoke Component Fabrication / Qualification Test									█	█	█	█																
81MM Smoke Design Phase									█	█	█	█																
81MM Smoke Ballistic Test I & II												█	█	█	█	█												
81MM Smoke Design Review																▲												
81MM Component Fabrication / Qualification Test													█	█	█	█												
60MM Smoke Design Phase																	█	█	█	█								
60MM Smoke Ballistic Test I & II																				█	█	█	█	█				
60MM Smoke Design Review																								▲				
60MM Component Fabrication / Qualification Test																					█	█	█	█				
Conventional Ammunition Range and Lethality Improvements																												

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Conventional Ammunition Improvements																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Fuze Technology Improvement	1	2016	4	2023
M734A1 Electronics Upgrade	1	2016	1	2019
Replacement of Obsolete Prox Electronic Component for Direct/Indirect Fire Fuzes	1	2017	4	2021
MEMS G-Switch Producibility Improvements	1	2018	2	2018
40mm Fuze Safety Improvements	1	2018	4	2021
Electronic Safe and Arm Indirect Fire Enhancements	1	2019	4	2021
Hand Grenade Fuze Improvements	1	2019	4	2022
Mortar Fuze Microcontroller Replacement	1	2019	4	2022
Power Source Improvements	1	2020	4	2022
M783 Mortar Training Fuze Project Improvement	1	2021	4	2023
Airburst Fuze Technologies for Medium and Large Caliber Munitions	1	2021	4	2023
Alternate Suppliers for Critical Fuzing Components	1	2022	4	2023
Mortars Smoke Development	1	2020	4	2023
120MM Smoke Design Pahse	3	2018	4	2018
120MM Smoke Ballistic Test I, II, & III	1	2019	4	2019
120MM Smoke Design Review	4	2019	4	2019
120MM Smoke Component Fabrication / Qualification Test	1	2020	3	2020
81MM Smoke Design Phase	1	2020	3	2020
81MM Smoke Ballistic Test I & II	3	2020	1	2021
81MM Smoke Design Review	1	2021	1	2021
81MM Component Fabrication / Qualification Test	1	2021	1	2022
60MM Smoke Design Phase	1	2022	3	2022

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER5 / <i>Indirect Fire and Fuze Technology</i>

Events	Start		End	
	Quarter	Year	Quarter	Year
60MM Smoke Ballistic Test I & II	3	2022	1	2023
60MM Smoke Design Review	1	2023	1	2023
60MM Component Fabrication / Qualification Test	1	2023	4	2023
Conventional Ammunition Range and Lethality Improvements	1	2020	4	2023
Conventional Ammunition Improvements	1	2020	4	2023

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ER6: Direct Fire Technology	-	8.354	12.591	8.525	-	8.525	5.729	6.592	6.413	2.989	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Direct Fire Technology funding will be used to support direct fire ammunition from small caliber ammunition, 40mm grenade, medium caliber cannon ammunition and large caliber ammunition enhancements to lethality, effectiveness, survivability, accuracy and general product improvements. FY 2020 funds are used for a more lethal and safer design for 40mm grenades that will be built and tested. Warhead improvement and primer improvement for 30mm ammunition are also under development. A number of improvements for training ammunition, environmentally friendly primers, and lightweight small caliber ammunition will continue to be developed. Potential improvements to 105mm and 120mm ammunition will be examined.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Lightweight Ammunition	-	0.250	3.700	-	3.700
Description: Develop, demonstrate, and qualify a Lightweight Small Caliber Ammunition (LSCA) 7.62mm, 5.56mm, .50 caliber and other caliber capability that will provide an ammunition weight savings of ten to fifty percent to the M2, M240, M4A1, and M249 gunner, assistant gunner, and ammo bearer.					
FY 2019 Plans: Phase II contractor will continue to develop 7.62mm preliminary lightweight cartridge design. The government will conduct Pre-Validation Testing (PVT) and a Limited User Evaluation (LUE) prior to down-selecting to a single contractor for Phase III award. Initial designs for .50 caliber lightweight cartridges will also be investigated.					
FY 2020 Base Plans: The Government will down-select to a single contractor and 7.62mm concept before entering into Phase III. Phase III contractor will continue to optimize their 7.62mm lightweight cartridge design ahead of Validation Testing (VT) and Limited User Evaluation (LUE). Multiple contracts will be awarded to develop a Lightweight .50 caliber design ahead of down-selecting to a single design.					
FY 2019 to FY 2020 Increase/Decrease Statement: Continued development of 7.62mm and .50 caliber lightweight ammunition.					
Title: Lead Free Primer	2.000	1.705	1.700	-	1.700
Description: Automate and integrate environment friendly lead free primary explosives within the small caliber family of ammunition. Addresses health concerns of lead intake during firing by removing lead styphnate from					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER6 / <i>Direct Fire Technology</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>small caliber primers. Automated pilot line combined with new mix reduces human exposure, improves quality, improves safety and reduces environmental waste in manufacturing process.</p> <p>FY 2019 Plans: FY 2019 funding will provide the ability to conduct primer qualification testing on 5.56mm primer and complete the build for the 7.62mm primer qualification. The program will continue to work through the transition of the automated primer manufacturing process to Lake City Army Ammunition Plant (LCAAP), as well as refinement and optimization of the automated process.</p> <p>FY 2020 Base Plans: FY 2020 funding will provide the ability to complete 5.56mm green primer Production Qualification Testing (PQT), complete the build and test in support of Pre-Production Qualification Testing (PPQT) for 7.62mm green primer ammunition, and begin the build for .50 Caliber PPQT.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funding to support 5.56mm PQT and 7.62mm PPQT.</p>					
<p>Title: Support Sniper Ammunition Integration Into Army Standard Sniper Weapons</p> <p>Description: Modify existing sniper ammunition to support integration into new Army standard sniper weapons. Maintain compatibility with legacy sniper weapons while improving operational availability.</p> <p>FY 2019 Plans: FY 2019 work will develop and evaluate sniper ammunition improvements.</p> <p>FY 2020 Base Plans: FY 2020 work will continue to test and evaluate sniper ammunition improvements.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decreased funding due decreased testing requirements in FY 2020.</p>	-	0.500	0.100	-	0.100
<p>Title: Support Improvements in Direct Fire Propulsion Systems</p> <p>Description: Improve Direct Fire Propulsion Systems to increase user survivability.</p> <p>FY 2019 Plans: FY 2019 work will explore additional sources of supply in the National Technology and Industrial Base (NTIB) and pursue improvements to address temperature sensitivities of energetics and primer ballistics. Efforts will</p>	-	0.500	0.100	-	0.100

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: March 2019	
Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>		Project (Number/Name) ER6 / <i>Direct Fire Technology</i>	
B. Accomplishments/Planned Programs (\$ in Millions)					
also be made to continue to explore technology improvements to reduce muzzle flash and increase precision by reducing dispersion of the M80A1, M118LR, and other sniper compatible ammunition.					
FY 2020 Base Plans: FY 2020 work will continue to pursue improvements to address temperature sensitivities of energetics and primer ballistics. Efforts will also be made to continue to explore technology improvements to reduce muzzle flash and increase precision by reducing dispersion of the M80A1, M118LR, and other sniper compatible ammunition.					
FY 2019 to FY 2020 Increase/Decrease Statement: Decreased funding due to a decrease in studies on direct fire systems.					
Title: Improved M789 Lethality, Warhead Fragmentation Improvement					
Description: Improve 30mm M789 warhead lethality by performing trade studies and implementing advanced warhead and fuze technologies to promote more efficient fragmentation.					
FY 2019 Plans: FY 2019 work will continue to support the down-select to a single decision and preparing for manufacturability and qualification build. Funding will also support the initial build to be used to for qualification testing.					
FY 2020 Base Plans: FY 2020 work will continue to support all necessary updates to the technical data package (TDP) for M789 ammunition.					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to testing completion in FY 2019.					
Title: M433 Warhead Improvement					
Description: 40mm: Improve lethality (fragmentation) of the M433 grenade.					
FY 2019 Plans: FY 2019 work will complete engineering change proposals (ECP) and technical data package (TDP) actions. FY 2019 work will complete qualification testing.					
FY 2019 to FY 2020 Increase/Decrease Statement:					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	1.307	2.520	0.250	-	0.250
	1.594	1.000	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER6 / <i>Direct Fire Technology</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Decrease due to completion of enhancement effort with FY 2019 funding.					
<p>Title: 20mm C-RAM Ammo Improvement</p> <p>Description: As per Joint Urgent Operational Needs Statement (JUONS) CC-0562 for enhanced lethality, M940 20mm ammunition requires research and development efforts to increase the lethality effects of the Land-based Phalanx Weapon System (LPWS) against larger rocket threats. This effort will increase the current capability of the M940 by incorporating design features to provide improvement to probability of Kill. This effort will also evaluate the effects the new ammunition has on the weapon system barrel wear.</p> <p>FY 2019 Plans: FY 2019 funding will continue to support the design and development of an optimized M940 concept to achieve enhanced lethality and an improved probability of kill.</p> <p>FY 2020 Base Plans: FY 2020 funding will continue to support the design and development of an optimized M940 concept and conduct studies and testing to improve barrel wear.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to reduced efforts required for M940 improvements.</p>	0.580	0.500	0.150	-	0.150
<p>Title: 30mm Ammunition Improvement</p> <p>Description: Increase anti-personnel lethality and lethality within Military Operations in an Urban Terrain (MOUT) structures compared to current Army medium caliber solutions.</p>	0.900	-	-	-	-
<p>Title: Tank Ammunition Improvements</p> <p>Description: Develop and test potential improvements to 105mm and 120mm gun system ammunition.</p> <p>FY 2019 Plans: FY 2019 work will continue to support various efforts for 105mm and 120mm tank ammunition, including tracer improvements, combustible cartridge case design and fabrication improvements, and cartridge testing for the M68 cannon.</p> <p>FY 2020 Base Plans: FY 2020 work will continue to support various efforts for 105mm and 120mm tank ammunition, including tracer improvements, combustible cartridge case design and fabrication improvements, and cartridge testing for the</p>	1.450	0.500	0.250	-	0.250

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: March 2019	
Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>		Project (Number/Name) ER6 / <i>Direct Fire Technology</i>	
B. Accomplishments/Planned Programs (\$ in Millions)					
M68 cannon. Additionally, initial feasibility studies and developmental efforts will explore a 105mm Advanced Multipurpose (AMP) cartridge.					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to reduced technology development.					
Title: 40mm M576 Improvement Study					
Description: 40mm M576 product improvement will provide the warfighter with the ability to quickly defeat closed-in personnel targets					
FY 2019 Plans: FY 2019 funding will be used to baseline the current performance and examine improved candidate designs.					
FY 2020 Base Plans: FY 2020 funding will continue exploration of improved candidate designs.					
Title: Single Crystal Tungsten Evaluation					
Description: Testing will be conducted to determine the effectiveness of single crystal tungsten penetrators against armored targets.					
FY 2019 Plans: FY 2019 work will continue to include testing to determine the effectiveness of single crystal tungsten penetrators against armored targets.					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to completion of testing.					
Title: M550 Fuze Improvement					
Description: Replace 40mm M550 single stage fuze with a dual spinlock fuze to improve safety and performance reliability.					
FY 2019 Plans: FY 2019 funding will be used to acquire and study M550 fuzes and materials in order to support the new fuze build and FY 2020 testing events.					
FY 2020 Base Plans:					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	-	0.200	0.200	-	0.200
	0.523	0.250	-	-	-
	-	1.250	0.500	-	0.500

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER6 / <i>Direct Fire Technology</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2020 funding will be used to complete and build the quantity required to support qualification testing planned for FY 2021.					
FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funding for quantity to support qualification testing.					
Title: Caliber .50 Improvement					
Description: Explore options for improvement to current legacy .50 caliber ammunition in response to the .50 caliber Munitions Capabilities Development Document (CDD).					
FY 2019 Plans: FY 2019 funding will support the exploration of improvements to various .50 caliber munitions to include the M903 and M962 rounds.					
FY 2020 Base Plans: FY 2020 funding will support Design Verification Test (DVT) 1 and DVT 2 of enhanced M903, M962, and other .50 caliber rounds as per required in the .50 Caliber Munitions CDD.					
	-	0.500	0.500	-	0.500
Title: Operation Inherent Resolve for ISIL - JUONS CC-0562 M940 Ammunition					
Description: FY 2019 Overseas Contingency Operations request includes \$2.548 Million for a Joint Urgent Operational Needs Statement for M940 ammunition.					
FY 2019 Plans: Continue improvements to M940 ammunition, perform design modifications, and build and test new ammunition.					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to satisfying JUONS by FY 2019.					
	-	2.548	-	-	-
Title: 40mm Airburst Training					
Description: Conduct studies and explore options to satisfy 40mm airburst training requirements.					
FY 2020 Base Plans: Conduct study and explore options that will satisfy 40mm airburst training requirements.					
FY 2019 to FY 2020 Increase/Decrease Statement:					
	-	-	0.100	-	0.100

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER6 / <i>Direct Fire Technology</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase due to new study on 40mm airburst training round.					
Title: 7.62mm Dispersion Improvement Description: Explore options for dispersion improvement to 7.62mm ammunition, specifically the XM1158 and M80A1, to provide increased lethality to the warfighter. FY 2020 Base Plans: FY 2020 funding will begin exploration into 7.62mm dispersion improvement methods to provide increased lethality to the warfighter. FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to studies on improving small caliber dispersion.	-	-	0.300	-	0.300
Title: Handgun Ammunition Enhancements Description: Modify existing handgun ammunition to increase battlefield effectiveness beyond current capabilities. FY 2020 Base Plans: FY 2020 activities will include testing and evaluating new handgun ammunition improvements. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increase due to the initial testing and evaluation of handgun ammunition improvements.	-	-	0.150	-	0.150
Title: Grenade Rifle Entry Munition (GREM) Improvements Description: Explore improvements to the Grenade Rifle Entry Munition (GREM) in order to increase performance and reliability and reduce costs. FY 2020 Base Plans: Conduct studies and perform preliminary tests to increase the performance and reliability of the Grenade Rifle Entry Munition (GREM) system. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 will begin exploring options for Grenade Rifle Entry Munition improvements.	-	-	0.525	-	0.525
Title: FY 2019 SBIR / STTR Transfer FY 2019 Plans:	-	0.368	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER6 / <i>Direct Fire Technology</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 SBIR / STTR Transfer					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	8.354	12.591	8.525	-	8.525

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• EL8: <i>LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER</i>	2.870	-	0.000	-	0.000	-	-	-	-	0.000	2.870

Remarks

D. Acquisition Strategy

The acquisition strategy is that all contracts will be full and open competition firm fixed price.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Manager Maneuver Ammunition Systems (PM MAS) - Labor & Travel	Various	Picatinny Arsenal : NJ	0.109	-		-		-		-		-	0.000	0.109	-
M433 Warhead Improvement - Contract 1	C/FFP	Polymer Technologies Incorporated : Newark, DE	0.171	-		-		-		-		-	0.000	0.171	-
M433 Warhead Improvement - Contract 2	C/IDIQ	Amtec Corporation : Huntsville, AL	0.134	-		-		-		-		-	0.000	0.134	-
M433 Warhead Improvement - Contract 3	C/FFP	Amtec Corporation : Huntsville, AL	2.275	-		-		-		-		-	0.000	2.275	-
M789 Enhanced Lethality - Contract 1	C/FFP	General Dynamics : Marion, VA	-	0.208	Oct 2017	0.850	Dec 2018	-		-		-	0.000	1.058	-
M789 Enhanced Lethality - Contract 2	TBD	CLogic Defense : Ponte Vedra Beach, Florida	-	0.700	Mar 2018	0.500	Jan 2019	0.800	Oct 2019	-		0.800	0.000	2.000	-
Lightweight Ammunition - Contract 1	C/FFP	TBD : TBD	-	-		-		2.000	Jan 2020	-		2.000	Continuing	Continuing	Continuing
Lightweight Ammunition - Contract 2	TBD	TBD : TBD	-	-		-		1.500	Jan 2020	-		1.500	Continuing	Continuing	Continuing
Green Primer - Contract 1	C/FFP	Innovative Materials & Processes (IMP), LLC : Rapid City, SD	0.971	-		0.135	Feb 2019	-		-		-	0.000	1.106	-
Green Primer - Contract 2	C/FFP	Alion Science and Technology Corporation : McLean, VA	0.038	-		-		-		-		-	0.000	0.038	-
Green Primer - Contract 3	C/FFP	Orbital - ATK : Independence, MO	0.750	-		0.361	Jan 2019	1.500	Nov 2019	-		1.500	0.000	2.611	-
Green Primer - Contract 4	C/FFP	Franklin Engineering Group : Nashville, TN	0.170	-		-		0.500	Oct 2019	-		0.500	0.000	0.670	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
M940 Enhancement - Contract 1	C/FFP	General Dynamics Ordnance and Tactical Systems : Marion, VA	0.231	-		-		-		-		-	0.000	0.231	-
M940 Enhancement - Contract 2	C/FFP	MATSYS : Sterling, VA	0.168	-		-		-		-		-	0.000	0.168	-
JUONS CC-0562 M940 Ammunition - Contract 1	C/FFP	TBD : TBD	-	-		2.548	Jan 2019	-		-		-	0.000	2.548	-
M865 Cartridge Case Development - Contract 1	C/CPFF	Polymer Processing Institute : Newark, NJ	-	0.358	Oct 2017	-		-		-		-	0.000	0.358	-
Single Crystal Tungsten Penetrators - Contract 1	C/CPFF	Savit Corporation : Rockaway, NJ	-	0.042		-		-		-		-	0.000	0.042	-
M550 Fuze Development - Contract 1	TBD	TBD : TBD	-	-		0.214	Jan 2019	-		-		-	0.000	0.214	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.368		-		-		-	0.000	0.368	-
Subtotal			5.017	1.308		4.976		6.300		-		6.300	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Armament Research Development and Engineering Center (ARDEC)	MIPR	ARDEC : Picatinny Arsenal, NJ	5.063	5.500	Oct 2017	5.350	Nov 2018	1.575	Nov 2019	-		1.575	Continuing	Continuing	Continuing
Subtotal			5.063	5.500		5.350		1.575		-		1.575	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army										Date: March 2019		
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				

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Army Research Lab (ARL)	MIPR	Army Research Lab (ARL) : Aberdeen, MD	0.215	0.230	Dec 2017	0.400	Jan 2019	0.200	Jan 2020	-		0.200	Continuing	Continuing	Continuing
Aberdeen Test Center (ATC)	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	0.036	1.316	Jun 2018	1.865		0.450	Jan 2020	-		0.450	Continuing	Continuing	Continuing
Redstone Arsenal	MIPR	Redstone Arsenal : Redstone Arsenal, AL	3.256	-		-		-		-		-	0.000	3.256	-
Subtotal			3.507	1.546		2.265		0.650		-		0.650	Continuing	Continuing	N/A
Project Cost Totals			13.587	8.354		12.591		8.525		-		8.525	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
30mm Ammunition Improvement	30mm Ammo Improvements																											
Testing of Various NATO Caliber Rounds	NATO Testing																											
M433 Warhead Improvement	M433 Warhead Improvement																											
Improved M789 Lethality, Warhead Fragmentation Improvement	Improved M789 Lethality, Warhead Fragmentation Improvement																											
Lightweight Ammunition	Lightweight Ammunition																											
Lead Free Primer	Lead Free Primer																											
20mm C-RAM Ammo Improvement	20mm C-RAM Ammo Improvement																											
Support Sniper Ammunition Integration Into Army Standard Sniper Weapons	Support Sniper Ammunition Integration Into Army Standard Sniper Weapons																											
Support improvements in Direct Fire Propulsion Systems	Support improvements in Direct Fire Propulsion Systems																											
Tank Ammunition Improvements	Tank Ammunition Improvements																											
40mm M576 Improvement Study	40mm M576 Improvement Study																											
Medium Caliber Single Crystal Tungsten Evaluation	Medium Caliber Single Crystal Tungsten Evaluation																											
JUONS CC-0562 M940 Ammunition	JUONS CC-0562 M940 Ammunition																											

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER6 / <i>Direct Fire Technology</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
.50 Caliber Improvements																												
.50 Caliber Improvements																												
M550 Fuze Escapement																												
M550 Fuze Escapement																												
40mm Airburst Training																												
40mm Airburst Training																												
7.62mm Dispersion Improvement																												
7.62mm Dispersion Improvement																												
Handgun Ammunition Enhancements																												
Handgun Enhancements																												
Grenade Rifle Entry Munition (GREM) Improvements																												
Grenade Rifle Entry Munition (GREM) Improvements																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607131A / <i>Weapons and Munitions Product Improvement Programs</i>	Project (Number/Name) ER6 / <i>Direct Fire Technology</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
30mm Ammunition Improvement	1	2018	4	2018
Testing of Various NATO Caliber Rounds	1	2016	4	2020
M433 Warhead Improvement	1	2015	4	2020
Improved M789 Lethality, Warhead Fragmentation Improvement	1	2015	4	2020
Lightweight Ammunition	1	2015	4	2023
Lead Free Primer	1	2015	4	2024
20mm C-RAM Ammo Improvement	1	2017	4	2020
Support Sniper Ammunition Integration Into Army Standard Sniper Weapons	1	2017	4	2020
Support improvements in Direct Fire Propulsion Systems	1	2017	4	2021
Tank Ammunition Improvements	1	2018	4	2022
40mm M576 Improvement Study	1	2018	4	2022
Medium Caliber Single Crystal Tungsten Evaluation	1	2018	4	2019
JUONS CC-0562 M940 Ammunition	1	2019	4	2019
.50 Caliber Improvements	1	2019	4	2020
M550 Fuze Escapement	1	2019	4	2020
40mm Airburst Training	1	2020	4	2022
7.62mm Dispersion Improvement	1	2020	4	2023
Handgun Ammunition Enhancements	1	2020	4	2021
Grenade Rifle Entry Munition (GREM) Improvements	1	2020	4	2021

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	12.143	12.357	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	24.500
ET2: <i>Tractor Stove</i>	-	12.143	12.357	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	24.500

A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)

	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	4.513	12.357	6.876	-	6.876
Current President's Budget	12.143	12.357	0.000	-	0.000
Total Adjustments	7.630	0.000	-6.876	-	-6.876
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	7.630	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-6.876	-	-6.876

Change Summary Explanation

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607134A / <i>Long Range Precision Fires (LRPF)</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	80.690	159.278	164.182	-	164.182	122.852	145.819	183.939	231.887	Continuing	Continuing
ES1: <i>Long Range Precision Fires (LRPF)</i>	-	80.690	159.278	164.182	-	164.182	122.852	145.819	183.939	231.887	Continuing	Continuing

Program MDAP/MAIS Code: 494

A. Mission Description and Budget Item Justification

Precision Strike Missile (PrSM), formerly known as Long Range Precision Fires (LRPF), is the Army's next generation surface to surface missile that replaces and improves upon Army Tactical Missile System (ATACMS) capabilities. PrSM requirements include: max range of greater than 400km, 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 (M270A1 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS)). PrSM will meet cluster and insensitive munition requirements. PrSM is being designed with an open system architecture that provides the capability for future growth to counter new and emerging threats. Spiral 1 will include the ability to attack moving maritime and ground targets, Spiral 2 will provide increased lethality, and Spiral 3 will provide extended range. The mission of the PrSM System is to attack/neutralize/ suppress/destroy targets using missile delivered indirect precision fires. PrSM will provide Joint Force Commanders with a 24/7, all-weather capability to attack critical and time sensitive area and point targets including threat air defense, missile launchers, command and control centers, assembly/staging areas and high payoff targets at all depths of the multi-domain battlefield. The PrSM will counter the enemy's ability to conduct combat maneuver and air defense operations. Milestone A; Technology Maturation and Risk Reduction (TMRR) was approved on 31 March 2017.

FY20 base dollars in the amount of \$164.182 million supports the continuation of PrSM development and qualification. In 3QFY17, the Army awarded TMRR agreements to Lockheed Martin and Raytheon. In FY20, contractors will continue TMRR efforts to include: conduct prototype test flights, finalize tactical designs, build six (6) PrSM Engineering Development Test (EDT) missiles, conduct component and system level qualification testing, finalize missile interface and continue software integration with existing launcher platforms, and begin production planning efforts. The culmination of these efforts will inform a Critical Design Review (CDR) planned for 1QFY22. Demonstrating PrSM capabilities through a rigorous test program, will ensure the Army makes an informed down-select decision based on the performance of the contractor's proposed design. The program will conduct critical missile survivability assessments to ensure the design that transitions to Engineering and Manufacturing Development (EMD) will successfully meet the Army's PrSM requirements.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607134A / <i>Long Range Precision Fires (LRPF)</i>
---	--

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	102.014	186.475	89.182	-	89.182
Current President's Budget	80.690	159.278	164.182	-	164.182
Total Adjustments	-21.324	-27.197	75.000	-	75.000
• Congressional General Reductions	-0.068	-0.197			
• Congressional Directed Reductions	-18.000	-27.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.256	-			
• Adjustments to Budget Years	-	-	75.000	-	75.000

Change Summary Explanation

FY18 funding reflects an adjustment of \$21.324M which includes a -\$4M congressional directed reduction for cybersecurity software, -\$14M congressional directed reduction for TMRR contract delay, and -\$3.256M for SBIR/STTR Transfer.

FY19 funding reflects an adjustment of \$33.902M which includes a -\$25M congressional directed reduction for "TMRR excess growth" and -\$2M congressional directed reduction for "Restoring acquisition accountability: Program management excess growth" and -\$6.902M for SBIR/STTR Transfer.

FY20 funding reflects an increase of \$75.000M to maintain competition with both contractors to finalize PrSM tactical designs, build additional missiles, and conduct EDT component and missile flight testing. The FY20 increase reduces program risk and ensures an informed down-select decision in support of urgent operational fielding in 1QFY23.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ES1: Long Range Precision Fires (LRPF)	-	80.690	159.278	164.182	-	164.182	122.852	145.819	183.939	231.887	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program supports the Cross Functional Team (CFT), LRPF.

A. Mission Description and Budget Item Justification

Precision Strike Missile (PrSM), formerly known as Long Range Precision Fires (LRPF), is the Army's next generation surface to surface missile that replaces and improves upon Army Tactical Missile System (ATACMS) capabilities. PrSM requirements include: max range of greater than 400km, 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 (M270A1 Multiple Launch Rocket System (MLRS) and M142 High Mobility Artillery Rocket System (HIMARS)). PrSM will meet cluster and insensitive munition requirements. PrSM is being designed with an open system architecture that provides the capability for future growth to counter new and emerging threats. Spiral 1 will include the ability to attack moving maritime and ground targets, Spiral 2 will provide increased lethality, and Spiral 3 will provide extended range. The mission of the PrSM System is to attack/neutralize/ suppress/destroy targets using missile delivered indirect precision fires. PrSM will provide Joint Force Commanders with a 24/7, all-weather capability to attack critical and time sensitive area and point targets including threat air defense, missile launchers, command and control centers, assembly/staging areas and high payoff targets at all depths of the multi-domain battlefield. The PrSM will counter the enemy's ability to conduct combat maneuver and air defense operations. Milestone A; Technology Maturation and Risk Reduction (TMRR) was approved on 31 March 2017.

FY20 base dollars in the amount of \$164.182 million supports the continuation of PrSM development and qualification. In 3QFY17, the Army awarded TMRR agreements to Lockheed Martin and Raytheon. In FY20, contractors will continue TMRR efforts to include: conduct prototype test flights, finalize tactical designs, build six (6) PrSM Engineering Development Test (EDT) missiles, conduct component and system level qualification testing, finalize missile interface and continue software integration with existing launcher platforms, and begin production planning efforts. The culmination of these efforts will inform a Critical Design Review (CDR) planned for 1QFY22. Demonstrating PrSM capabilities through a rigorous test program, will ensure the Army makes an informed down-select decision based on the performance of the contractor's proposed design. The program will conduct critical missile survivability assessments to ensure the design that transitions to Engineering and Manufacturing Development (EMD) will successfully meet the Army's PrSM requirements.

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

	FY 2018	FY 2019	FY 2020
Title: TMRR	80.690	152.573	164.182
Description: Develop the Army's next generation missile capability that doubles firepower, meets range requirements by exceeding 400km, provides required lethality for both point and area targets, ensures survivability, meets cluster munition policy			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
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 2018	FY 2019	FY 2020
<p>requirements, and provides an open system architecture. PrSM provides field artillery units with a deep-strike capability while supporting Brigade, Division, Corps, Army, Theater, Joint and Coalition forces in full, limited or expeditionary operations.</p> <p>FY 2019 Plans: Continue execution of two TMRR prototyping and flight demonstration agreements. Continue risk reduction activities and allow both contractors to mature their tactical designs which incorporate technologies required to defeat an emerging threat. Complete a Preliminary Design Review (PDR) with each competing contractor. Complete integration and qualification of a Flight Termination System (FTS) required to support White Sands Missile Range (WSMR) testing. Both contractors will begin build of four missiles required for flight testing. One contractor will complete build and flight test their first missile. Contractors will conduct component and system level Engineering Development Test (EDT) qualification activities, conduct critical missile survivability assessments, and ensure risk mitigation activities support schedule requirements. Continue to conduct Hardware in the Loop (HWIL), Software in the Loop (SWIL) and 6 Degrees of Freedom (6DoF) analysis of test data. Continue missile and launcher software development activities. Continue assessment and implementation of software cybersecurity requirements. As the launcher software owner, the Government will begin activities to support contractor unique missile software integration with the HIMARS fire control system to include required interface with Advanced Artillery Tactical Data System (AFATDS). The Government will conduct testing to characterize anti-jamming features required to operate in a GPS degraded environment. The Government will continue to assess contractor's missile performance through modeling, simulation, and performance testing.</p> <p>FY 2020 Plans: Contractors will finalize their tactical designs, complete missile software development and launcher integration, complete prototype missile builds, and finalize integration at WSMR required to conduct system level flight testing. One contractor will conduct remaining two flight tests. Second contractor will conduct all three flight tests. Contractors will build an additional six missiles to support flight testing in FY21. Contractors will continue to conduct Hardware in the Loop (HWIL), Software in the Loop (SWIL), and 6 Degrees of Freedom (6DoF) analysis. Contractors will complete assessment and implementation of software cybersecurity requirements, component level EDT qualification, and conduct critical missile survivability assessments. Government will continue activities to support contractor unique missile software integration with the HIMARS fire control system to include required interface with AFATDS. Government will continue to assess contractor's missile performance through modeling, simulation, and performance testing. The Army will ensure all efforts support transition to Engineering and Manufacturing Development (EMD) and informs a down-select decision to a single contractor in FY21.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: \$11.609M funding increase from FY19-20 is attributed to FY20 requirement to complete missile fabrication, including flight termination hardware in support of component and system level flight testing to meet TMRR requirements. Additionally, funding supports continued competition to reduce program risk and make an informed down-select decision in FY21.</p>				
Title: FY 2019 SBIR / STTR Transfer		-	6.705	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
<i>FY 2019 Plans:</i> N/A			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Decrease in FY 2020 due to SBIR / STTR transfer in FY2019.			
Accomplishments/Planned Programs Subtotals	80.690	159.278	164.182

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

N/A

Remarks

D. Acquisition Strategy

The PrSM Acquisition Strategy supports development of the Army's next generation surface to surface missile that replaces and improves upon Army Tactical Missile System (ATACMS) capabilities with major improvements in range, effectiveness, lethality, and rate of fire, while meeting insensitive and cluster munition policy requirements. PrSM provides an open system architecture that facilitates future growth. PrSM provides responsive engagement of high value point and area targets by Army and Joint Force Commanders under all weather conditions, at operational ranges defended by enemy air-defense systems. An AoA supporting the MS A decision was completed by U.S. Army Training and Doctrine Command (TRADOC) Analysis Center-White Sands Missile Range (TRAC-WSMR), with an OSD letter of sufficiency issued in September 2015. In 4QFY16, the Army awarded 9 month risk reduction, trade study and initial design development agreements to two contractors. The effort resulted in development of initial baseline designs presented during final technical reviews that resulted in a seamless transition into the TMRR phase. Subsequent to MS A approval on 31 March 2017, the Army awarded TMRR agreements to two contractors. TMRR is ongoing and includes risk reduction activities and further maturation of contractor design concepts. Both contractors participated in a PDR in 1QFY19 and have begun to receive hardware for assembling four (4) system level missile prototypes culminating in flight tests to provide demonstration of their system capabilities.

In FY18, the Army directed acceleration of PrSM capability in response to immediate near-peer threats and the requirement to engage targets with a precision guided missile out to 499km. As a result, the program was restructured to conduct the following key activities previously not planned for in TMRR: finalize tactical designs, build additional missiles for system level Engineering Development Testing (EDT) flight tests, and establish a production capability. This approach allows the Army to reduce program risk, make a more informed down-select decision at EMD, and accelerate an early capability. Component and system level testing will inform contractor down-select at EMD.

The EMD phase will complete product development, qualification, production readiness assessment, and Initial Operational Test and Evaluation (IOT&E).

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	MIPR	Various : RSA	3.869	2.651	Nov 2017	1.819	Nov 2018	1.949	Nov 2019	-		1.949	Continuing	Continuing	Continuing
Subtotal			3.869	2.651		1.819		1.949		-		1.949	Continuing	Continuing	N/A

Remarks
RSA - Redstone Arsenal, Alabama

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PrSM TMRR - 2 Vendors (Raytheon and Lockheed Martin)	C/CPIF	DOTC : Picatinny, NJ	29.652	73.501	Nov 2017	130.306	Nov 2018	144.792	Nov 2019	-		144.792	Continuing	Continuing	Continuing
Development Engineering Support	MIPR	AMCOM/AMRDEC/ S3I : RSA	1.022	3.721	Nov 2017	9.988	Nov 2018	10.698	Nov 2019	-		10.698	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		6.705		-		-		-	0.000	6.705	-
Subtotal			30.674	77.222		146.999		155.490		-		155.490	Continuing	Continuing	N/A

Remarks
AMCOM - Aviation and Missile Command; AMRDEC - U.S. Army Research, Development and Engineering Command; DOTC - DoD Ordnance Technology Consortium; OTA - Other Transaction Agreements; S3I - Systems Simulation, Software and Integration; RSA - Redstone Arsenal, Alabama

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Quality, Safety, Systems Engineering, and Analysis	SS/T&M	Various : RSA	1.496	0.333	Nov 2017	2.491	Nov 2018	2.693	Nov 2019	-		2.693	Continuing	Continuing	Continuing
Subtotal			1.496	0.333		2.491		2.693		-		2.693	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)
--	---	---

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
RSA - Redstone Arsenal, AL

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support	MIPR	WSMR; RTC : WSMR,NM; RSA, AL	0.283	0.484	Nov 2017	7.969	Nov 2018	4.050	Nov 2019	-		4.050	Continuing	Continuing	Continuing
Subtotal			0.283	0.484		7.969		4.050		-		4.050	Continuing	Continuing	N/A

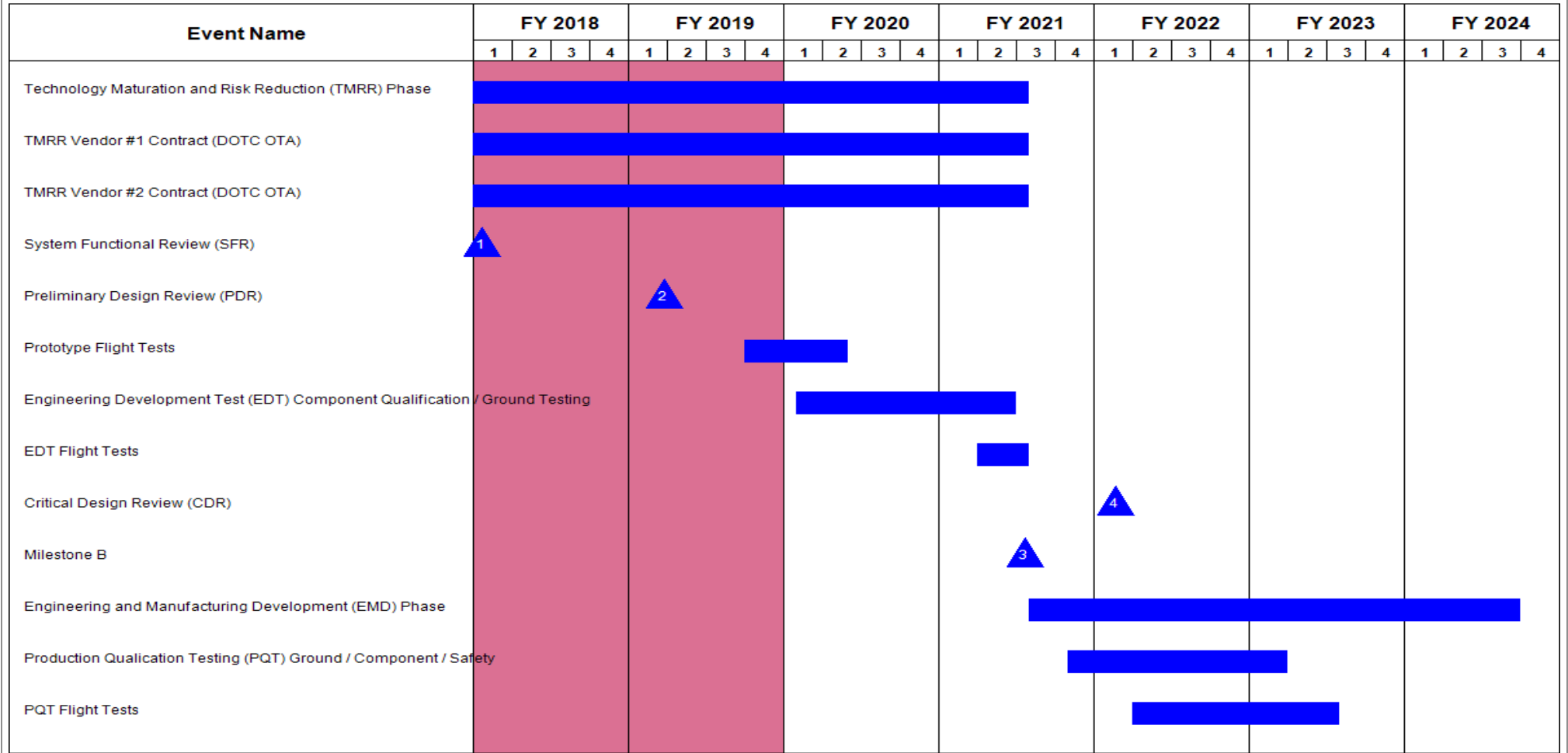
Remarks
WSMR, NM - White Sands Missile Range, New Mexico; RTC - Redstone Test Center; RSA - Redstone Arsenal, Alabama

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	36.322	80.690	159.278	164.182	-	164.182	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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)



UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
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)	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Initial Operational Test and Evaluation (IOT&E)																												
Milestone C / Full Rate Production Decision																									5			

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 0607135A / Apache Product Improvement Program							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	55.565	24.019	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	79.584
ES2: Apache Product Improvement Program	-	55.565	24.019	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	79.584

A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	59.977	31.049	0.169	-	0.169
Current President's Budget	55.565	24.019	0.000	-	0.000
Total Adjustments	-4.412	-7.030	-0.169	-	-0.169
• Congressional General Reductions	-0.047	-0.030			
• Congressional Directed Reductions	-2.100	-7.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.265	-			
• Adjustments to Budget Years	-	-	-0.169	-	-0.169

Change Summary Explanation

Adjustment to FY 2020 budget year based on anticipated completion of Apache System Development and Demonstration (SDD) V6 program.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607135A / Apache Product Improvement Program				Project (Number/Name) ES2 / Apache Product Improvement Program			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ES2: Apache Product Improvement Program	-	55.565	24.019	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	79.584
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

	FY 2018	FY 2019	FY 2020
<p>Title: Product Development</p> <p>Description: Funding is provided for the following efforts by Boeing.</p> <p>FY 2019 Plans: Will continue the Development, Integration & Testing work associated with the planned remanufacture and new build of Apache aircraft in the AH-64E Capability Version 6 configuration (cognitive decision aiding, modernized dayside assembly, modernized radio frequency interferometer, maritime targeting, and radar upgrades) and to enhance operational capabilities, and JAGM integration.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Completion of Apache System Development and Demonstration (SDD) V6 program.</p>	50.904	14.190	-
<p>Title: Test and Evaluation</p> <p>Description: Funding is provided for Development Testing and Evaluation and Operational Test and Evaluation.</p> <p>FY 2019 Plans: Funds are required for completion of FOT&E II</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>	2.100	7.289	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607135A / Apache Product Improvement Program	Project (Number/Name) ES2 / Apache Product Improvement Program

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Completion of Apache System Development and Demonstration (SDD) V6 program.			
Title: Management Services	2.561	1.435	-
Description: Funding is provided for the following effort: Payroll, Travel, Support Contractors, Matrix Support.			
FY 2019 Plans: Will continue to provide funding for the following effort: Payroll, Travel, Support Contractors, Matrix Support.			
FY 2019 to FY 2020 Increase/Decrease Statement: Completion of Apache System Development and Demonstration (SDD) V6 program.			
Title: FY2019 SBIR / STTR Transfer	-	1.105	-
FY 2019 Plans: SIBR / STTR Transfer break-out			
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR / STTR Transfer			
Accomplishments/Planned Programs Subtotals	55.565	24.019	-

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• AA6605: AH-64 MODS	238.141	104.996	58.172	-	58.172	85.475	84.505	82.166	64.682	580.576	1,298.713
• A05111: AH-64 Apache Block IIIA Reman	905.326	927.798	997.719	-	997.719	962.446	706.243	799.500	806.301	Continuing	Continuing
• A05133: AH-64 Apache Block IIIB New Build	1,023.300	511.287	0.000	-	0.000	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

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

In FY14, a contract for Apache AH-64E Lot 3, initiating Full Rate Production, was awarded with options for Lot 4.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607135A / <i>Apache Product Improvement Program</i>	Project (Number/Name) ES2 / <i>Apache Product Improvement Program</i>
<p>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.</p> <p>In FY13, FY14, and FY15 MRL NRE encompassed US Government (USG) design of the Hydra Launcher Electronics Assembly (LEA), modification of the M261 launcher, launcher fabrication, and launcher testing.</p> <p>In FY15-FY19, Apache AH-64E Version 6 System Development and Demonstration (SDD) Contract.</p> <p>Multi-year production awarded March 15, 2017.</p> <p>E. Performance Metrics N/A</p>		

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607135A / Apache Product Improvement Program	Project (Number/Name) ES2 / Apache Product Improvement Program
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Management Services (In-House, Travel, etc.)	MIPR	PMO AAH Matrix Support AMCOM Express : Redstone Arsenal, AL	8.291	2.561		1.435		-		-		-	0.000	12.287	-
Subtotal			8.291	2.561		1.435		-		-		-	0.000	12.287	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
The Boeing Company	SS/CPIF	Boeing Contracts : Mesa, AZ	165.512	50.904		14.190		-		-		-	0.000	230.606	-
Longbow Limited Liability (LBL) Contracts	SS/CPIF	Longbow Limited Liability (LBL) Contracts : Orlando, FL	9.000	-		-		-		-		-	0.000	9.000	-
Ground Fire Acquisition Development (GFAD)	SS/CPIF	PM AVIATION SYSTEMS Various Activities : Various	12.000	-		-		-		-		-	0.000	12.000	-
FY2019 SBIR/STTR Transfer	TBD	N/A : N/A	-	-		1.105		-		-		-	0.000	1.105	-
Subtotal			186.512	50.904		15.295		-		-		-	0.000	252.711	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Support Activities	MIPR	Various : Various	3.855	-		-		-		-		-	0.000	3.855	-
Subtotal			3.855	-		-		-		-		-	0.000	3.855	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019


Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607135A / Apache Product Improvement Program	Project (Number/Name) ES2 / Apache Product Improvement Program
--	--	--

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Operational Assessments, Test Integration Working Group (TWIG), TEMP, etc.	MIPR	Various : Various	11.400	2.100		7.289		-		-		-	0.000	20.789	-
Subtotal			11.400	2.100		7.289		-		-		-	0.000	20.789	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			210.058	55.565		24.019		-		-		-	0.000	289.642	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607135A / Apache Product Improvement Program	Project (Number/Name) ES2 / Apache Product Improvement Program	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NRE Contracts - Boeing	[REDACTED]				 FOT&E II																							
Follow-On Test & Eval II	NRE Contracts - Boeing																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607135A / Apache Product Improvement Program	Project (Number/Name) ES2 / Apache Product Improvement Program

Schedule Details

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	48.241	35.196	13.039	-	13.039	11.247	5.232	0.000	0.000	Continuing	Continuing
ES3: <i>Blackhawk Product Improvement Program</i>	-	48.241	35.196	13.039	-	13.039	11.247	5.232	0.000	0.000	Continuing	Continuing

Note

MEDEVAC:
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 FY19-22. In accordance with AR 40-60, Medical Materiel Acquisition Policy, the Army's Aeromedical Evacuation capability is funded by two portfolio managers, PEOAVN and MRMC. PEOAVN is responsible for the integration of MEDEVAC Mission Equipment Package (MEP) on the UH-60V. MRMC is responsible for recurring costs to procure kits and resource the installation of MEP kits on UH-60V MEDEVAC helicopters.

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 FY19, RDT&E funding will support non-recurring engineering to integrate and qualify MEDEVAC 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 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.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>
---	--

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	34.416	35.240	13.039	-	13.039
Current President's Budget	48.241	35.196	13.039	-	13.039
Total Adjustments	13.825	-0.044	0.000	-	0.000
• Congressional General Reductions	-0.028	-0.044			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	15.200	-			
• SBIR/STTR Transfer	-1.347	-			

Change Summary Explanation

FY 2019 Funding added for MEDEVAC MEP RDT&E.

The \$1.334M cut (FY19) is for SBIR / STTR (Small Business Innovation Research/Small Business Tech Transfer) and FFRDC (Federally Funded Research and Development Centers).

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>				Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ES3: <i>Blackhawk Product Improvement Program</i>	-	48.241	35.196	13.039	-	13.039	11.247	5.232	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

MEDEVAC:
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 FY19-22. In accordance with AR 40-60, Medical Materiel Acquisition Policy, the Army's Aeromedical Evacuation capability is funded by two portfolio managers, PEOAVN and MRMC. PEOAVN is responsible for the integration of MEDEVAC Mission Equipment Package (MEP) on the UH-60V. MRMC is responsible for recurring costs to procure kits and resource the installation of MEP kits on UH-60V MEDEVAC helicopters.

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 FY19, RDT&E funding will support non-recurring engineering to integrate and qualify MEDEVAC 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 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.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Product Development</p> <p>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.</p> <p>FY 2019 Plans: Continued 60V EMD efforts including hardware development, Flight Test Software Build 2, and PIF labor in support of 60V development.</p> <p>FY 2020 Base Plans: Continued 60V EMD efforts including hardware development and PIF labor in support of 60V development.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: UH-60V EMD contract ends in 2020.</p>	36.200	8.486	1.253	-	1.253
<p>Title: Support</p> <p>Description: Support Costs include Systems Engineering/Program Management (SEPM) type activities performed at the Prototype Integration Facility (PIF). This includes Army Engineering Directorate (AED) support for propulsion, structures, aeromechanics, mission equipment, as well as PIF program management.</p> <p>FY 2019 Plans: Continue AED support for propulsion, structures, aeromechanics, mission equipment, SED SIL Support, Air Worthiness Release (AWR), as well as PIF program management.</p> <p>FY 2020 Base Plans: Continue AED support for propulsion, structures, aeromechanics, mission equipment, SED SIL Support, Air Worthiness Release (AWR), and Logistics Demonstration as well as PIF program management.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Transitioning to production.</p>	3.445	3.348	1.423	-	1.423
<p>Title: Management Services</p>	2.598	1.145	0.755	-	0.755

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>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.</p> <p>FY 2019 Plans: Continue core and contractor (SEPM) activities in support of UH-60V.</p> <p>FY 2020 Base Plans: Continue core and contractor (SEPM) activities in support of UH-60V.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Transitioning to production.</p>					
<p>Title: Test & Evaluation</p> <p>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, Initial Operational Test and Evaluation (IOTE), Cybersecurity and Interoperability tests.</p> <p>FY 2019 Plans: ATEC Initial Operational Testing and Evaluation (IOT&E).</p> <p>FY 2020 Base Plans: EMV (Electromagnetic Vulnerability) testing and evaluation.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: IT&E testing was conducted in FY19. EMV testing is less expensive.</p>	5.998	4.475	1.677	-	1.677
<p>Title: MEDEVAC MEP Integration Product Development</p> <p>Description: MEDEVAC MEP Integration Product Development.</p> <p>FY 2019 Plans:</p>	-	13.947	5.457	-	5.457

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Develop Contract with PIF Contractor to perform Hardware (HW) design and Software (SW) Design activities for H-60V MEDEVAC MEP Integration effort.</p> <p>FY 2020 Base Plans: Continue executing contract with PIF Contractor to perform Hardware (HW) design and Software (SW) Design activities for H-60V MEDEVAC MEP Integration effort.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY19 activities include intensive systems engineering efforts immediately after contract award, as well as the engineering to successfully conduct the Preliminary Design Review (PDR). Because the preponderance of the engineering activities leading up to Critical Design Review (CDR) will occur in FY19, the RDT&E funding requirement for product development is greater in FY19.</p>					
<p>Title: MEDEVAC MEP Integration Support</p> <p>Description: Support the HW and SW Design Activities with Airworthiness and Technical data division support.</p> <p>FY 2019 Plans: Support the HW and SW Design Activities with Airworthiness and Technical data division support.</p> <p>FY 2020 Base Plans: Support the HW and SW Design Activities with Airworthiness and Technical data division support.</p>	-	0.592	0.592	-	0.592
<p>Title: MEDEVAC MEP Management Services</p> <p>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.</p> <p>FY 2019 Plans: Provide Management Services with Government / Contractor System Engineering Program Management (SEPM) to include the cost of the Government and contractor personnel supporting the H-60V MEDEVAC MEP Integration Program.</p> <p>FY 2020 Base Plans:</p>	-	1.913	1.882	-	1.882

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Provide Management Services with Government / Contractor System Engineering Program Management (SEPM) to include the cost of the Government and contractor personnel supporting the H-60V MEDEVAC MEP Integration Program. FY 2019 to FY 2020 Increase/Decrease Statement: FY19 activities include intensive systems engineering efforts immediately after contract award, as well as the engineering to successfully conduct the Preliminary Design Review (PDR). Because the preponderance of the engineering activities leading up to Critical Design Review (CDR) will occur in FY19, the RDT&E funding requirement for contractor support is greater in FY19.					
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	1.290	-	-	-
Accomplishments/Planned Programs Subtotals	48.241	35.196	13.039	-	13.039

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• A05009: <i>UH-60 Black Hawk L and V Models</i>	76.516	148.138	169.290	-	169.290	172.969	173.634	174.656	153.267	0.000	1,068.470
• MN1000: <i>Combat Support Medical</i>	95.533	102.765	68.225	2.735	70.960	36.564	42.674	33.691	29.750	0.000	411.937

Remarks
MN1000, MEDEVAC Mission Equipment Package (MEP) provides procurement funding for MEDEVAC MEP capability on UH-60 helicopters. Starting in FY22, MN1000 will resource procurement of MEDEVAC MEP kits and installations at a rate of 15 aircraft per year through FY34, which is the estimated year the AAO of 200 UH-60V MEDEVAC is reached. Figures shown above reflect the full MN1000 - OPA3/MN1000/Combat Support Medical funding line, which includes the production kits and MEP installation costs at CCAD. UH-60V MEDEVAC MEP MN1000 OPA requirements are \$5.7M in FY22, \$6.1M in FY23, and \$6.1M in FY24. Total MEDEVAC MEP requirement in MN1000 through FY34 is \$88.1M.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>

D. Acquisition Strategy

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

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

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
UH-60V - Organic	MIPR	Various : Redstone Arsenal, AL	10.352	1.096	Oct 2017	0.483	Oct 2018	0.305	Oct 2019	-		0.305	Continuing	Continuing	-
UH-60V - Contractor	C/LH	Various : Redstone Arsenal, AL	7.483	1.502	Oct 2017	0.662	Oct 2018	0.450	Oct 2019	-		0.450	Continuing	Continuing	-
MEDEVAC MEP Integration - Organic	MIPR	Various : Redstone Arsenal	-	-		1.015	Oct 2018	1.045	Oct 2019	-		1.045	Continuing	Continuing	-
MEDEVAC MEP Integration - Contractor	C/LH	Various : Redstone Arsenal, AL	-	-		0.898	Oct 2018	0.837	Oct 2019	-		0.837	Continuing	Continuing	-
Subtotal			17.835	2.598		3.058		2.637		-		2.637	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
UH-60V Development Engineering	C/CPFF	AMRDEC PIF : Redstone Arsenal, AL	124.591	36.200	Oct 2017	8.486	Oct 2018	1.253	Oct 2019	-		1.253	Continuing	Continuing	-
MEDEVAC MEP Product Development and Integration	C/CPFF	AMRDEC PIF : Redstone Arsenal AL	-	-		13.947	Oct 2018	5.457	Oct 2019	-		5.457	Continuing	Continuing	-
FY 2019 SBIR / STTR Transfer	TBD	HDQA : HDQA	-	-		1.290		-		-		-	0.000	1.290	-
Subtotal			124.591	36.200		23.723		6.710		-		6.710	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
UH-60V	MIPR	Various : Redstone Arsenal, AL	9.340	3.445	Oct 2017	3.348	Oct 2018	1.423	Oct 2019	-		1.423	Continuing	Continuing	-
MEDEVAC MEP Integration Support	MIPR	Various : Redstone Arsenal AL	-	-		0.592	Oct 2018	0.592	Oct 2019	-		0.592	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>
--	--	--

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			9.340	3.445		3.940		2.015		-		2.015	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
UH-60V	MIPR	Redstone Test Center : Redstone Arsenal, AL	5.617	5.998	Oct 2017	4.475	Oct 2018	1.677	Oct 2019	-		1.677	Continuing	Continuing	-
Subtotal			5.617	5.998		4.475		1.677		-		1.677	Continuing	Continuing	N/A

Remarks
Government Support

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	157.383	48.241	35.196	13.039	-	13.039	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UH-60V Development (Research, Development, Test, and Evaluation)																												
UH-60V EMD (Product Development)																												
Support (RDTE)																												
Support																												
Test and Evaluation (RDTE)																												
Test and Evaluation (RDTE)																												
Test and Evaluation																												
Management Services (RDTE)																												
Management Services																												
UH-60V Future Integration Efforts (RDTE)																												
UH-60V Future Integration Efforts (RDTE)																												
Integration																												
UH-60V Digital Modifications (Low Rate Initial Production (LRIP)) (APA)																												
UH-60V LRIP																												
UH-60V Digital Modifications Full Rate Production (APA) (FY22-FY36)																												
UH-60V Digital Modifications Full Rate Production (APA) (FY22-FY36)																												
UH-60V Production (FY22-FY36)																												
MEDEVAC MEP Integraton Management Services (RDTE)																												
MEDEVAC MEP Integration Management Services																												
MEDEVAC MEP Product Development and Integration (RDTE)																												
MEDEVAC MEP Product Development and Integration																												
MEDEVAC MEP Integration Support (RDTE)																												
MEDEVAC MEP Integration Support																												
MEDEVAC MEP Integration Test and Evaluation (RDTE)																												
MEDEVAC MEP Integration Test and Evaluation																												
MEDEVAC MEP Integration Test and Evaluation (RDTE)																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607136A / <i>Blackhawk Product Improvement Program</i>	Project (Number/Name) ES3 / <i>Blackhawk Product Improvement Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
UH-60V Development (Research, Development, Test, and Evaluation (RDTE)	4	2014	4	2020
Support (RDTE)	1	2014	4	2020
Test and Evaluation (RDTE)	4	2015	4	2020
Management Services (RDTE)	1	2014	4	2020
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	2023	4	2036
MEDEVAC MEP Integraton 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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	155.433	144.722	174.371	-	174.371	46.136	2.052	2.000	1.021	Continuing	Continuing
ES4: <i>Chinook Product Improvement Program</i>	-	155.433	144.722	174.371	-	174.371	46.136	2.052	2.000	1.021	Continuing	Continuing

Program MDAP/MAIS Code: 577

Note

Funds in this Program Element (PE) were realigned from PE 0203744A Aircraft Modifications/Product Improvement Programs, Project Number 430 Improved Cargo Helicopter.

A. Mission Description and Budget Item Justification

This Program Element (PE) supports continued modernization of the Army's only heavy lift helicopter the CH-47F Chinook providing tomorrow's heavy lift readiness. The CH-47F project funds modernization, integration and improvements to the CH-47F and MH-47G helicopters through the CH-47F Block II program of record.

The CH-47F is a twin-turbine, tandem-rotor, heavy-lift transport helicopter with a useful load of up to 25,000 lbs, representing an essential element of Multi-Domain Battle Operations. The CH-47F and MH-47G helicopters perform over 95% of the Army's heavy lift missions including troop transport, air assault and resupply in combat, combat support and combat service support roles.

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. Additionally, funding supports full component qualification for numerous aircraft subsystems such as the Improved Drive Train (IDT) and Advanced Chinook Rotor Blade (ACRB), which increase performance in all environmental conditions (especially at high altitude and increased temperature). The CH-47F Block II program restores payload lost through mission equipment package (MEP) growth and enhances flight control systems, while providing the most cost effective procurement alternative to maintain heavy lift capability and reduce Operation & Support (O&S) costs.

The Cargo Project Management Office awarded the CH-47F Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase will produce three production representative test articles to support a Milestone C decision in the 4th quarter of FY21. This phase will include contractor and Government led system level qualification testing. The contractor led system level qualification testing includes both ground and flight test. The Government led system level qualification testing includes Electromagnetic Environmental Effects (E3), Limited User Test (LUT) and aircraft subsystem Live-Fire Test and Evaluation (LFTE).

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>
---	--

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	194.567	157.822	174.371	-	174.371
Current President's Budget	155.433	144.722	174.371	-	174.371
Total Adjustments	-39.134	-13.100	0.000	-	0.000
• Congressional General Reductions	-0.130	-0.179			
• Congressional Directed Reductions	-32.750	-12.921			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-6.254	-			

Change Summary Explanation

FY 2019 Base RDTE \$139.003 million. Adjustments FY2019 Previous President's Budget: *Congressional Directed Reductions -\$12.921 million, *SBIR/STTR Transfer Total -\$5.719 million (SBIR -\$5.066 million and STTR -\$0.653 million), and FFRDC -\$0.179 million

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>				Project (Number/Name) ES4 / <i>Chinook Product Improvement Program</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ES4: <i>Chinook Product Improvement Program</i>	-	155.433	144.722	174.371	-	174.371	46.136	2.052	2.000	1.021	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Quantity of RDT&E Articles:

FY18 - Awarded: 1 - Ground Test Vehicle (GTV), 2 - CH-47F Block II Prototypes

FY19 - Awarded: 1 - CH-47F Block II Prototype

FY19 - Scheduled Delivery: 1 - GTV, 2 - CH-47F Block II Prototypes

FY20 - Scheduled Delivery: 1 - CH-47F Block II Prototype

A. Mission Description and Budget Item Justification

This Program Element (PE) supports continued modernization of the Army's only heavy lift helicopter the CH-47F Chinook providing tomorrow's heavy lift readiness. The CH-47F project funds modernization, integration and improvements to the CH-47F and MH-47G helicopters through the CH-47F Block II program of record.

The CH-47F is a twin-turbine, tandem-rotor, heavy-lift transport helicopter with a useful load of up to 25,000 lbs, representing an essential element of Multi-Domain Battle Operations. The CH-47F and MH-47G helicopters perform over 95% of the Army's heavy lift missions including troop transport, air assault and resupply in combat, combat support and combat service support roles.

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. Additionally, funding supports full component qualification for numerous aircraft subsystems such as the Improved Drive Train (IDT) and Advanced Chinook Rotor Blade (ACRB), which increase performance in all environmental conditions (especially at high altitude and increased temperature). The CH-47F Block II program restores payload lost through mission equipment package (MEP) growth and enhances flight control systems, while providing the most cost effective procurement alternative to maintain heavy lift capability and reduce Operation & Support (O&S) costs.

The Cargo Project Management Office awarded the CH-47F Engineering and Manufacturing Development (EMD) contract in July 2017. The EMD phase will produce three production representative test articles to support a Milestone C decision in the 4th quarter of FY21. This phase will include contractor and Government led system level qualification testing. The contractor led system level qualification testing includes both ground and flight test. The Government led system level qualification testing includes Electromagnetic Environmental Effects (E3), Limited User Test (LUT) and aircraft subsystem Live-Fire Test and Evaluation (LFTE).

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>	Project (Number/Name) ES4 / <i>Chinook Product Improvement Program</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Modernization Integration</p> <p>Description: This effort performs the following objectives: finalizes a test article design that converts a CH-47D aircraft to a Ground Test Vehicle (GTV); completes Block II Common Avionics Architecture System (CAAS) coordination and vehicle interface planning; updates weight and balance data with the final design inputs and changes; finalizes Reliability and Maintainability (R&M) and safety analyses; finalizes structural, stress, and fatigue substantiation; finalizes vehicle level drawings and assemblies (including alignment definitions); completes all manufacturing tooling designs for specific cockpit and cabin positions; releases final engineering to support test article development; finalizes manufacturing planning for the Block II Air Vehicle; completes system integration non-recurring engineering (NRE) prior to Engineering and Manufacturing Development (EMD).</p>	6.049	-	-	-	-
<p>Title: Improved Drive Train (IDT)</p> <p>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.</p> <p>FY 2019 Plans: Continue test preparation and execution for the forward transmission, static/dynamics strain survey and sync shaft fatigue tests. Initiate qualification endurance, overstress, gear tooth bending fatigue test for aft/forward transmission. Initiate planning for reduced lubrication and oil out test on the aft/combiner/forward transmissions.</p> <p>FY 2020 Base Plans: Perform contractor led component qualification to support forward and aft rotor shaft fatigue testing. Document test results to support full airworthiness component qualification. Additionally, this testing will identify component useful life necessary to support flight test.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to test completion and documentation in FY20 to support full component qualification on the Improved Drive Train (IDT).</p>	17.500	9.471	7.587	-	7.587
<p>Title: Transportable Flight Proficiency Simulator (TFPS)</p> <p>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</p>	9.915	12.300	1.000	-	1.000

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>	Project (Number/Name) ES4 / <i>Chinook Product Improvement Program</i>

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>training mission tasks and emergency procedures and provides a cost savings when compared to using aircraft for these purposes. The TFPS will increase safety and mitigate risk to Block II Limited User Test (LUT) aircrews by allowing pilots to train aircraft differences in modifications, handling qualities, performance and human factors considerations before actual flight is performed. Training in the TFPS reduces LUT timelines and improves aircrew proficiency as confirmed in the CH-47F (Block I) Phase 2 User Test Report. The initial Block II TFPS will also serve as building block for upgrading the fielded TFPSs to the Block II configuration.</p> <p>FY 2019 Plans: Continue procurement, development, integration and fabrication of simulator hardware and software components.</p> <p>FY 2020 Base Plans: Build, certify, test, and relocate the Transportable Flight Proficiency Simulator to prepare for training.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to completion of the design and build efforts for the initial Transportable Flight Proficiency Simulator to support Block II.</p>					
<p>Title: CH-47F Block II Engineering and Manufacturing Development (EMD)</p> <p>Description: Conduct and support aircraft development and complete assembly of three (3) EMD test articles to include Advanced Chinook Rotor Blade (ACRB), airframe components, Improved Drive Train (IDT) and rotor components, light weight fuel system and electrical components. Complete fabrication, assembly, and initial functional checks of the GTV and remote control system (RCS). Conduct functional testing of the CH-47F Block II systems. Conduct Test Readiness Review (TRR) for EMD ground and flight testing. Release of EMD flight test software. Begin contractor led system level ground and flight testing. Deliver documentation that demonstrates requirements verification and production configuration baseline. Continue Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) support for initial flight test activities.</p> <p>FY 2019 Plans: Conduct and support aircraft development and complete assembly of three (3) EMD test articles to include ACRB, airframe components, Improved Drive Train (IDT) and rotor components, light weight fuel system and electrical components. Complete fabrication, assembly, and initial functional checks of the GTV and remote control system (RCS). Conduct functional testing of the CH-47F Block II systems. Conduct Test Readiness Review (TRR) for EMD ground and flight testing. Release of EMD flight test software. Begin contractor led</p>	92.215	89.759	131.836	-	131.836

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>	Project (Number/Name) ES4 / <i>Chinook Product Improvement Program</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>system level ground and flight testing. Deliver documentation that demonstrates requirements verification and production configuration baseline. Continue Integrated Logistics Support (ILS) and Integrated Contractor Supply (ICS) support for initial flight test activities.</p> <p>FY 2020 Base Plans: Continue Engineering and Manufacturing Development (EMD) system level ground and flight testing to support full airworthiness qualification. Develop technical publications, provisioning and training for operators and maintainers. Develop material solutions and fielding plan for ground support equipment. Perform maintenance demonstration, requirements traceability and system verification. Utilize the Ground Test Vehicle (GTV) to support dynamic live fire testing.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding increase due to majority of system level test occurring in FY20.</p>					
<p>Title: Matrix and Contractor Support</p> <p>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.</p> <p>FY 2019 Plans: Continue funding support costs for various external government agencies, contractor support and other matrix organizations supporting the Block II development Program.</p> <p>FY 2020 Base Plans: Continue funding support costs for various government agencies, contractor support, and other matrix organizations supporting the Block II EMD Program.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease to align with support requirements for FY 20 approved development activities.</p>	7.346	7.163	6.738	-	6.738
<p>Title: Advanced Chinook Rotor Blade (ACRB)</p> <p>Description: This effort designs, develops and performs contractor led component qualification for an improved rotor blade capability. This capability significantly increases lift capability, reduces Operation and Support (O&S) costs and is a form, fit replacement for the current blade, which will enable payload restoration to the ground force commander. Conduct additional flight testing to reduce risk for Engineering and Manufacturing</p>	17.694	9.858	8.619	-	8.619

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019				
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>	Project (Number/Name) ES4 / <i>Chinook Product Improvement Program</i>					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Development (EMD) and validate Computational Fluid Dynamics (CFD) and Computational Structural Dynamics (CSD) models. FY 2019 Plans: Complete build of ACRB blades for component level qualification testing to support entry into Block II Flight Testing. Submit test plans and test reports in support of EMD flight test Air Worthiness Release (AWR). FY 2020 Base Plans: Conduct engineering analysis of Advanced Chinook Rotor Blade (ACRB) design changes resulting from Block II flight testing. Continue structural testing and development of material allowables in support of ACRB full component qualification. FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to level of effort required to perform full component airworthiness qualification.							
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 endurance, Live-Fire Test and Evaluation (LFTE), Electromagnetic Environmental Effects (E3), Limited User Test (LUT), and test evaluation activities. FY 2019 Plans: Construct GTV fixture and perform endurance testing of the Improved Drive Train and Improved Rotor Subsystem. Conduct first flight and begin Block II EMD ground and flight test. Test preparation for and commencement of Live Fire testing on the Lightweight Fuel System and selected components of the Improved Drive Train. Continued coordination, planning and subsystem test and execution of the cybersecurity test program. Commencement of the RAM data collection program. Initiate planning requests and coordination for the Limited User Test (LUT). FY 2020 Base Plans: Transition from contractor led flight testing to government led flight testing of three production representative test aircraft for system level performance and airworthiness qualification. Continue Advanced Chinook Rotor Blade (ACRB) live fire testing and conduct system level live fire testing at Army Research Laboratory (ARL).			4.714	10.452	18.591	-	18.591

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Conclude system level Electromagnetic Environmental Effects (E3) and ground developmental testing. Complete coordination and initiate execution support for Limited User Test (LUT).					
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increase due to majority of system level test occurring in FY 20. This includes performing Electromagnetic Environmental Effects (E3), Live-Fire Test and Evaluation (LFTE) and Limited User Test (LUT).					
Title: FY 2019 SBIR / STTR Transfer	-	5.719	-	-	-
Description: FY2019 SBIR/STTR Transfer value was not adjusted for PB2020 Army (February 2019) See R-2 section B "Change Summary Explanation" page 2. Current President's Budget amount 144.722M only reflects Congressional marks and FFRDC adjustments and appears 5.719M more than funding amount received 139.003M. The SBIR / STTR adjustment must be captured to adequately portray total program for FY2019. This is a work around to alleviate the perceived overage until the P&R database syncs with the Resource Formulation System (RFS).					
FY 2019 Plans: The program did not receive these dollars as this is a standard transfer of dollars not received by the program office.					
FY 2019 to FY 2020 Increase/Decrease Statement: The FY2020 SBIR/STTR amount is expected to increase as this value is derived as a fixed percentage of the PB submission. CH-47F Block II total program funding for PB20 is greater than PB19, thus an increase is expected.					
Accomplishments/Planned Programs Subtotals	155.433	144.722	174.371	-	174.371

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• AA0252: CH-47 Cargo Helicopter Mods (MYP)	22.366	27.807	11.785	-	11.785	3.552	2.936	0.606	0.734	Continuing	Continuing
• A05105: CH-47 SLEP	88.560	140.056	158.476	-	158.476	179.300	166.100	183.687	194.350	Continuing	Continuing
• A05008: CH-47 NEW BUILD	368.236	-	0.000	25.000	25.000	25.000	-	-	-	0.000	418.236

Remarks

100% of the A05105 is MH-47G Block II procurement.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>	Project (Number/Name) ES4 / <i>Chinook Product Improvement Program</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
100% of the A05008 OCO is MH-47G Block II procurement.											

D. Acquisition Strategy

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

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Modernization Integration	Option/ Various	Boeing Ridley : Park PA	30.881	6.049	Nov 2017	-		-		-		-	Continuing	Continuing	Continuing
Engineering and Manufacturing Development (EMD)	SS/CPIF	Boeing Ridley : Park, PA	34.964	92.215	Dec 2017	89.759	Dec 2018	131.836	Dec 2019	-		131.836	Continuing	Continuing	Continuing
Advanced Chinook Rotor Blade (ACRB)	SS/CPFF	Boeing Ridley : Park PA	31.523	17.694	Nov 2017	9.858	Dec 2018	8.619	Nov 2019	-		8.619	Continuing	Continuing	Continuing
Improved Drive Train (IDT)	SS/CPFF	Boeing Ridley : Park, PA	18.504	17.500	Nov 2017	9.471	Dec 2018	7.587	Nov 2019	-		7.587	Continuing	Continuing	Continuing
Electronic Control Unit (ECU) Software Upgrade	SS/CPFF	Honeywell : Phoenix, AZ	8.607	-		-		-		-		-	0.000	8.607	-
Ratio Detector Power Supply (RDPS)	SS/CPFF	Boeing Ridley : Park, PA	5.570	-		-		-		-		-	0.000	5.570	-
Transportable Flight Proficiency Simulator (TFPS)	MIPR	NAVAIR : Patuxent River NAS, MD	-	9.915	May 2018	12.300	May 2019	1.000	May 2020	-		1.000	Continuing	Continuing	-
FY 2019 SBIR / STTR Transfer	TBD	To Be Determined : To Be Determined	-	-		5.719	Jan 2019	-		-		-	0.000	5.719	-
Subtotal			130.049	143.373		127.107		149.042		-		149.042	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix and Contractor Support from External Sources	Various	Various Government and contractor : RSA & Huntsville, AL, Aberdeen Proving Ground MD,	7.938	7.346	Oct 2017	7.163	Oct 2018	6.738	Oct 2019	-		6.738	Continuing	Continuing	Continuing
Subtotal			7.938	7.346		7.163		6.738		-		6.738	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System and Component Level Test	Various	Boeing Ridley : Park PA and Various Government	16.873	4.714	Dec 2017	10.452	Dec 2018	18.591	Dec 2019	-		18.591	Continuing	Continuing	Continuing
Subtotal			16.873	4.714		10.452		18.591		-		18.591	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			154.860	155.433		144.722		174.371		-		174.371	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
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	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Modernization Integration	[Redacted]				[Redacted]																							
Improved Drive Train (IDT)	[Redacted]				[Redacted]																							
Transportable Flight Proficiency Simulator (TFPS)	[Redacted]				[Redacted]																							
CH-47F Block II EMD	[Redacted]				[Redacted]																							
In-house and Program Management Administration	[Redacted]				[Redacted]																							
Testing and Evaluation	[Redacted]				[Redacted]																							
Advanced Chinook Rotor Blade (ACRB)	[Redacted]				[Redacted]																							

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607137A / <i>Chinook Product Improvement Program</i>	Project (Number/Name) ES4 / <i>Chinook Product Improvement Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Modernization Integration	3	2015	3	2019
Improved Drive Train (IDT)	3	2014	1	2021
Transportable Flight Proficiency Simulator (TFPS)	2	2018	4	2020
CH-47F Block II EMD	4	2017	4	2021
In-house and Program Management Administration	1	2017	4	2024
Testing and Evaluation	3	2015	4	2024
Advanced Chinook Rotor Blade (ACRB)	1	2011	1	2023

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	7.782	2.280	4.545	-	4.545	1.920	0.000	0.000	0.000	0.000	16.527
ES5: Fixed Wing Product Improvement Program	-	7.782	2.280	4.545	-	4.545	1.920	0.000	0.000	0.000	0.000	16.527

A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	9.981	4.189	4.545	-	4.545
Current President's Budget	7.782	2.280	4.545	-	4.545
Total Adjustments	-2.199	-1.909	0.000	-	0.000
• Congressional General Reductions	-0.008	-0.003			
• Congressional Directed Reductions	-	-1.906			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.800	-			
• SBIR/STTR Transfer	-0.391	-			

Change Summary Explanation

The FUA Test and Evaluation Plan was scheduled to have the highest cost in FY18 with a decrease in FY 2019 due to completion of test activities. House Appropriations Committee (HAC) marked FY 2019 in the amount of -\$2.043M.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607138A / Fixed Wing Product Improvement Program				Project (Number/Name) ES5 / Fixed Wing Product Improvement Program			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ES5: Fixed Wing Product Improvement Program	-	7.782	2.280	4.545	-	4.545	1.920	0.000	0.000	0.000	0.000	16.527
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Program Management (PM)	0.467	0.215	0.383	-	0.383
Description: Program Management support for Fixed Wing (FW) Aircraft efforts					
FY 2019 Plans: PM Fixed Wing (FW) will provides funding for Program Management and Engineering Support for Fixed Wing (FW) fielded fleet Non-Recurring Engineering (NRE), development of Supplemental Type Certificates (STC) and associated developmental testing, and integration of all Army Fixed Wing Aircraft to provide Communications, Navigation and Surveillance (CNS), Aircraft Survivability Equipment (ASE), modifications in service, and Department of Defense (DoD) mandated safety equipment to meet current and evolving international and Army standards.					
FY 2020 Base Plans: Provides funding for Program Management and Engineering Support in order to meet Fixed Wing Aircraft Capability requirements					
FY 2019 to FY 2020 Increase/Decrease Statement:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607138A / Fixed Wing Product Improvement Program	Project (Number/Name) ES5 / Fixed Wing Product Improvement Program			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
\$.168 million increase from FY19 to FY20 is due to increased Test and Evaluation required program management.					
<p>Title: Test And Evaluation</p> <p>Description: Support studies, test and evaluations, and Analysis of Alternatives to support emerging Army Fixed Wing (FW) requirements for product improvements to support the FW fleet.</p> <p>FY 2019 Plans: This budget line will provide funding for continued Test and Evaluation of Fixed Wing Aircraft.</p> <p>FY 2020 Base Plans: Provides funding for Test and Evaluation and Engineering Services in order to meet Fixed Wing Aircraft Capability requirements</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: \$.549 million increase from FY19 to FY20 is to evaluate feasibility of increasing performance of Army Test & Evaluation Command T-6 aircraft to support future testing of all Fixed Wing and Rotary Wing aircraft.</p>	7.315	1.116	1.665	-	1.665
<p>Title: Support Cost</p> <p>Description: Non-recurring Engineering Support for Fixed Wing (FW) Aircraft</p> <p>FY 2019 Plans: This budget line will provide funding for Support Cost of FW Aircraft.</p> <p>FY 2020 Base Plans: Provides funding for Support Costs and Engineering Services in order to meet Fixed Wing Aircraft Capability requirements</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: \$1.682 million increase from FY19 to FY20 is due to aircraft navigation and performance enhancements to include survivability, safety, and situational awareness such as C-26 extended range fuel tanks and Army Test & Evaluation Command T-6 increase max gross takeoff weight.</p>	-	0.815	2.497	-	2.497
<p>Title: FY 2019 SBIR/STTR Transfer</p> <p>Description: FY2019 SBIR/STTR Transfer of \$134M</p>	-	0.134	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607138A / Fixed Wing Product Improvement Program	Project (Number/Name) ES5 / Fixed Wing Product Improvement Program

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 Plans: FY2019 SBIR/STTR Transfer of \$134M					
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR/STTR Reduction of \$134M					
Accomplishments/Planned Programs Subtotals	7.782	2.280	4.545	-	4.545

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• A11300: Utility F/W Aircraft	75.115	18.644	16.000	-	16.000	-	-	-	-	0.000	109.759
• AA0270: Utility/ Cargo Airplane Mods	57.737	17.719	15.476	8.362	23.838	22.244	-	-	-	Continuing	Continuing

Remarks

The A11300 Utility F/W Aircraft (Aircraft Procurement Army (APA) P-1 Line #2) budget line provides for the acquisition of Army Fixed Wing Aircraft in support of mission requirements, training, and other support activities. The AA0270 Utility/Cargo Airplane Mods (Aircraft Procurement Army (APA) P-1 Line #27) provides for aircraft modification in support of Fixed Wing programs.

D. Acquisition Strategy

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

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607138A / Fixed Wing Product Improvement Program	Project (Number/Name) ES5 / Fixed Wing Product Improvement Program
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support	Various	PM Fixed Wing : Redstone Arsenal, AL	0.118	0.467	Jan 2018	0.215	Jan 2019	0.383	Jan 2020	-		0.383	0.190	1.373	-
Subtotal			0.118	0.467		0.215		0.383		-		0.383	0.190	1.373	N/A

Remarks
FY19 to FY20 increase due to test and evaluation program management requirements.

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Fixed Wing Non-recurring Engineering	Various	Various : Various	1.806	-		1.116	Mar 2019	2.497	Mar 2020	-		2.497	0.866	6.285	-
2019 SBIR/STTR Transfer	TBD	NA : NA	-	-		0.134		-		-		-	0.000	0.134	-
Subtotal			1.806	-		1.250		2.497		-		2.497	0.866	6.419	N/A

Remarks
FY19 to FY20 increases are due to aircraft navigation and performance enhancements to include survivability, safety, and situational awareness such as C-26 extended range fuel tanks and Army Test & Evaluation Command T-6 increase max gross takeoff weight.

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Testing Support	Various	Various : Various	0.765	7.315	Jun 2018	0.815	Jun 2019	1.665	Jun 2020	-		1.665	0.864	11.424	-
Subtotal			0.765	7.315		0.815		1.665		-		1.665	0.864	11.424	N/A

Remarks
FY19 to FY20 increase is to evaluate feasibility of increasing performance of Army Test & Evaluation Command T-6 aircraft to support future testing of all Fixed Wing and Rotary Wing aircraft.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0607138A / Fixed Wing Product Improvement Program				Project (Number/Name) ES5 / Fixed Wing Product Improvement Program					
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.689	7.782		2.280		4.545		-		4.545	1.920	19.216	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607138A / Fixed Wing Product Improvement Program	Project (Number/Name) ES5 / Fixed Wing Product Improvement Program	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
FW Non-Recurring Engineering					FW Non-Recurring Engineering																							
Testing Support					Testing Support																							

Note
 FY18 Funds: \$7.782 million FY19 Funds: \$2.146 million FY20 Funds: \$4.545 million FY21 Funds: \$1.920 million

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607138A / <i>Fixed Wing Product Improvement Program</i>	Project (Number/Name) ES5 / <i>Fixed Wing Product Improvement Program</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FW Non-Recurring Engineering	1	2019	4	2021
Testing Support	1	2018	4	2021

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0607139A / <i>Improved Turbine Engine Program</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	167.532	188.903	206.434	-	206.434	279.600	217.900	166.400	165.662	Continuing	Continuing
ES6: <i>Improved Turbine Engine Program</i>	-	167.532	188.903	206.434	-	206.434	279.600	217.900	166.400	165.662	Continuing	Continuing

Note

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

A. Mission Description and Budget Item Justification

ITEP develops, tests, qualifies, and integrates the next generation turboshaft engine on the 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 increasing 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, as well as integration into the airframe.

FY 2019 funds the Engineering and Manufacturing Development (EMD) contract that will be awarded to one vendor, platform/engine integration design engineering, and ballistic assessments ending in FY 2020. FY 2020 funding continues both the EMD effort and platform/engine integration A-kit development, resulting in a Critical Design Review (CDR). Engine component testing will begin, and engine fit check will be performed for both platforms. FY 2021 continues the EMD effort, continues A-Kit component testing, begins Preliminary Flight Rating (PFR) testing leading to First Engine To Test (FETT). FY 2021 also begins physical airframe integration. FY 2022 funding will continue PFR testing, leading to a Flight Test Air Worthiness Release (AWR) in early FY 2023. FY 2023 funding provides for aircraft flight/qualification testing for both Apache and Black Hawk and the initiation of engine full qualification testing. FY 2024 funding provides for completion of engine qualification, completion of aircraft flight/qualification testing for both Apache and Black Hawk, and Low Rate Initial Production (LRIP).

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607139A / <i>Improved Turbine Engine Program</i>
---	--

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	204.304	192.637	246.810	-	246.810
Current President's Budget	167.532	188.903	206.434	-	206.434
Total Adjustments	-36.772	-3.734	-40.376	-	-40.376
• Congressional General Reductions	-0.142	-0.234			
• Congressional Directed Reductions	-29.800	-3.500			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-6.830	-			
• Adjustments to Budget Years	-	-	-40.376	-	-40.376

Change Summary Explanation

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

FY 2018 funding was reduced by \$29.800M due to funding ahead of need (Apache Integration & Qualification) and SBIR/STTR Transfer in the amount of \$6.972M.

FY 2019 funding was reduced by \$234K for a General Reduction and \$3.500M for Testing Ahead of Need.

FY 2020 budget adjustment of \$40.376 million from the President's Budget 2019 submission was based on the Department's mission priorities during the budget build.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ES6: Improved Turbine Engine Program	-	167.532	188.903	206.434	-	206.434	279.600	217.900	166.400	165.662	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

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

A. Mission Description and Budget Item Justification

ITEP develops, tests, qualifies, and integrates the next generation turboshaft engine on the 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 6000 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 increasing 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, as well as integration into the airframe.

FY 2019 funds the Engineering and Manufacturing Development (EMD) contract that will be awarded to one vendor, platform/engine integration design engineering, and ballistic assessments ending in FY 2020. FY 2020 funding continues both the EMD effort and platform/engine integration A-kit development, resulting in a Critical Design Review (CDR). Engine component testing will begin, and engine fit check will be performed for both platforms. FY 2021 continues the EMD effort, continues A-Kit component testing, begins Preliminary Flight Rating (PFR) testing leading to First Engine To Test (FETT). FY 2021 also begins physical airframe integration. FY 2022 funding will continue PFR testing, leading to a Flight Test Air Worthiness Release (AWR) in early FY 2023. FY 2023 funding provides for aircraft flight/qualification testing for both Apache and Black Hawk and the initiation of engine full qualification testing. FY 2024 funding provides for completion of engine qualification, completion of aircraft flight/qualification testing for both Apache and Black Hawk, and Low Rate Initial Production (LRIP).

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

	FY 2018	FY 2019	FY 2020
Title: ITEP	167.532	181.866	206.434
Description: ITEP - a multi-platform turbine engine development required across existing Army aircraft to fill the capability gaps for Army Aviation Operations			
FY 2019 Plans:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607139A / <i>Improved Turbine Engine Program</i>	Project (Number/Name) ES6 / <i>Improved Turbine Engine Program</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Will down-select to a single vendor, and award an EMD contract to develop, test, and qualify the engine design. Platform/engine integration design engineering will begin.</p> <p>FY 2020 Plans: Continuation of the EMD engine development effort culminating in a Critical Design Review (CDR). Continue platform/engine integration and A-kit design/development resulting in two A-kit Preliminary Design Reviews (PDRs) - one for Apache and one for Black Hawk. Completion of ballistic assessment, begin engine component testing, and perform engine fit check for both platforms. Life cycle support planning, and completion of the Analysis of Product Support Alternatives.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Engine ballistic assessment to support CDR, begin engine component testing, and perform engine fit check into both platforms. Integration efforts to support two A-kit PDR events, one for Apache and one for Black Hawk.</p>			
<p>Title: FY2019 SBIR/STRR TRANSFER</p> <p>Description: FY2019 SBIR/STRR Transfer</p> <p>FY 2019 Plans: FY2019 SBIR/STRR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR/STRR Transfer. FY2020 SBIR/STRR Transfer will be determined in year of execution.</p>	-	7.037	-
Accomplishments/Planned Programs Subtotals	167.532	188.903	206.434

<p>C. Other Program Funding Summary (\$ in Millions) N/A</p> <p>Remarks For Fiscal Year (FY) 2014 and prior, all funding for the Improved Turbine Engine Program (ITEP) was contained in Program Element (PE) 0203744A - Aircraft Modifications/Product Improvement Programs, Project 504. FY 2015 funding was initially moved to PE 0203744A, Project EB1. Prior to execution, FY 2015 and beyond funding was moved to to PE 0607139A, Project ES6.</p> <p>D. Acquisition Strategy ITEP TMRR contracts were based on Full and Open Competition. Awarded Fixed Price Incentive (Firm Target) contracts in FY 2016 to two vendors for TMRR. Following a successful Milestone B decision, there will be a cost-plus-incentive-fee contract awarded to one vendor for EMD contractual effort.</p>

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607139A / <i>Improved Turbine Engine Program</i>	Project (Number/Name) ES6 / <i>Improved Turbine Engine Program</i>

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 will be awarded to design and develop A-kits to integrate the ITE into both the Apache and Black Hawk platforms. Pending a successful CDR in FY 2020, the integration efforts will continue to include fabrication of the A-kits, flight test support, and pubs/provisioning.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
ITEP SEPM - Organic	Allot	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	12.418	13.290	Oct 2017	10.299	Oct 2018	10.402	Oct 2019	-		10.402	Continuing	Continuing	Continuing
ITEP SEPM - Contractor	C/IDIQ	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	5.101	4.567	Oct 2017	4.664	Oct 2018	4.764	Oct 2019	-		4.764	Continuing	Continuing	Continuing
ITEP SEPM - OGA	MIPR	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	11.621	3.394	Oct 2017	3.465	Oct 2018	3.500	Oct 2019	-		3.500	Continuing	Continuing	Continuing
ITEP EMD SSEB	MIPR	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	-	5.708	Oct 2017	-		-		-		-	0.000	5.708	-
Subtotal			29.140	26.959		18.428		18.666		-		18.666	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607139A / Improved Turbine Engine Program				ES6 / Improved Turbine Engine Program							
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
ITEP Technology Maturation/Risk Reduction (TMRR) Contracts	C/FPIF	General Electric Company (GE), and Advanced Turbine Engine Company (ATEC) : Lynn, MA (GE), and Phoenix, AZ (ATEC)	142.336	117.634	Oct 2017	-		-		-		-	0.000	259.970	-
Engine OEM EMD Contract	C/FPIF	TBD : TBD	-	-		129.903	Jan 2019	137.517	Oct 2019	-		137.517	Continuing	Continuing	Continuing
Boeing - ITEP Vehicle Platform Integration Trade Studies Contract	SS/IDIQ	The Boeing Company : Phoenix, AZ	9.998	5.202	Oct 2017	-		-		-		-	0.000	15.200	-
Sikorsky Aircraft - ITEP Vehicle Platform Integration Trade Studies Contract	SS/FPIF	The Sikorsky Corporation : Stratford, CT	18.900	7.428	Oct 2017	-		-		-		-	0.000	26.328	-
Platform Integration and Qualification Contracts	SS/CPIF	The Boeing Company, The Sikorsky Corporation : Phoenix, AZ, Stratford, CT	-	-		22.529	Mar 2019	36.788	Oct 2019	-		36.788	Continuing	Continuing	Continuing
SBIR/STRR	TBD	HQDA : Washington, DC	-	-		7.037		-		-		-	0.000	7.037	-
Subtotal			171.234	130.264		159.469		174.305		-		174.305	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
ITEP Engineering Support - Organic	Allot	Program Management Office (PMO) Aviation Turbine Engines	0.313	0.170	Oct 2017	0.174	Oct 2018	0.178	Oct 2019	-		0.178	Continuing	Continuing	Continuing

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
		Project Office (ATE), Various : Redstone Arsenal, AL													
ITEP Engineering Support - Contractor	C/IDIQ	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	1.435	3.488	Oct 2017	3.561	Oct 2018	3.638	Oct 2019	-		3.638	Continuing	Continuing	Continuing
ITEP Engineering Support - OGA	MIPR	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	7.981	6.651	Oct 2017	7.046	Oct 2018	9.297	Oct 2019	-		9.297	Continuing	Continuing	Continuing
Subtotal			9.729	10.309		10.781		13.113		-		13.113	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Test Planning	SS/TBD	Program Management Office (PMO) Aviation Turbine Engines Project Office (ATE), Various : Redstone Arsenal, AL	-	-		0.225	Mar 2019	0.350	Oct 2019	-		0.350	Continuing	Continuing	Continuing
Subtotal			-	-		0.225		0.350		-		0.350	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ITEP Systems Engineering/Program Management	[Blue bar spanning all quarters from FY 2018 to FY 2024]																											
Milestone B	[Pink shaded area from Q1 FY 2018 to Q4 FY 2019]																											
Milestone C	[Blue triangle '1' in Q2 FY 2019]																											
Development Engineering (TMRR)	[Blue bar from Q1 FY 2018 to Q2 FY 2019]																											
Air Vehicle Integration Trade Studies	[Blue bar from Q1 FY 2018 to Q2 FY 2019]																											
Engineering & Manufacturing Development	[Blue bar from Q2 FY 2019 to Q4 FY 2023]																											
EMD Contract Award	[Blue triangle '2' in Q2 FY 2019]																											
Critical Design Review (CDR)	[Blue triangle '3' in Q2 FY 2020]																											
Air Vehicle Integration	[Blue bar from Q2 FY 2019 to Q4 FY 2023]																											
Testing	[Blue bar from Q2 FY 2019 to Q4 FY 2023]																											
First Engine To Test (FETT)	[Blue triangle '4' in Q2 FY 2021]																											
Flight Test Air Worthiness Release	[Blue triangle '5' in Q2 FY 2022]																											
Low Rate Initial Production (LRIP)	[Blue bar in Q4 FY 2024]																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607139A / <i>Improved Turbine Engine Program</i>	Project (Number/Name) ES6 / <i>Improved Turbine Engine Program</i>

Schedule Details

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0607140A / Emerging Technologies from NIE
--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	26.112	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	26.112
ES7: Emerging Technologies from NIE	-	26.112	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	26.112

A. Mission Description and Budget Item Justification

Emerging Technologies from Network Integration Evaluation (NIE) supports the Army's Equipment Modernization Strategy, Army Force Generation (ARFORGEN) cycle and consolidates capabilities to gain efficiencies. These funds provide for an iterative and incremental approach to software development and hardware/software integration as a result of NIEs and Joint Warfighter Assessments (JWA). These funds promote industry's efforts to support the Army's Modernization Plan for Force 2025 and beyond. These funds will facilitate the identification, assessment and acquisition of capability solutions for the Army.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	1.023	0.000	0.000	-	0.000
Current President's Budget	26.112	0.000	0.000	-	0.000
Total Adjustments	25.089	0.000	0.000	-	0.000
• Congressional General Reductions	-0.001	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	25.130	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.040	-			

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

Project: ES7: Emerging Technologies from NIE

Congressional Add: Emerging Technologies from NIEs - RCO

	FY 2018	FY 2019
Congressional Add Subtotals for Project: ES7	25.130	-
Congressional Add Totals for all Projects	25.130	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607140A / <i>Emerging Technologies from NIE</i>	Project (Number/Name) ES7 / <i>Emerging Technologies from NIE</i>
--	---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
<i>ES7: Emerging Technologies from NIE</i>	-	26.112	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	26.112
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Emerging Technologies from Network Integration Evaluation (NIE) supports the Army's Equipment Modernization Strategy, Army Force Generation (ARFORGEN) cycle and consolidates capabilities to gain efficiencies. These funds provide for an iterative and incremental approach to software development and hardware/software integration as a result of NIEs and Army Warfighting Assessments (AWA). These funds promote industry's efforts to support the Army's Modernization Plan for Force 2025 and beyond. These funds will facilitate the identification, assessment and acquisition of capability solutions for the Army.

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

	FY 2018	FY 2019	FY 2020
Title: Emerging Technologies from NIEs	0.982	-	-
Description: To mature, test, integrate and evaluate traditional and nontraditional small business and industry's technologies.			
Accomplishments/Planned Programs Subtotals	0.982	-	-

	FY 2018	FY 2019
Congressional Add: Emerging Technologies from NIEs - RCO	25.130	-
FY 2018 Accomplishments: Emerging Technologies from NIEs - RCO		
Congressional Adds Subtotals	25.130	-

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607140A / <i>Emerging Technologies from NIE</i>	Project (Number/Name) ES7 / <i>Emerging Technologies from NIE</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
NIE (AWA) 18.1 Planning - Execution																												
NIE/AWA 18.1 Planning/Prep - ValEx/CommEX/Pilot																												
NIE/AWA 18.1 Event																												
NIE/AWA 18.1 Event Analysis & Summary																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607140A / <i>Emerging Technologies from NIE</i>	Project (Number/Name) ES7 / <i>Emerging Technologies from NIE</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
NIE (AWA) 18.1 Planning - Execution	2	2017	1	2018
NIE/AWA 18.1 Planning/Prep - ValEx/CommEX/Pilot	2	2017	1	2018
NIE/AWA 18.1 Event	1	2018	1	2018
NIE/AWA 18.1 Event Analysis & Summary	1	2018	1	2018

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement and Development							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	9.662	38.452	24.221	-	24.221	17.171	13.608	11.066	3.000	Continuing	Continuing
EW9: Aviation Rocket System Product Improvement and Dev	-	9.662	38.452	24.221	-	24.221	17.171	13.608	11.066	3.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Aviation Rockets and Small Guided Munitions Product Improvement and Development line funds the development, integration and test of current and future munitions and launchers, and their interface to platforms. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system. The current Hydra-70 2.75 inch rocket system requires performance improvements to comply with 1) US Code - Title 10, Chapter 141, Section 2389 "Ensuring Safety regarding Insensitive Munitions", 2) Department of Defense (DoD) Directive 5000.1, Chairman of the Joint Chiefs of Staff (CJCS) Instruction 3170.01C, Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD (AT&L)) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to Insensitive Munitions (IM) Requirements", 3) validated Lightweight Precision Munition (LPM) Operational Needs Statement (ONS) 16-21556 and 15 Dec 2017 Directed Requirement, 4) signed Initial Capability Document for Army Aviation Weapons, Sub systems and Munitions (AAWSSM), 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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	10.064	60.860	24.221	-	24.221
Current President's Budget	9.662	38.452	24.221	-	24.221
Total Adjustments	-0.402	-22.408	0.000	-	0.000
• Congressional General Reductions	-0.008	-0.048			
• Congressional Directed Reductions	-	-22.360			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.394	-			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EW9: Aviation Rocket System Product Improvement and Dev	-	9.662	38.452	24.221	-	24.221	17.171	13.608	11.066	3.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Aviation Rockets and Small Guided Munitions Product Improvement and Development line funds the development, integration and test of current and future munitions and launchers, and their interface to platforms. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system. The current Hydra-70 2.75 inch rocket system requires performance improvements to comply with 1) US Code - Title 10, Chapter 141, Section 2389 "Ensuring Safety regarding Insensitive Munitions", 2) Department of Defense (DoD) Directive 5000.1, Chairman of the Joint Chiefs of Staff (CJCS) Instruction 3170.01C, Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD (AT&L)) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to Insensitive Munitions (IM) Requirements", 3) validated Lightweight Precision Munition (LPM) Operational Needs Statement (ONS) 16-21556 and 15 Dec 2017 Directed Requirement, 4) signed Initial Capability Document for Army Aviation Weapons, Sub systems and Munitions (AAWSSM), 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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Guided Air-to-Ground Rockets (AGR) variants (Advanced Precision Kill Weapon System (APKWS))	0.482	0.608	1.499	-	1.499
Description: These funds will be used to optimize AGR-19 / AGR-20 / ARG-21 integration on the Apache and for activities required to obtain an Army Full Materiel Release (FMR) for AGR-19 / AGR-20 / ARG-21. This effort will include design and build of all-up-round (AUR) containers and test assets, conduct environmental qualification testing, perform ground firings, update aviation platform software, support Apache weapon survey firings, provide technical support to platform integration and testing, and development and revision of training/maintenance materiel.					
FY 2019 Plans: Complete Full Material Release (FMR) efforts and analysis needed to optimize fire control integration on the AH-64 for guided variants. Continue APKWS Insensitive Munition (IM) All Up Round (AUR) container.					
FY 2020 Base Plans:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue efforts to optimize fire control integration on the AH-64 Apache for guided variants. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to FMR and containers activities completion.					
Title: Modernized Rocket Launcher Increment 1 Description: This effort provides the interface with aircraft and emerging munitions utilizing non-proprietary, open systems architecture allowing easy compatibility when integrating with aircrafts. This inherent flexibility of an open architecture serves as a building block for future weapons systems and is the basis for an Integrated Munitions Launcher (IML). This effort evaluates launcher-to-munition electrical and mechanical interfaces for a fully capable smart munition and launcher system for the legacy fleet, as well as reduces both programmatic and technical risk. The effort informs requirements for a government owned, non-proprietary physical interface definition. FY 2019 Plans: Perform technical performance assessments, concept studies, and prepare documentation in effort to merge Modernized Rocket Launcher (MRL) and Smart Digital Interface (SDI) efforts into a single, universal capability. FY 2019 to FY 2020 Increase/Decrease Statement: Funds were realigned to the Integrated Munitions Launcher (IML) effort to support the merger of Modernized Rocket Launcher (MRL) and Smart Digital Interface (SDI) for programmatic reasons.	1.164	11.127	-	-	-
Title: Smart Digital Interface Description: The Smart Digital Interface program is an effort to support both the LPM Directed Requirement and the future smart, two-way digital communications capability to be included in the fully capable Integrated Munitions Launcher (IML). This effort will evaluate launcher-to-munition physical interface technologies for the fully capable smart munition and launcher system to reduce both programmatic and technical risk, as well as to inform requirements for a government owned, nonproprietary physical interface definition. FY 2019 Plans: Continue phase 2 test asset development/procurement and testing. FY 2019 to FY 2020 Increase/Decrease Statement:	8.016	0.155	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funds were realigned to the Integrated Munitions Launcher (IML) effort to support the merger of MRL and SDI for programmatic reasons.					
<p>Title: Army aviation weapons</p> <p>Description: These funds will be used for Army Aviation modular weapon systems and their interface to launchers and platforms. These efforts will include technical assessments, concept studies, perform risk reduction efforts, technology maturation, demonstration, engineering design, engineering / manufacturing development, test, integration and document preparation for Army Aviation manned and unmanned platforms. Evaluation of the Smart Digital Interface technologies will be leveraged to facilitate satisfaction of Lightweight Precision Munition (LPM) ONS and Directed Requirement. The LPM efforts will be utilized to identify deficiencies and define future requirements to include the Army Aviation Weapons, Sub-systems and Munitions (AAWSSM) Capability Development Document.</p> <p>FY 2019 Plans:</p> <ol style="list-style-type: none"> 1. Perform technical assessments, concept studies, perform risk reduction efforts and prepare appropriate documentation for emerging Army Aviation Weapons, Sub-systems and Munitions (AAWSSM) Initial Capability Document requirements. 2. Begin Lightweight Precision Munition (LPM) technology maturity and risk reduction efforts with industry to include fabrication of munition/launch system prototypes, evaluate mature existing systems to meet validated ONS 16-21556, integration and test efforts on the MQ-1C Gray Eagle. <p>FY 2020 Base Plans:</p> <ol style="list-style-type: none"> 1. Continue technical assessments, concept studies, perform risk reduction efforts and prepare appropriate documentation for emerging AAWSSM. Initial Capability Document requirements. 2. Continue LPM technology maturity and risk reduction efforts with industry to include fabrication of munition/launch system prototypes, evaluate mature existing systems to meet validated ONS 16-21556 and 15 Dec 2017 Directed Requirement, integration and test efforts on the MQ-1C Gray Eagle. <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to completion of necessary activities.</p>	-	24.434	2.004	-	2.004
<p>Title: Integrated Munitions Launcher</p> <p>Description: These funds will be used to design, develop, and qualify a future launcher with standard interfaces to support current and future munitions outlined in the Army Aviation Weapons, Sub Systems and Munitions</p>	-	-	20.718	-	20.718

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>(AAWSSM) Initial Capability Document (ICD), dated 17 July 2018. This effort is a continuation of Modernized Rocket Launcher Increment 1 and Smart Digital Interface efforts; merging these efforts will allow the government to align technology enabling solutions with the AAWSSM ICD, maturing technological developments of Integrated Munitions Launcher (IML) prototypes at the subsystem level to mitigate Apache helicopter and Gray Eagle Unmanned Aerial System launcher obsolescence limitations.</p> <p>The Integrated Munitions Launcher (IML) effort will define and provide the interface between aircraft and emerging munitions utilizing a non-proprietary, open systems architecture allowing easy compatibility when integrating on to aviation platforms. The inherent flexibility of an open architecture serves as a building block for future weapons systems. This effort includes the design of a launcher with future smart, two-way digital communications capability and the capability to launch current and future weapons from aviation aircraft</p> <p>FY 2020 Base Plans: Perform and implement functional architecture design and structure concept development in an effort to add additional weapon capability into the electrical and mechanical designs developed in Modernized Rocket Launcher Increment 1. Develop IML prototypes at the subsystem level and perform Safety testing to address release retention force methodology and the coupling to launch transient events to include firing tests.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funds were realigned from Modernized Rocket Launcher Increment 1 and Smart Digital Interface efforts and merged into the IML effort. Activities associated with these efforts, to include design, fabrication and test of IML prototype hardware and software, increased.</p>					
<p>Title: FY2019 SBIR / STTR Transfer</p> <p>Description: FY2019 SBIR / STTR Transfer</p> <p>FY 2019 Plans: FY2019 SBIR / STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to this being for FY2019 SBIR / STTR Transfer</p>	-	2.128	-	-	-
Accomplishments/Planned Programs Subtotals	9.662	38.452	24.221	-	24.221

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• E37300: Rocket, Hydra 70, All Types	296.375	275.685	0.000	255.453	255.453	230.404	88.597	150.214	63.510	Continuing	Continuing

Remarks

D. Acquisition Strategy

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

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0607142A / Aviation Rocket System Product Improvement and Development				EW9 / Aviation Rocket System Product Improvement and Dev							
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering/ Project Management	SS/ Various	Various : Performers	-	0.225	Jun 2018	2.625	Oct 2018	2.139	Oct 2019	-		2.139	Continuing	Continuing	-
Subtotal			-	0.225		2.625		2.139		-		2.139	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Advanced Precision Kill Weapon System (APKWS)	MIPR	AMRDEC : Redstone Arsenal, AL	-	0.482	Jul 2018	0.608	Nov 2018	0.921	Nov 2019	-		0.921	0.000	2.011	-
Modernized Rocket Launcher Increment 1	MIPR	AMRDEC : Redstone Arsenal, AL	-	1.164	Aug 2018	10.445	Nov 2018	-		-		-	0.000	11.609	-
Smart Digital Interface	MIPR	AMRDEC : Redstone Arsenal, AL	-	7.791	Jun 2018	0.155	Jan 2019	-		-		-	0.000	7.946	-
Army aviation weapons	MIPR	Various : Various Performers	-	-		18.859	Nov 2018	1.904	Jan 2020	-		1.904	Continuing	Continuing	-
Integrated Munitions Launcher	MIPR	AMRDEC : Redstone Arsenal, AL	-	-		-		16.071	Dec 2020	-		16.071	Continuing	Continuing	-
FY2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		2.128	Oct 2019	-		-		-	0.000	2.128	-
Subtotal			-	9.437		32.195		18.896		-		18.896	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Research Studies	MIPR	AMRDEC : Redstone Arsenal, AL	-	-		0.282	Dec 2018	-		-		-	Continuing	Continuing	-
Subtotal			-	-		0.282		-		-		-	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Testing	C/Various	TBD : TBD	-	-		3.350	Dec 2018	3.186	Dec 2019	-		3.186	Continuing	Continuing	-
Subtotal			-	-		3.350		3.186		-		3.186	Continuing	Continuing	N/A
Project Cost Totals			-	9.662		38.452		24.221		-		24.221	Continuing	Continuing	N/A

Remarks
The increase in FY19 funding and subsequent decrease in FY20 are due to ramp up and completion of activities associated with the validated ONS 16-21556 and Directed Requirement for Lightweight Precision Munitions.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
APKWS					[Bar]				[Bar]																			
Modernized Rocket Launcher Increment 1					[Bar]				[Bar]																			
Smart Digital Interface					[Bar]				[Bar]																			
Integrated Munitions Launcher													[Bar]															
Army aviation weapons									[Bar]				[Bar]				[Bar]				[Bar]							
AAWSSM ICD									▲ 1																			
LPM Operational Assessment													[Bar]															

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	36.926	38.331	32.016	-	32.016	7.751	4.901	3.485	3.379	Continuing	Continuing
EX1: <i>Unmanned Aircraft Systems Universal Products</i>	-	36.926	38.331	32.016	-	32.016	7.751	4.901	3.485	3.379	Continuing	Continuing

A. Mission Description and Budget Item Justification

Universal Ground Control Station (UGCS) software and hardware modernization effort updates the operating system from a proprietary system to a hardware agnostic Modular Open Systems Architecture that supports the separation of flight and mission critical functionality. Builds software infrastructure in accordance with a modular open systems approach (MOSA); more specifically, this open software architecture will strictly adhere to the Future Airborne Computing Environment (FACE) and UAS Control Segment (UCS) standards. This software will also support emerging Unmanned Aircraft Systems (UAS) Universal Ground Control Station (UGCS) and Scalable Control Interface (SCI) requirements.

Current Universal Products consist of the UGCS, the Universal Ground Data Terminal (UGDT) and the Universal Mission Simulator (UMS). The Universal Products will be capable of flight and payload control of multiple unmanned aircraft systems. UGCS is protected in a climate-controlled, standard S-280 or S-788 U.S. Army shelter and mounted on either a standard Army FMTV or HMMWV, the UGCS commands multi-UAS missions by controlling flight as well as receiving and disseminating battlefield video and situational awareness data through state-of-the-art operator consoles (UAS Cockpit). Consoles can be used to provide aircraft command and control, payload control and weapons launch. Future GCS modifications will allow scaled down sizes of GCS to support expeditionary operations.

The UGDT provides a Line of Sight (LOS) capability for transmit and receipt of UAS command and control and UAS payload products. The UGDT is the common datalink system for U. S. Army UAS.

The Universal Mission Simulator (UMS) consists of the hardware and software required to fully train UAS operators to full Readiness Level (RL) 1, IAW Army aviation standards. The UMS will be capable of training and simulating flight and payload control of [Directorate of Simulation (DOS)] Shadow and Gray Eagle unmanned aircraft systems.

The OSRVT Increment II consists of a Remote Operations Video Enhanced Receiver (ROVER), Miltope tablet, Antennas, UHF Modem, Type I encryption, Ku-Directional Antennas (KuDA) with an On-The-Move (OTM) capable variant, and an extended range Mobile Directional Antennas System (MDAS). Software supports decoding Telemetry Data from multiple Manned/Unmanned Aircraft Systems, provides Electro-Optical (EO)/Infrared (IR) payload control, and supports off-target calculations. OSRVT supports current operations and emerging requirements.

Justification: FY2020 Universal Product Base funding of \$32.016M will be used for continuing the development of modifications needed to address UGCS modernization utilizing MOSA, maintain interoperability, increase commonality for the Family of UAS, Gray Eagle (MQ-1C), and Shadow (RQ-7) programs of record as well as SCI including Systems Engineering, Logistics, and Program Management.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

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

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	38.463	52.019	6.716	-	6.716
Current President's Budget	36.926	38.331	32.016	-	32.016
Total Adjustments	-1.537	-13.688	25.300	-	25.300
• Congressional General Reductions	-0.031	-0.047			
• Congressional Directed Reductions	-	-13.641			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.506	-			
• Adjustments to Budget Years	-	-	25.300	-	25.300

Change Summary Explanation

Decreased funding in FY 2019 result of Congressional Reduction. Increased funding in FY 2020 will allow continued development and integration of FACE and UCS aligned software in support of UASGCS-V4 MOSA requirement.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>				Project (Number/Name) EX1 / <i>Unmanned Aircraft Systems Universal Products</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EX1: <i>Unmanned Aircraft Systems Universal Products</i>	-	36.926	38.331	32.016	-	32.016	7.751	4.901	3.485	3.379	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Universal Ground Control Station (UGCS) software and hardware modernization effort updates the operating system from a proprietary system to a hardware agnostic Modular Open Systems Architecture that supports the separation of flight and mission critical functionality. Builds software infrastructure in accordance with a modular open systems approach (MOSA); more specifically, this open software architecture will strictly adhere to the Future Airborne Computing Environment (FACE) and UAS Control Segment (UCS) standards. This software will also support emerging Unmanned Aircraft Systems (UAS) Universal Ground Control Station (UGCS) and Scalable Control Interface (SCI) requirements.

Current Universal Products consist of the UGCS, the Universal Ground Data Terminal (UGDT) and the Universal Mission Simulator (UMS). The Universal Products will be capable of flight and payload control of multiple unmanned aircraft systems. UGCS is protected in a climate-controlled, standard S-280 or S-788 U.S. Army shelter and mounted on either a standard Army FMTV or HMMWV, the UGCS commands multi-UAS missions by controlling flight as well as receiving and disseminating battlefield video and situational awareness data through state-of-the-art operator consoles (UAS Cockpit). Consoles can be used to provide aircraft command and control, payload control and weapons launch. Future GCS modifications will allow scaled down sizes of GCS to support expeditionary operations.

The UGDT provides a Line of Sight (LOS) capability for transmit and receipt of UAS command and control and UAS payload products. The UGDT is the common datalink system for U. S. Army UAS.

The Universal Mission Simulator (UMS) consists of the hardware and software required to fully train UAS operators to full Readiness Level (RL) 1, IAW Army aviation standards. The UMS will be capable of training and simulating flight and payload control of [Directorate of Simulation (DOS)] Shadow and Gray Eagle unmanned aircraft systems.

The OSRVT Increment II consists of a Remote Operations Video Enhanced Receiver (ROVER), Miltope tablet, Antennas, UHF Modem, Type I encryption, Ku-Directional Antennas (KuDA) with an On-The-Move (OTM) capable variant, and an extended range Mobile Directional Antennas System (MDAS). Software supports decoding Telemetry Data from multiple Manned/Unmanned Aircraft Systems, provides Electro-Optical (EO)/Infrared (IR) payload control, and supports off-target calculations. OSRVT supports current operations and emerging requirements.

Justification: FY2020 Universal Product Base funding of \$32.016M will be used for continuing the development of modifications needed to address UGCS modernization utilizing MOSA, maintain interoperability, increase commonality for the Family of UAS, Gray Eagle (MQ-1C), and Shadow (RQ-7) programs of record as well as SCI including Systems Engineering, Logistics, and Program Management.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>	Project (Number/Name) EX1 / <i>Unmanned Aircraft Systems Universal Products</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Title: Universal Products (UGCS and UGDT) Improvements</p> <p>Description: Development of Universal Products Improvements - Funding continues to support development of Hardware, Software, and documentation to ensure a supportable UGCS and UGDT that increases interoperability and commonality. This software will also support emerging Unmanned Aircraft Systems (UAS) Universal Ground Control Station (UGCS) as well as Scalable Control Interface (SCI) requirements.</p> <p>FY 2019 Plans: Funding continues to support Development of Universal Products Improvements to include: Hardware, Software and documentation to ensure a supportable UGCS and UGDT that is interoperable and increases commonality. The UGCS and UGDT will be used across Army UAS.</p> <p>FY 2020 Plans: Funding continues to support development of Universal Products Improvements to include Hardware, Software and documentation to ensure a supportable UGCS and UGDT that increases interoperability and commonality. This software will also support Modular Open Systems Architecture (MOSA) for emerging UAS UGCS as well as SCI requirements.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The UAS Universal Products requirement/mission will continue in 2020. Increased funding in 2020 will allow continued development and integration of FACE and UCS aligned software in support of UASGCS-V4 MOSA requirement.</p>		33.009	36.488	32.016
<p>Title: Training Device Improvements</p> <p>Description: Training Device Improvements are with respect to the Universal Mission Simulator (UMS), which is used for training and simulating flight and payload control of multiple types of Unmanned Aircraft Systems (UAS).</p>		3.917	-	-
<p>Title: FY2019 SBIR STTR Transfer</p> <p>FY 2019 Plans: FY2019 SBIR STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR STTR Transfer</p>		-	1.843	-
Accomplishments/Planned Programs Subtotals		36.926	38.331	32.016

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>	Project (Number/Name) EX1 / <i>Unmanned Aircraft Systems Universal Products</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>			<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• A02706: <i>Universal Ground Control Equipment (UAS)</i>	15.000	27.114	2.090	-	2.090	7.872	7.987	-	-	0.000	60.063

Remarks

D. Acquisition Strategy

The Universal Products began full rate production as part of the MQ-1C and RQ-7 programs of record (both ACAT 1C) after Milestone III/C decisions were reached for both programs. Continued development of the Universal Products will be accomplished through a series of modifications and retrofits. Software obsolescence development integration efforts will be based on competitive awards.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>		Project (Number/Name) EX1 / <i>Unmanned Aircraft Systems Universal Products</i>	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Universal Products (UGCS and UGDT) Improvements	[Redacted]																											
UGCS/UGDT Improve																												
Training Device Improvements	[Redacted]																											
Trng Dev Improve																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607143A / <i>Unmanned Aircraft System Universal Products</i>	Project (Number/Name) EX1 / <i>Unmanned Aircraft Systems Universal Products</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Universal Products (UGCS and UGDT) Improvements	3	2018	4	2023
Training Device Improvements	3	2018	4	2022

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0607145A / <i>Apache Future Development</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	5.448	-	5.448	7.252	9.032	11.606	10.495	0.000	43.833
FD5: <i>Apache Product Improvement</i>	-	0.000	0.000	5.448	-	5.448	7.252	9.032	11.606	10.495	0.000	43.833

Note

This Program Element is a New Start effort.

A. Mission Description and Budget Item Justification

The Apache Capabilities Enhancements (ACE) prioritizes, informs and influences, technologies and 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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	5.448	-	5.448
Total Adjustments	0.000	0.000	5.448	-	5.448
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	5.448	-	5.448

Change Summary Explanation

This Program Element is a New Start effort.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FD5: Apache Product Improvement	-	0.000	0.000	5.448	-	5.448	7.252	9.032	11.606	10.495	0.000	43.833
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This RDT&E Project is a New Start effort.

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 2018	FY 2019	FY 2020
Title: Product Development	-	-	5.448
Description: Future development of production program.			
FY 2020 Plans: Perform trade studies evaluating options for pursuing a family, i.e. large, medium, small, of common processors that are software and shop-level re-configurable and exploring options for sensor processing and fusion at the platform level processor or other dedicated processor. The Common Processor trade study supports Apache's approach for addressing the increasing demand for processing power while reducing logistical impact from both a maintenance and supply perspective. The sensor processing and fusion at a platform level processor or other upstream dedicated processor trade study will look at identifying upstream processing options for providing an optimized situational awareness picture of the operational environment and supporting enhanced target/threat identification utilizing multiple sensor inputs.			
FY 2019 to FY 2020 Increase/Decrease Statement: Funding in FY20 is for future development of production program.			
Accomplishments/Planned Programs Subtotals	-	-	5.448

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607145A / Apache Future Development	Project (Number/Name) FD5 / Apache Product Improvement
--	---	--

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• A05111: AH-64 Apache Block IIIA Reman	905.326	927.798	997.719	-	997.719	962.446	706.243	799.500	806.301	6,118.130	12,223.463
• A05133: AH-64 Apache Block IIIB New Build	1,023.300	511.287	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• AA6605: AH-64 MODS	238.141	104.996	58.172	-	58.172	85.475	84.505	82.166	64.682	580.576	1,298.713

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 FY14, 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 FY13, FY14, and FY15 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 FY15-FY19, Apache AH-64E Version 6 System Development and Demonstration (SDD) Contract. Multi-year production awarded March 15, 2017.

FY 20, 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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
TBD	SS/CPIF	TBD : TBD	-	-		-		5.448	Mar 2020	-		5.448	0.000	5.448	-
Subtotal			-	-		-		5.448		-		5.448	0.000	5.448	N/A
Project Cost Totals			-	-		0.000		5.448		-		5.448	0.000	5.448	N/A

Remarks
 Funding for FY19 moved from PE 677145, Project FD5 line to PE 677135, Project ES2. 1) Allows alignment with Joint Air to Ground Missile (JAGM) without requiring a future software insertion. 2) Improves efficiency and effectiveness of operational testing by conducting a combined OT event for JAGM and AH-64Ev6. 3) Reduces burden on FORSCOM and Soldiers by consolidating two test events into one event. 4) Allows further development and refinement of AH-64Ev6 software with user input prior to fielding.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019				
Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0607145A / Apache Future Development			Project (Number/Name) FD5 / Apache Product Improvement		

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Contract Award																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607145A / <i>Apache Future Development</i>	Project (Number/Name) FD5 / <i>Apache Product Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Contract Award	3	2020	3	2022

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0607312A / <i>Army Operational Systems Development</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	49.526	-	49.526	35.885	33.891	33.063	33.586	0.000	185.951
BR5: <i>Army Operational Systems Development</i>	-	0.000	0.000	49.526	-	49.526	35.885	33.891	33.063	33.586	0.000	185.951

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	49.526	-	49.526
Total Adjustments	0.000	0.000	49.526	-	49.526
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	49.526	-	49.526

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607665A / <i>Family of Biometrics</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	3.032	2.397	1.702	-	1.702	1.325	1.193	1.209	1.221	Continuing	Continuing
DT2: <i>Non-MIP Biometrics</i>	-	2.400	0.988	0.281	-	0.281	0.000	0.000	0.000	0.000	0.000	3.669
DU2: <i>Management Agency</i>	-	0.632	1.409	1.421	-	1.421	1.325	1.193	1.209	1.221	Continuing	Continuing

A. Mission Description and Budget Item Justification

DT2 / Non-MIP Biometrics - Biometrics Enabling Capability (BEC) Increment 0, also known as DoD Automated Biometrics Identification System (DoD ABIS), is an information technology system supporting identity superiority by providing the critical core capability for Warfighters to identify known or suspected terrorists and third country nationals in the course of military operations. BEC Increment 0 is a 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 terrorists across the full range of military operations and preventing terrorist operations. DoD ABIS enables DOD, 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 improvements, 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 2020 RDT&E funding in the amount of \$0.281 million (DT2: Non-MIP Biometrics) supports cyber security testing and preparation for DoD ABIS Service Life Extension Program (SLEP) operational testing.

FY 2020 funding in the amount of \$1.421 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 biometrics and forensics activities (e.g. standards conformance and interoperability assessments), support to DoD acquisition organizations, and provision of subject matter expertise to DoD and non-DoD government stakeholders.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607665A / <i>Family of Biometrics</i>
---	---

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	6.159	2.400	1.421	-	1.421
Current President's Budget	3.032	2.397	1.702	-	1.702
Total Adjustments	-3.127	-0.003	0.281	-	0.281
• Congressional General Reductions	-0.003	-0.003			
• Congressional Directed Reductions	-3.000	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.124	-			
• Adjustments to Budget Years	-	-	0.281	-	0.281

Change Summary Explanation

Increase of \$0.281 million FY 2020 BASE RDT&E supports DoD ABIS cyber security testing and preparation for operational testing of the SLEP.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607665A / Family of Biometrics				Project (Number/Name) DT2 / Non-MIP Biometrics			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DT2: Non-MIP Biometrics	-	2.400	0.988	0.281	-	0.281	0.000	0.000	0.000	0.000	0.000	3.669
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

DT2 / Non-MIP Biometrics - Biometrics Enabling Capability (BEC) Increment 0, also known as DoD Automated Biometrics Identification System (DoD ABIS), is an information technology system supporting identity superiority by providing the critical core capability for Warfighters to identify known or suspected terrorists and third country nationals in the course of military operations. BEC Increment 0 is a 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 terrorists across the full range of military operations and preventing terrorist operations. DoD ABIS enables DOD, Interagency and International Partners to effectively impede adversary's ability to conceal their identity and intentions. DoD ABIS supports all three objectives of the National Defense Strategy to increase lethality, enhance International Cooperation and improve business practices.

Justification:

FY 2020 RDT&E funding in the amount of \$0.281 million (DT2: Non-MIP Biometrics) supports cyber security testing and preparation for DoD ABIS Service Life Extension Program (SLEP) operational testing.

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

	FY 2018	FY 2019	FY 2020
Title: DoD ABIS (BEC 0)	2.400	0.956	0.281
Description: Supports cyber security testing and preparation for DoD ABIS Service Life Extension Program (SLEP) operational testing.			
FY 2019 Plans: FY 2019 RDT&E funding in the amount of \$0.956 million (DT2: Non-MIP Biometrics) supports the service life extension of DoD ABIS contractor testing.			
FY 2020 Plans: FY 2020 RDT&E funding in the amount of \$0.281 million (DT2: Non MIP Biometrics) supports cyber security testing and preparation for operational testing of the SLEP.			
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease reflects costs to support cyber security testing and preparation for DoD ABIS SLEP operational testing.			
Title: FY 2019 SBIR / STTR Transfer	-	0.032	-
FY 2019 Plans:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
SBIR/STTR			
FY 2019 to FY 2020 Increase/Decrease Statement: SBIR only accounted for in FY19.			
Accomplishments/Planned Programs Subtotals	2.400	0.988	0.281

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• BA1300: FAMILY OF BIOMETRICS	-	8.319	1.000	-	1.000	-	-	-	-	0.000	9.319

Remarks

D. Acquisition Strategy

The Army conducted a fair opportunity competition in FY17 to competitively select the contractor to continue to sustain the system and perform the Service Life Extension Program (SLEP) Development and Deployment. The resulting contract for DoD ABIS Sustainment Services and SLEP was awarded on June 30, 2017. This upgrade is extremely critical in order to replace end of life hardware and software components, including Commercial Off the Shelf products whose versions currently included in DoD ABIS are no longer supported. The SLEP will extend the service life of the current capability and will improve interoperability with other government entities such as the FBI and DHS.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/CPFF	Various : various	87.351	-		-		-		-		-	0.000	87.351	-
Service Life Extension	Option/ Various	Leidos : Fairmont, WV	16.203	2.400		0.956	Jun 2019	0.281		-		0.281	0.000	19.840	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.032		-		-		-	0.000	0.032	-
Subtotal			103.554	2.400		0.988		0.281		-		0.281	0.000	107.223	N/A

Remarks

FY 2018, \$150K will cover the cost of Test & Evaluation (T&E) and \$839K will cover the developmental testing (DT).

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PM Civilian Personnel	TBD	Alexandria : Virginia	3.358	-		-		-		-		-	0.000	3.358	-
Other Support Costs (Facility Related Expenses)	TBD	Alexandria : Virginia	0.794	-		-		-		-		-	0.000	0.794	-
Subtotal			4.152	-		-		-		-		-	0.000	4.152	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation (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

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

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

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
(1) DoD ABIS v1.2 Sustainment	1	2017	4	2020
(2) DoD ABIS SLEP Development and Contractor Testing	3	2017	4	2020
(3) DoD ABIS v1.3 Sustainment	1	2021	4	2023

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DU2: Management Agency	-	0.632	1.409	1.421	-	1.421	1.325	1.193	1.209	1.221	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Defense Forensics and Biometrics Agency (DFBA) under the Provost Marshal General, fulfills the Secretary of the Army's Executive Agent (EA) responsibilities for all DoD forensics and biometrics activities. As the proponent, DFBA supports and provides oversight for Research, Development, Test & Evaluation (RDT&E) activities and information management throughout the Armed Services and DoD. DFBA leads and facilitates in the development of improvements, 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 2020 funding in the amount of \$1.421 million for Project DU2 will provide DFBA the ability to actively manage research efforts to ensure scientific merit, feasibility, and DFBA objectives and requirements are met. DFBA supports the conduct of biometric and forensics activities (e.g. standards conformance and interoperability assessments), support to DoD acquisition organizations, and provision of subject matter expertise to DoD and non-DoD government stakeholders.

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

	FY 2018	FY 2019	FY 2020
Title: Development and Implementation of Biometric Technologies	0.632	1.364	1.421
Description: Biometrics and Forensics Technologies Research			
FY 2019 Plans: FY 2019 funding in the amount of \$1.411 million will provide DFBA the ability to actively manage internal and external research efforts to ensure scientific merit, feasibility, and DFBA objectives and requirements are met. Funding will be used to support enhancements for automated matching and detection capabilities for fingerprints, face, iris, voice, DNA modalities supporting DoD acquisition organizations and stakeholders, and in coordination with non-DoD stakeholders.			
FY 2020 Plans: FY 2020 funding in the amount of \$1.421 million will provide DFBA the ability to actively manage research efforts to ensure scientific merit, feasibility, and DFBA objectives and requirements are met. Funding will be used to support enhancements for automated matching and detection capabilities for fingerprints, palm, face, iris, voice, and DNA modalities supporting DoD acquisition organizations and stakeholders, and in coordination with non-DoD stakeholders.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Increase from FY 2019 to FY 2020 is due to application of inflation.			
Title: FY 2019 SBIR / STTR Transfer	-	0.045	-
FY 2019 Plans: SBIR/STTR			
FY 2019 to FY 2020 Increase/Decrease Statement: SBIR/STTR only accounted for in FY19.			
Accomplishments/Planned Programs Subtotals	0.632	1.409	1.421

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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
DFBA RDTE efforts	MIPR	Various Activities : Various locations	10.422	0.632	Jun 2018	1.364		1.421	Jun 2020	-		1.421	Continuing	Continuing	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.045		-		-		-	0.000	0.045	-
Subtotal			10.422	0.632		1.409		1.421		-		1.421	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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	10.422	0.632	1.409	1.421	-	1.421	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army **Date:** March 2019

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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
DFBA RDT&E Fingerprint, Face, Iris, Palm, and Voice																												
DFBA Interoperability																												
DFBA RDTE Efforts																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

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

Schedule Details

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0607865A / <i>Patriot Product Improvement</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	77.391	75.288	96.430	-	96.430	102.095	81.545	97.510	96.395	Continuing	Continuing
DV8: <i>Patriot Product Improvement</i>	-	77.391	75.288	96.430	-	96.430	102.095	81.545	97.510	96.395	Continuing	Continuing

Note

Beginning FY17, funding specific to LTAMD-C realigned to PE 0604114A, Lower Tier Missile Defense (LTAMD) Capability.

A. Mission Description and Budget Item Justification

PATRIOT is an advanced Surface-to-Air guided missile system with a high probability of kill, capable of operation in the presence of Electronic Countermeasures (ECM) and able to conduct multiple simultaneous engagements against high performance air breathing targets and ballistic missiles likely to be encountered by U.S. Forces. The PATRIOT Product Improvement Program provides for the upgrade of the PATRIOT System through individual materiel changes and upgrades to the PATRIOT system to address operational lessons learned, enhancements to joint force interoperability, and other system performance improvements to provide overmatch capability with the emerging threat.

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

Funding is also utilized to identify, analyze, design and test materiel solutions to counter cybersecurity and electronic warfare shortcomings to all elements of the Lower Tier Battle Space.

FY20 base dollars in the amount of \$96.430 million support the continuance of Software Improvement for Threat Evolution, PAC-3 Seeker Software Improvement, Advanced Electronic Counter Measures (AECM), Assured Positioning, Navigation and Timing (PNT), Combat ID enhancements, Tasks 2, 6, and 7 activities, government and contractor support.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0607865A / <i>Patriot Product Improvement</i>
---	--

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	90.217	65.369	42.803	-	42.803
Current President's Budget	77.391	75.288	96.430	-	96.430
Total Adjustments	-12.826	9.919	53.627	-	53.627
• Congressional General Reductions	-0.042	-0.081			
• Congressional Directed Reductions	-10.750	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	10.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.012	-			
• SBIR/STTR Transfer	-2.022	-			
• Adjustments to Budget Years	-	-	53.627	-	53.627

Change Summary Explanation

Adjustment to budget years increases FY 2020 funding by \$53.627 million; these funds will be used for software development to address evolving threats and countermeasures to those threats, development of Seeker software, ID enhancements, and continuation of task 2, task 6, and task 7.

FY 2019 increase of \$7.526 million will fund development of Seeker Software.

FY 2018 reduction of \$10.75 million for prior year carry-over and "restoring acquisition accountability".

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0607865A / <i>Patriot Product Improvement</i>				Project (Number/Name) DV8 / <i>Patriot Product Improvement</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DV8: <i>Patriot Product Improvement</i>	-	77.391	75.288	96.430	-	96.430	102.095	81.545	97.510	96.395	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning FY17, funding specific to LTAMDS Capability realigned to PE 0604114A, Lower Tier Missile Defense Sensor (LTAMDS) Capability.

A. Mission Description and Budget Item Justification

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

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

Radar Digital Processor (RDP) Waveform Suite: Develops a comprehensive set of waveforms in the RDP to improve PATRIOT radar capabilities against current and evolving threats, including support to Task 6 and 7 efforts (see below), and implements advanced data collection enabled by the RDP to support further system improvements. The new waveforms enabled by the RDP allow capability improvements in Discrimination, Combat ID, Electronic Protection, Search, Tracking, and other areas of need.

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

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

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

Task 6: Software improvements enhance discrimination of higher altitude Tactical Ballistic Missile Re-entry Vehicles (RVs) from associated objects to support the full engagement capabilities of the interceptor. Longer-range detection, track, and improved high-altitude discrimination are required to achieve the required lethality

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / <i>Patriot Product Improvement</i>	Project (Number/Name) DV8 / <i>Patriot Product Improvement</i>
--	--	--

performance against the RV and to mitigate missile wastage against separation debris. This task leverages the signal processing capabilities of the Radar Digital Processor, and supports the high altitude engagements required by the PATRIOT Advanced Capability-3 (PAC-3) and PAC-3 Missile Segment Enhancement (MSE) missiles.

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

Assured Positioning, Navigation, and Timing (PNT): Efforts will develop and test the military's improved Global Position M-Code with PATRIOT Major End Items (MEI) integrating the improved anti-jamming and secure access of military GPS signals. This effort meets the requirement for Assured PNT through M-Code as mandated by FY2011 National Defense Act, public law 111-383 & 913.

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

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

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

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

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

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: PATRIOT Product Improvement	77.391	75.288	96.430	-	96.430
Description: Patriot Product improvement line provides continuous Improvement to keep pace with and counter evolving and emerging threats.					
FY 2019 Plans:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / <i>Patriot Product Improvement</i>	Project (Number/Name) DV8 / <i>Patriot Product Improvement</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-Continues Software Improvement for Threat Evolution and Advanced Electronic Countermeasures (AECM) -Continues Combat ID enhancements and Assured Positioning, Navigation, and Timing (PNT) -Continues Tasks 2, 6, and 7 activities. -Develop Seeker Software Improvement -U.S. Government and contractor support to counter emerging threat <i>FY 2020 Base Plans:</i> -Continues Software Improvement for Threat Evolution and Advanced Electronic Countermeasures (AECM). -Continues Combat ID enhancements and Assured Positioning, Navigation, and Timing (PNT). -Continues Tasks 2, 6, and 7 activities. -U.S. Government and contractor support to counter emerging threat. -PAC-3 Seeker Software Improvements <i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Adjustment to budget years increases FY20 funding by \$53.627 million; these funds will be used for software development to address evolving threats and countermeasures to those threats, development of Seeker software, ID enhancements, and continuation of task 2, task 6, and task 7.					
Accomplishments/Planned Programs Subtotals	77.391	75.288	96.430	-	96.430

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• C50700: <i>Patriot Mods</i>	536.527	323.228	0.000	279.464	279.464	192.287	135.857	157.679	93.164	Continuing	Continuing

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

D. Acquisition Strategy
 The design objective of the PATRIOT system was to provide a baseline system capable of modification to cope with continuing threat evolution. This program minimizes technological risks and provides a means of enhancing system capability through planned upgrades of deployed systems. The PATRIOT Product Improvement Program upgrades the PATRIOT system to address operational lessons learned, enhancements to joint force interoperability and communications, and other system performance improvements to provide overmatch capability against the emerging threat. Upgrades are implemented through individual hardware and software materiel

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / <i>Patriot Product Improvement</i>	Project (Number/Name) DV8 / <i>Patriot Product Improvement</i>

changes and fielded incrementally. This program encompasses several changes which will require the use of a variety of acquisition methods to develop, test, procure and field. Future hardware and software capabilities will be incorporated into future Post Deployment Build (PDB) releases.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	MIPR	RSA, AL : RSA, AL	6.000	2.890	Oct 2017	2.538	Oct 2018	1.634	Oct 2019	-		1.634	Continuing	Continuing	-
U.S. Contracts	Various	Multiple : Multiple	5.361	1.600	Feb 2018	1.600	Feb 2019	1.600	Feb 2020	-		1.600	Continuing	Continuing	-
Subtotal			11.361	4.490		4.138		3.234		-		3.234	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Software Improvement for Threat Evolution	Various	Multiple : Multiple	39.099	7.170	Jan 2018	9.018	Jan 2019	10.144	Jan 2020	-		10.144	Continuing	Continuing	-
Upper Tier Debris Mitigation (UTDM)	Various	Multiple : Multiple	1.000	2.940	Jan 2018	-		-		-		-	Continuing	Continuing	-
Radar Digital Processor (RDP) Development	Various	Raytheon : Andover, Massachusetts	49.835	-		-		-		-		-	Continuing	Continuing	-
RDP Waveform Suite	Various	Raytheon : Andover, Massachusetts	-	2.000	Jan 2018	-		-		-		-	Continuing	Continuing	-
THAAD PATRIOT Interoperability	Various	Raytheon : Andover, Massachusetts	3.200	2.200	Jan 2018	-		-		-		-	Continuing	Continuing	-
Advanced Electronic Counter Measures (AECM)	Various	Multiple : Multiple	50.004	15.158	Jan 2018	18.576	Jan 2019	19.220	Jan 2020	-		19.220	Continuing	Continuing	-
Task 2 Non-Ballistic Tactical Ballistic Missile (TBM)	Various	Multiple : Multiple	30.100	8.000	Feb 2018	4.400	Feb 2019	6.200	Feb 2020	-		6.200	Continuing	Continuing	-
Task 6 Discrimination Improvements	Various	Multiple : Multiple	28.000	9.500	Feb 2018	3.700	Feb 2019	6.700	Feb 2020	-		6.700	Continuing	Continuing	-
Task 7 TBM Countermeasures / Effectors	Various	Multiple : Multiple	17.000	10.700	Feb 2018	10.000	May 2019	11.100	Feb 2020	-		11.100	Continuing	Continuing	-
Assured PNT	Various	Multiple : Multiple	7.440	3.600	Jan 2018	3.300	Jan 2019	2.800	Jan 2020	-		2.800	Continuing	Continuing	-
Combat ID Enhancements	Various	Multiple : Multiple	15.437	7.683	Feb 2018	11.537	May 2019	16.332	Feb 2020	-		16.332	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / Patriot Product Improvement	Project (Number/Name) DV8 / Patriot Product Improvement
--	---	---

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Flat Panel Array Concept Development	Various	Multiple : Multiple	3.300	-		-		-		-		-	Continuing	Continuing	-
Anti-Radiation Missile (ARM) Asset Defense	Various	Raytheon : Andover, Massachusetts	2.000	3.000	Jan 2018	-		-		-		-	Continuing	Continuing	-
Tactical Telemetry Ground Station	Various	Multiple : Multiple	-	0.250	Jan 2018	-		-		-		-	Continuing	Continuing	-
PAC-3 Seeker SW Improvement	TBD	Multiple : Multiple	-	-		7.526	Feb 2019	20.000	Feb 2020	-		20.000	Continuing	Continuing	-
SBIR/STTR	TBD	TBD : TBD	-	-		2.393		-		-		-	0.000	2.393	-
Subtotal			246.415	72.201		70.450		92.496		-		92.496	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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RDEC and Other Govt Agencies	MIPR	RDEC and OGA'S : RSA, AL	4.512	0.700	Jan 2018	0.700	Jan 2019	0.700	Jan 2020	-		0.700	Continuing	Continuing	-
Subtotal			4.512	0.700		0.700		0.700		-		0.700	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	262.288	77.391	75.288	96.430	-	96.430	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / <i>Patriot Product Improvement</i>	Project (Number/Name) DV8 / <i>Patriot Product Improvement</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Software Build																												
Software Build																												
Advanced Electronic Counter Measures (AECM)																												
AECM																												
Software Improvement for Threat Evolution																												
Software Threat																												
Combat ID Enhancements																												
PDB 8 IOC																												
PDB 8 Fielding																												
PDB 8.1																												
Task 2 Non-Ballistic Tactical Ballistic Missile (TBM)																												
Task 2 Non-Ballistic TBM																												
Task 6 Discrimination Improvements																												
Task 6 Discrimination Improvements																												
Task 7 TBM Countermeasures / Effectors																												
Task 7 TBM Countermeasures																												
Assured PNT																												
Assured PNT																												
Tactical Telemetry Ground Station																												
Tactical Telemetry Ground Station																												
PAC-3 Seeker Software Improvements																												
PAC-3 Seeker Software Improvements																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0607865A / <i>Patriot Product Improvement</i>	Project (Number/Name) DV8 / <i>Patriot Product Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Software Build	4	2005	4	2024
Advanced Electronic Counter Measures (AECM)	1	2014	4	2024
Software Improvement for Threat Evolution	1	2014	4	2024
Combat ID Enhancements	1	2014	4	2024
PDB 8 IOC	4	2018	4	2018
PDB 8 Fielding	2	2018	4	2022
PDB 8.1	3	2022	3	2022
Task 2 Non-Ballistic Tactical Ballistic Missile (TBM)	1	2015	4	2024
Task 6 Discrimination Improvements	1	2014	4	2024
Task 7 TBM Countermeasures / Effectors	1	2015	4	2024
Assured PNT	1	2017	4	2021
Tactical Telemetry Ground Station	2	2018	4	2023
PAC-3 Seeker Software Improvements	2	2020	4	2024

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203728A / <i>Joint Automated Deep Operation Coordination System (JADOCs)</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	32.256	30.915	47.398	-	47.398	34.289	14.208	8.688	3.500	0.000	171.254
EF7: <i>Precision Fires Warrior Dismounted & Mounted</i>	-	4.355	3.879	3.500	-	3.500	3.500	3.500	3.500	3.500	0.000	25.734
EF8: <i>AFATDS Increment 1</i>	-	27.901	27.036	43.898	-	43.898	30.789	10.708	5.188	0.000	0.000	145.520

A. Mission Description and Budget Item Justification

FSC2 supports the Army's Network Modernization Strategy Lines of Efforts: LOE 2 Common Operating Environment

Precision Fires-Dismounted/Mounted (PF-D/M), formerly known as Pocket-sized Forward Entry Device (PFED) Increment II is a software application that operates on the Nett Warrior End User Device (EUD). It will provide the dismounted Forward Observer (FO) and Fire Support Teams (FISTs) the capability and functionality to accurately and rapidly locate ground targets and digitally process a Call For Fire, precision targeting, DACAS and video. PFED Increment II answers the Mobile Handheld Computing Environment requirement that all handheld applications reside on the Nett Warrior EUD. PFED supports the Army's Network Modernization Strategy Lines of Efforts: LOE 2 Common Operating Environment

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

PF-D/M and AFATDS support 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 Projectile Tracking System (PTS) initiatives. To support these LRPF initiatives AFATDS will serve as the key sensor to shooter link for the Army and USMC providing fully automated support for planning, coordinating, controlling and executing fires and effects.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203728A / <i>Joint Automated Deep Operation Coordination System (JADOCS)</i>
---	--

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	33.520	30.954	32.807	-	32.807
Current President's Budget	32.256	30.915	47.398	-	47.398
Total Adjustments	-1.264	-0.039	14.591	-	14.591
• Congressional General Reductions	-0.026	-0.039			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.238	-			
• Adjustments to Budget Years	-	-	14.591	-	14.591

Change Summary Explanation

Funds were added in FY 2020 to facilitate software development of the CP CE Initiative C2IUL which will allow AFATDS to properly interface with COE systems. Funds also align development of AFATDS and PF-D/M to sensor and munition initiatives.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EF7: Precision Fires Warrior Dismounted & Mounted	-	4.355	3.879	3.500	-	3.500	3.500	3.500	3.500	3.500	0.000	25.734
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

The Army PF-D/M funding line supports the Army's Network Modernization Strategy Lines of Efforts: LOE 2 Common Operating Environment.

FY 2020 funding of \$3.500 million supports the evolutionary software development and testing of PF-D/M and transition to the mounted computing environment.

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

	FY 2018	FY 2019	FY 2020
Title: Program Management Support Costs for PF-D/M	0.662	0.390	0.438
Description: Program support for PFED INC II software development efforts.			
FY 2019 Plans: Provide Program Management Office (PMO) support (Core, Matrix, and SETA) for all aspects of the PF-D/M program including requirements development, software development efforts, logistics, and business management support.			
FY 2020 Plans: Will provide Program Management Office (PMO) support (Matrix, and SETA) for all aspects of the PF-D/M program including requirements development, software development efforts, logistics, and business management support.			
FY 2019 to FY 2020 Increase/Decrease Statement: Management cost increase cost due to economic factors.			
Title: PFED INC II Software Development	3.343	3.097	2.895
Description: PFED INC II Software Development			
FY 2019 Plans:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020
Development and testing of Block 2 capabilities. Complete hardware/software integration with Nett Warrior EUD and MFOCS. Complete software Information Assurance certification. FY 2020 Plans: Will continue development and testing of Block 2 capabilities. Complete hardware/software integration with Nett Warrior EUD and MFOCS. Complete software Information Assurance certification. FY 2019 to FY 2020 Increase/Decrease Statement: Development requirements decreasing as development moves to fielding.			
Title: Testing Description: Conduct and Support Army Testing Activities FY 2019 Plans: Prepare and execute Engineering Release Evaluation/Testing. FY 2020 Plans: Continue to prepare and execute Engineering Release Evaluation/Testing. FY 2019 to FY 2020 Increase/Decrease Statement: Test requirements decreasing as development moves to fielding.	0.350	0.250	0.167
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	0.142	-
Accomplishments/Planned Programs Subtotals	4.355	3.879	3.500

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	Total Cost
			Base	OCO	Total					Complete	Total Cost
• BZ9851: POCKET FORWARD ENTRY DEVICE (PFED)	4.213	10.644	8.620	-	8.620	-	-	-	-	Continuing	Continuing

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

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 Acquisition Decision Memorandum (ADM) officially approved entry into the Development phase as an Acquisition Category (ACAT) III program. The system received a limited deployment decision in Dec 2016 to enter into operational test and subsequently expects to receive full material release in Jan 2018

PF-D/M leverages an Army Science and Technology investment by transitioning a software application that has been developed and used in proponent experimentation events (e.g. Army Expeditionary Warrior Experiment (AEWE) and Bold Quest). Upon a successful Milestone B decision in FY2015, this software application transitioned to PM Mission Command to conduct all Army developmental and operational test and evaluation requirements. PF-D/M will be integrated onto the Nett Warrior End User Devices (EUDs) and will be fielded by PM Soldier Warrior (PM SWAR). Training on the PF-D/M software will be conducted by PM Mission Command as units are fielded the capability.

PM Mission Command will continue to manage future capability blocks of software development. while continuing to coordinate with PM SWAR to field and train future versions of the software, as described above.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support for PFED Inc2 (CORE)	Sub Allot	PM Mission Command (MC) : APG, MD	-	0.100		-		-		-		-	0.000	0.100	-
Program Management Support for PFED Inc2 (Matrix)	IA	Various Mix Orgs (Govt) : APG, MD	0.075	0.226		0.190		0.226		-		0.226	0.000	0.717	-
Program Management Support for PFED Inc2 (SETA)	C/FFP	CRSA : APG, MD	-	0.450		0.200		0.212		-		0.212	0.000	0.862	-
Subtotal			0.075	0.776		0.390		0.438		-		0.438	0.000	1.679	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PFED Increment II Software Development efforts	IA	AMRDEC : Redstone, AL	7.582	2.866		3.097		2.895		-		2.895	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.142		-		-		-	0.000	0.142	-
Subtotal			7.582	2.866		3.239		2.895		-		2.895	Continuing	Continuing	N/A

Remarks
SW development contract awarded 6 October 2017

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support	Various	PM Mission Command (MC) : APG, MD	1.154	0.363		-		-		-		-	Continuing	Continuing	Continuing

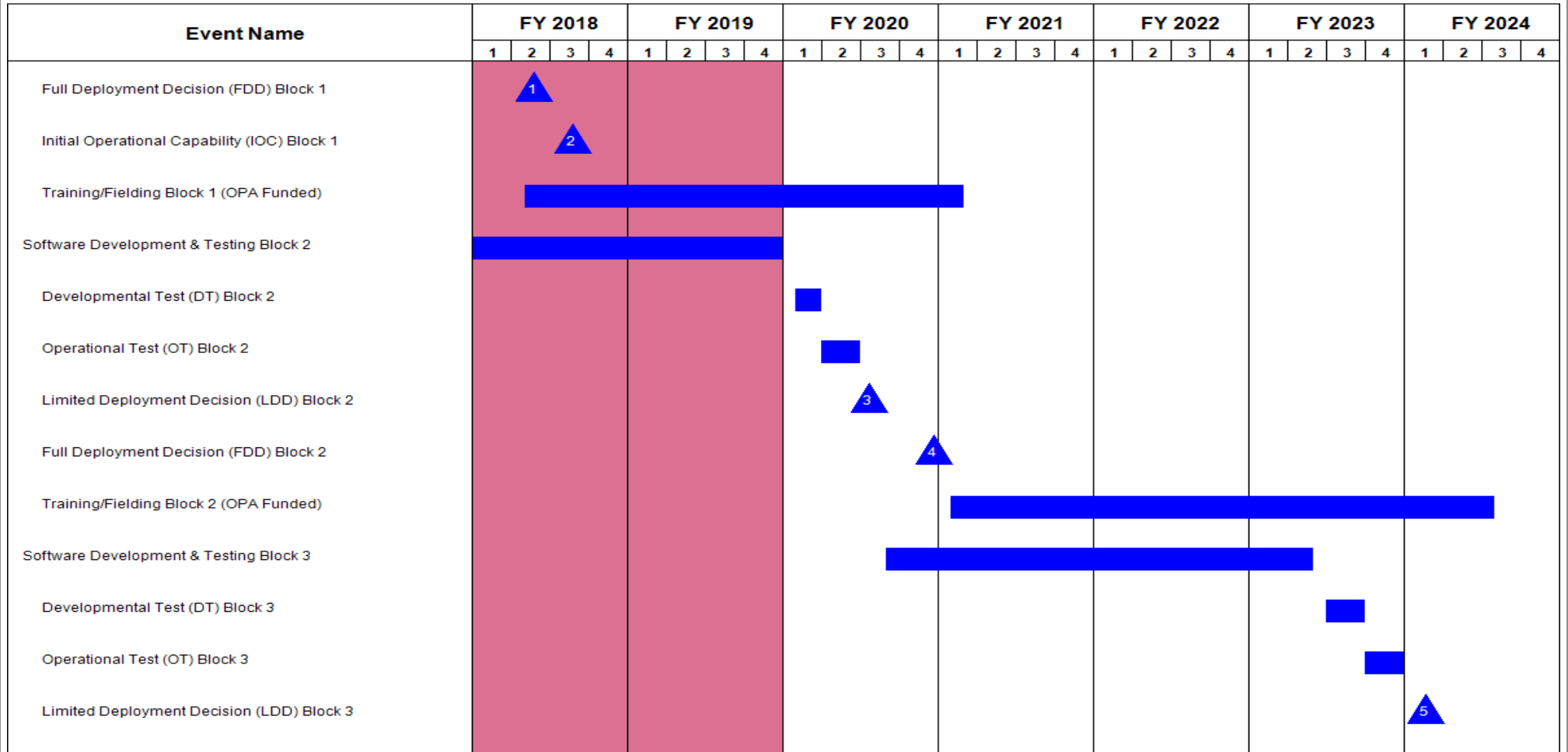
UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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							
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			1.154	0.363		-		-		-		-	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support (Engineering Release)	Various	Testing : Various	0.806	0.350		0.250		0.167		-		0.167	Continuing	Continuing	Continuing
Subtotal			0.806	0.350		0.250		0.167		-		0.167	Continuing	Continuing	N/A
Project Cost Totals			9.617	4.355		3.879		3.500		-		3.500	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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



UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Full Deployment Decision (FDD) Block 3																									6			
Training/Fielding Block 3 (OPA Funded)																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

Events	Start		End	
	Quarter	Year	Quarter	Year
Software Development & Testing Block 1	3	2015	3	2017
Developmental Test (DT) Block 1	1	2017	1	2017
Operational Test (OT) Block 1	2	2017	2	2017
Full Deployment Decision (FDD) Block 1	2	2018	2	2018
Initial Operational Capability (IOC) Block 1	3	2018	3	2018
Training/Fielding Block 1 (OPA Funded)	2	2018	1	2021
Software Development & Testing Block 2	1	2018	4	2019
Developmental Test (DT) Block 2	1	2020	1	2020
Operational Test (OT) Block 2	2	2020	2	2020
Limited Deployment Decision (LDD) Block 2	3	2020	3	2020
Full Deployment Decision (FDD) Block 2	4	2020	4	2020
Training/Fielding Block 2 (OPA Funded)	1	2021	3	2024
Software Development & Testing Block 3	3	2020	2	2023
Developmental Test (DT) Block 3	3	2023	3	2023
Operational Test (OT) Block 3	4	2023	4	2023
Limited Deployment Decision (LDD) Block 3	1	2024	1	2024
Full Deployment Decision (FDD) Block 3	3	2024	3	2024
Training/Fielding Block 3 (OPA Funded)	3	2024	2	2027

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EF8: AFATDS Increment 1	-	27.901	27.036	43.898	-	43.898	30.789	10.708	5.188	0.000	0.000	145.520
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Field Artillery Tactical Data System (AFATDS) 7.0 modernizes the existing AFATDS software currently in the field. AFATDS 7.0 enhances the existing AFATDS baseline by: (1) Providing a modernized web service based backend that will simplify long-term maintenance of the software, (2) Bringing AFATDS into full compliance with the Army's Common Operating Environment (COE) Command Post Computing Environment (CPCE) initiative and (3) Enhancing overall usability of the system through the implementation of a role-based capability architecture with embedded training that allows the AFATDS operator to receive on-the-spot training for any aspect of AFATDS via interactive instruction.

The Army Advanced Field Artillery Tactical Data System (AFATDS) 7.0 funding line supports the Army's Network Modernization Strategy Lines of Efforts: LOE 2 Common Operating Environment.

FY 2020 funding in the amount of \$43.898 million will be used to continue development efforts on AFATDS version 7.0.

PF-D/M and AFATDS support 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 Projectile Tracking System (PTS) initiatives. To support these LRPF initiatives AFATDS will serve as the key sensor to shooter link for the Army and USMC providing fully automated support for planning, coordinating, controlling and executing fires and effects.

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

	FY 2018	FY 2019	FY 2020
Title: Program Management Costs for AFATDS software development	2.560	2.416	4.388
Description: Provide program support for AFATDS software development efforts.			
FY 2019 Plans: Provide Program Management Office (PMO) support (Core, Matrix, and SETA) for all aspect of the AFATDS program including requirements analysis, software development efforts, logistics, and business management support.			
FY 2020 Plans: Continue to provide Program Management Office (PMO) support (Matrix, and SETA) for all aspect of the AFATDS program including requirements analysis, software development efforts, logistics, and business management support.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
Funds were added in FY 2020 to increase program management costs to facilitate software development to develop CP CE Initiative C2IUL this will allow AFATDS to properly interface with COE systems. Funds also assist with management costs to align development of AFATDS and PF-D/M to Long Range Precision Fires (LRPF) CFT sensor and munition initiatives.			
Title: AFATDS software development efforts Description: Development of AFATDS 7.0 software FY 2019 Plans: Continue to focus on the AFATDS v7.0 effort to include building fire support, fire control and fire direction role based capabilities, integrating available CP CE v3 common components, and updating the user interface for the application. FY 2020 Plans: Development will continue to focus on the AFATDS v7.0 effort to include building fire support, fire control and fire direction role based capabilities, integrating available CP CE v3 common components, and updating the user interface for the application. FY 2019 to FY 2020 Increase/Decrease Statement: Funds were added in FY 2020 to facilitate software development to develop CP CE Initiative C2IUL this will allow AFATDS to properly interface with COE systems. Funds also align development of AFATDS and PF-D/M to Long Range Precision Fires (LRPF) CFT sensor and munition initiatives.	25.341	23.629	39.510
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	0.991	-
Accomplishments/Planned Programs Subtotals	27.901	27.036	43.898

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
			Base	OCO	Total						
• B28620: MOD OF IN-SVC EQUIP, AFATDS	2.765	6.830	4.083	-	4.083	-	-	-	-	0.000	13.678

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

Remarks

D. Acquisition Strategy

On 13 May 2015, the Army Acquisition Executive (AAE) determined that a modernization of the existing Advanced Field Artillery Tactical Data System (AFATDS) software code is required to comply with Army Common Operating Environment (COE) standards to be executed as AFATDS 7.0. In V7.0, the PM will re-design AFATDS to provide the operator role/duty-based interaction, a dynamic embedded training capability, integration of COE compliant architectures and allowance for more efficient insertion of future capabilities.

Development of future AFATDS capabilities will be considered based on requirements approved through the Fires Center of Excellence (FCoE) Tactical Software Requirements Governance Board.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support for AFATDS (Core)	Sub Allot	PM Mission Command (MC) : APG, MD	3.198	0.810		-		-		-		-	0.000	4.008	-
Program Management Support for AFATDS (Matrix)	IA	Various Matrix Orgs (Govt) : Aberdeen PG, MD	1.790	1.010		0.969		1.993		-		1.993	0.000	5.762	-
Program Management Support for AFATDS (SETA Contr)	C/FFP	CRSA : Aberdeen PG, MD	1.243	0.540		0.827		1.634		-		1.634	0.000	4.244	-
Program Management Support for AFATDS (FFRDC)	FFRDC	MITRE : APG, MD	-	0.200		0.183		0.761		-		0.761	0.000	1.144	-
Subtotal			6.231	2.560		1.979		4.388		-		4.388	0.000	15.158	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Software Development of AFATDS Version 6.8.1.1	C/CPFF	Raytheon Systems Corp. : Ft. Wayne, IN	21.636	-		-		-		-		-	0.000	21.636	33.188
Software Development of AFATDS Version 7.0	C/CPFF	Leidos : Aberdeen, MD	21.931	25.341		24.066		38.317		-		38.317	0.000	109.655	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.991		-		-		-	0.000	0.991	-
Subtotal			43.567	25.341		25.057		38.317		-		38.317	0.000	132.282	N/A

Remarks
AFATDS 7.0 contract awarded 8 June 2017

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Information Assurance and Engineering Support for AFATDS requirements	C/CPFF	CSC : Various Locations	1.060	-		-		0.774		-		0.774	0.000	1.834	-
Defensive Cyber Tools (T-PKI)	TBD	TBD : TBD	1.100	-		-		0.251		-		0.251	0.000	1.351	-
Subtotal			2.160	-		-		1.025		-		1.025	0.000	3.185	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Confidence Demo for AFATDS V6.8.x requirements.	IA	Army Test & Evaluation Command (ATEC)/Fires Test Directorate (FTD) : Various Locations	0.626	-		-		-		-		-	0.000	0.626	-
Independent Verification and Validation of AFATDS V7.0 requirements	C/CPFF	Engility : Various Locations	1.538	-		-		0.168		-		0.168	0.000	1.706	-
Developmental Testing for AFATDS v7.0	IA	Multiple Govt Test Agencies (ATEC, ATC, EPG) : Multiple	0.750	-		-		-		-		-	0.000	0.750	-
Subtotal			2.914	-		-		0.168		-		0.168	0.000	3.082	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		54.872	27.901		27.036		43.898		-	43.898	0.000	153.707	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
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	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024																											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																								
V6.8.1.1 P1 Fielding (OPA Funding)																																																				
V6.8.1.1 P2 Development																																																				
V6.8.1.1 P2 Customer Test																																																				
V6.8.1.1 P2 Fielding																																																				
V7.0 Development (Base Period)																																																				
V7.0 Independent Verification and Validation																																																				
V7.0 Test for Record (Developmental Test/Operational Test)																																																				
V7.0 Fielding Decision																																																				
V7.0 Fielding & New Equipment Training (OPA Funded)																																																				
V7.0 Logistics Demo																																																				
V7.0.X Development (Option) Contract Option																																																				
V7.0.X Development (Option Period)																																																				
V7.0.X Test for Record (Developmental Test/Operational Test)																																																				

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
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	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
V7.0.X Fielding Decision																					▲ 4							
V7.0.X Fielding																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

Events	Start		End	
	Quarter	Year	Quarter	Year
V6.8.1.1 P1 Fielding (OPA Funding)	4	2018	1	2019
V6.8.1.1 P2 Development	1	2019	1	2019
V6.8.1.1 P2 Customer Test	2	2019	2	2019
V6.8.1.1 P2 Fielding	4	2019	3	2020
V7.0 Development (Base Period)	3	2017	1	2021
V7.0 Independent Verification and Validation	3	2018	3	2018
V7.0 Test for Record (Developmental Test/Operational Test)	1	2021	4	2021
V7.0 Fielding Decision	2	2021	2	2021
V7.0 Fielding & New Equipment Training (OPA Funded)	3	2021	1	2024
V7.0 Logistics Demo	3	2020	1	2021
V7.0.X Development (Option) Contract Option	1	2021	1	2021
V7.0.X Development (Option Period)	1	2021	1	2023
V7.0.X Test for Record (Developmental Test/Operational Test)	2	2023	3	2023
V7.0.X Fielding Decision	2	2023	2	2023
V7.0.X Fielding	4	2023	2	2025

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	293.921	336.063	334.463	-	334.463	273.052	199.165	158.680	142.288	Continuing	Continuing
280: <i>RECOV VEH IMPROV PROG</i>	-	12.800	25.312	68.752	-	68.752	94.584	85.047	57.429	7.830	Continuing	Continuing
330: <i>Abrams Tank Improve Prog</i>	-	93.739	165.655	119.645	-	119.645	83.983	68.332	63.419	99.979	Continuing	Continuing
371: <i>Bradley Improve Prog</i>	-	121.374	86.877	89.697	-	89.697	46.925	23.381	24.843	19.974	Continuing	Continuing
431: <i>M113 IMPROVEMENTS</i>	-	0.000	7.905	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.905
EE2: <i>Stryker Improvement</i>	-	63.032	50.314	56.369	-	56.369	47.560	22.405	12.989	14.505	0.000	267.174
FD8: <i>Light Armored Vehicle Improvement</i>	-	2.976	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.976

Note

PE Number 0203735A/Project EE2 funds development efforts for the Stryker Double V-Hull A1 (DVH A1) Engineering Change Proposal (ECP) (formerly named Stryker ECP 1), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS) (formerly named Stryker ONS Lethality), Stryker Survivability Enhancements, and Stryker Lethality ECPs (formerly referred to as Stryker ECP 2). PE Number 0203735A/Project FD8 funds the development of LAV25 enhancements.

A. Mission Description and Budget Item Justification

This Program Element (PE) 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 3Q FY 2011.

The Recovery Vehicle Improvement program is a group of ECPs that will allow the current recovery vehicle to regain Single Vehicle Recovery (SVR) for the heaviest tracked combat vehicle. The current M88A2 is not capable of Single Vehicle Recovery of the M1A2 SEPv2 in all situations and the M1A2C (formerly M1A2 SEPv3) fielding in FY 2020 will further exacerbate the recovery problem.

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 Engineering Change Proposals (ECPs) to support the

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	
<p>current embedded systems and to facilitate integration of technologies currently in development under other existing Programs of Record. The ECPs are not intended to exceed the operational capability outlined in current system requirements documents, but rather to ensure that the existing system performance is not further degraded and that Army mission equipment packages can be integrated on the Abrams and Bradley Platforms.</p> <p>M113 improvements will develop an affordable solution for upgrading the M113s to enhance protection, survivability, mobility and power generation to support the current and future network systems. This will provide the necessary enhancements to the M113 capability for Echelons Above Brigade (EAB) units with priority to the forward deployed units and equipment sets. The Armored Multi Purpose Vehicle (AMPV) program will replace all M113 family of vehicles in Armored Brigade Combat Teams (ABCT).</p> <p>Stryker Improvement will address the development of Lethality, Survivability, Mobility, and Communication, Command and Control (C3) improvements within the Stryker Family of Vehicles (FoV). Principal development efforts include upgrades associated with the Stryker Double V-Hull (DVH) A1 Engineering Change Proposal (ECP), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS), Common Remotely Operated Weapon Station-Javelin (CROWS-J) ONS, Stryker Survivability Enhancement, and Stryker Lethality ECPs. DVH A1 ECP power generation, suspension, and network upgrades restores Stryker DVH Space, Weight, and Power-Cooling (SWaP-C) lost as a result of incorporating vehicle changes to counter threats encountered during deployment operations while allowing the future network to be hosted without further degradation in vehicle protection and mobility. The Stryker 30mm ICVD and CROWS-J ONS efforts addressed Urgent Operational Need to increase the firepower of Stryker Infantry Carrier Vehicles (ICV) within the US Army European Command (USAREUR). The 30mm ICVD ONS effort integrates a 30mm-equipped weapon station providing, USAREUR with precision direct firepower to overwhelm the enemy in encounter actions and suppressive fire to preserve mounted and dismounted freedom of movement. The Stryker Survivability Enhancement will address evolving threats by assessing survivability improvements, to include passive protection systems, active protection systems, and an under-armor fire capability for Stryker-equipped reconnaissance troops. Stryker Lethality ECP efforts focus on the integration of a suite of complementary Mission Equipment Package (MEP) lethality upgrades (medium caliber weapon ECP, CROWS-J ECP, Anti-Tank Guided Missile (ATGM) ECP, common masted sensor ECP, and other capabilities) that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's Stryker Brigade Combat Teams (SBCTs) and address Remote Weapon Station (RWS) and Modified Improved Target Acquisitions System (MITAS) obsolescence issues that will impact fleet sustainment beginning in FY 2020. The ATGM ECP will upgrade the MITAS, incorporate a far target locator and disseminate target acquirement information utilizing network lethality, providing a common operating picture.</p> <p>Light Armored Vehicle improvement program will design, test and modify two Light Armored Vehicles (LAV-25A2s) for Low Velocity Air Drop (LVAD) to inform operational concepts for Infantry Brigade Combat Teams (IBCT) in support of Global Response Force early entry operations. This directly supports the expeditionary maneuver excursion conducted by the XVIII Airborne Corps in FY 2017- FY 2018. The Light Armored Vehicle improvement program will also execute a Company-size LAV-25 excursion that will inform the development of initial Company Tactics, Techniques, and Procedures (TTP) to be utilized during the FY 2020 Mobile Protected Firepower (MPF) Soldier Vehicle Assessment (SVA).</p>		

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>
---	--

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	343.175	411.927	335.086	-	335.086
Current President's Budget	293.921	336.063	334.463	-	334.463
Total Adjustments	-49.254	-75.864	-0.623	-	-0.623
• Congressional General Reductions	-0.251	-0.364			
• Congressional Directed Reductions	-33.000	-117.500			
• Congressional Rescissions	-	-			
• Congressional Adds	11.000	42.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-14.874	-			
• SBIR/STTR Transfer	-12.129	-			
• Adjustments to Budget Years	-	-	-0.623	-	-0.623

Change Summary Explanation

FY 2018 Congressional Rescission of \$40M.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>				Project (Number/Name) 280 / <i>RECOV VEH IMPROV PROG</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
280: <i>RECOV VEH IMPROV PROG</i>	-	12.800	25.312	68.752	-	68.752	94.584	85.047	57.429	7.830	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

FY 2020 Base dollars will continue the design, development, integration, prototype build, as well as pay government salaries. The prototype vehicles will enter testing in FY 2021 to confirm technical solutions meet performance requirements.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Program Management Office (PMO) Support	2.000	2.000	6.080	-	6.080
Description: Program Management Office Support includes Systems Engineering, Government and in-house support Contractor salaries, travel and other support costs required to effectively manage the program.					
FY 2019 Plans:					
Continue United States Government (USG) acquisition activities to support a contractor full vehicle prototype delivery in FY 2021, continue the agreement with a target completion in FY 2022. These activities will include conducting contractor surveillance, receipt of CDRLS, contract changes as required and conducting of key program milestones.					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 280 / <i>RECOV VEH IMPROV PROG</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Execute ramp up activities within the PMO office to support the design maturity review, support subsystem design reviews. Conduct contract surveillance, receipt of CDRLS, and manage the Other Transaction Authority agreement to support vehicle prototype testing in FY 2021.</p> <p>FY 2020 Base Plans: Oversight of OTA project agreement holder, technical solution development, prototype build and preparation of follow-on OTA production contract(s). Continue Government Systems Engineering and Program Management office support in FY 2020. This will include labor, training, travel, supplies, and equipment to effectively manage the program.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in efforts will require additional government and in-house contractor Program Management Support.</p>					
<p>Title: Test and Evaluation</p> <p>Description: Concept and Evaluation activities include contractor and government testing, as well as test documentation development. Contractor prove-out testing will be conducted using U.S. Army test facilities. 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.</p>	1.000	-	-	-	-
<p>Title: Product Development</p> <p>Description: Design, and Development of Engineering Change Proposals (ECPs).</p> <p>FY 2019 Plans: Funding will support the award of the M88A3 Single Vehicle Recovery ECP, execute the start of work meeting, and support baseline requirements assessment. Funding will also support allocation to meet single vehicle recovery of the heaviest tracked combat vehicle. Finally, the funding will support the ordering of long lead prototype hardware to support vehicle integration activities.</p> <p>FY 2020 Base Plans: Funding will support contractor development of the M88A3 Single Vehicle Recovery ECP, design maturity review, support subsystem technical review, finalize design to support vehicle integration activities in late FY 2020 and early FY 2021.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>	9.800	22.852	62.672	-	62.672

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 280 / <i>RECOV VEH IMPROV PROG</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The increase in FY 2020 will be used for ramp-up of the design and development effort, as well as build up to 9 prototype vehicles; this is a continuation of the efforts awarded in FY 2019.					
Title: FY 2019 SBIR / STTR Transfer	-	0.460	-	-	-
Description: FY 2019 SBIR / STTR Transfer					
FY 2019 Plans: FY 2019 SBIR / STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	12.800	25.312	68.752	-	68.752

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• GA0570: <i>Improved Recovery Vehicle (M88A2 HERCULES)</i>	153.378	152.854	0.000	80.146	80.146	-	-	20.000	60.000	0.000	466.378
• G80571: <i>M88 FOV MODS</i>	4.826	4.517	4.500	-	4.500	8.000	6.000	-	-	0.000	27.843

Remarks

D. Acquisition Strategy
The Project Director (PD) for MBTS intends to execute an ECP to regain single vehicle recovery capability of the M88A2 HERCULES vehicle. The strategy is to utilize the Detroit Arsenal Automotive Other Transaction Authority (DA2 OTA) to competitively award a single contract to develop, integrate and produce up to 9 prototype vehicles that will enter testing in FY 2021. After completion of the test, a follow-on OTA contract will be awarded to produce up to 3 brigades of initial production vehicles. FAR based contracts will be awarded to complete production of the remaining vehicles up to the Army Acquisition Objective (AAO).

E. Performance Metrics
N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 280 / <i>RECOV VEH IMPROV PROG</i>
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Office (PMO) Support	MIPR	PMO Support Offices : Various	-	1.500	May 2018	2.000	Jan 2019	6.080	Jan 2020	-		6.080	0.000	9.580	-
Subtotal			-	1.500		2.000		6.080		-		6.080	0.000	9.580	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	Various	Various : TBD	-	10.798	Jul 2019	22.852	Jul 2019	62.672	Jan 2020	-		62.672	0.000	96.322	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.460	Nov 2018	-		-		-	0.000	0.460	-
Subtotal			-	10.798		23.312		62.672		-		62.672	0.000	96.782	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	Various	Various : Various	-	0.502	Jul 2018	-		-		-		-	0.000	0.502	-
Subtotal			-	0.502		-		-		-		-	0.000	0.502	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	12.800	25.312	68.752	-	68.752	0.000	106.864	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 280 / <i>RECOV VEH IMPROV PROG</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024								
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4					
M88A3 ECP Pre-Contract Award Activity	████████████████																																
M88A3 ECP OTA Contract Award	████████████████				▲ 1																												
M88A3 ECP Design/Develop Prototype Build	████████████████								████████████████																								
M88A3 ECP Developmental Test (DT)	████████████████												████████████████																				
M88A3 ECP Initial Production Contract Award	████████████████																				▲ 2												
M88A3 ECP Fielding Start Date (First Unit Equipped)	████████████████																								▲ 3				▲ 4				
M88A3 ECP Production Award	████████████████																												▲ 3				

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 280 / <i>RECOV VEH IMPROV PROG</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
M88A3 ECP Pre-Contract Award Activity	3	2018	3	2019
M88A3 ECP OTA Contract Award	3	2019	3	2019
M88A3 ECP Design/Develop Prototype Build	4	2019	3	2021
M88A3 ECP Developmental Test (DT)	2	2021	4	2022
M88A3 ECP Initial Production Contract Award	1	2023	1	2023
M88A3 ECP Fielding Start Date (First Unit Equipped)	3	2024	3	2024
M88A3 ECP Production Award	1	2024	1	2024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>				Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
330: <i>Abrams Tank Improve Prog</i>	-	93.739	165.655	119.645	-	119.645	83.983	68.332	63.419	99.979	Continuing	Continuing
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 3Q 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, 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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Abrams Power Engineering Change Proposal M1A2SEPV3/ECP 1A	7.842	6.283	11.709	-	11.709
Description: The improvements implemented through the M1A2SEP V3/ECP 1A Abrams Power program will restore lost power generation and distribution, mitigate impending obsolescence, and incorporate inbound technologies currently under development.					
FY 2019 Plans: The USG will complete Live Fire Test and Evaluation (LFT&E) and Follow-on Operational Test and Evaluation (FOT&E). The USG will continue Production Qualification Testing (PQT). Logistics will finalize technical manual development and complete the logistics demonstration.					
FY 2020 Base Plans: The USG will complete Production Qualification Testing (PQT), logistics product development, engineering actions following the completion of USG testing, and contract close out actions.					
FY 2019 to FY 2020 Increase/Decrease Statement:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2020 increase is due to the contract closing out in FY 2020 and funding the incentive fee.					
Title: Training Device Updates					
Description: Development and design of training device upgrades to reflect upgrades to the vehicle.					
FY 2019 Plans: Continue development, design, test, and evaluation activities of training device upgrade kits.					
FY 2019 to FY 2020 Increase/Decrease Statement: Training Device Updates funded in FY 2019.					
	3.761	0.491	-	-	-
Title: Abrams Lethality Engineering Change Proposal M1A2SEP V4/ECP 1B					
Description: The Abrams SEP V4 program consists of lethality improvements. The primary focus is the integration of 3GEN Forward Looking Infrared (FLIR) and the integration of Ammunition Data Link (ADL) for the Advanced Multi-purpose (AMP) round. Additional improvements to the target acquisition sensors consist of inclusion of color cameras, laser capabilities, and image processing improvements. Other potential improvements consist of an improved environmental control system, laser warning receiver, vehicle smoke generation, survivability enhancements, signature management improvements, embedded training enhancements, 360 degree 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.					
FY 2019 Plans: SEP V4 completed a Preliminary Design Review (PDR) in 1Q FY 2019 and began critical design efforts. The primary tasks focused on systems engineering, design trade studies, engineering modeling and analysis, initial hardware mockups, and software development. Early hardware will be used to continue Design Verification Testing (DVT). Test and logistics planning will be completed throughout FY 2019. PM Abrams will begin to integrate the Advanced Multi-Purpose (AMP) round into the Abrams SEP V4.					
FY 2020 Base Plans: SEP V4 will complete a Critical Design Review (CDR) in 1Q FY 2020, begin component qualification testing, and continue prototype vehicle build planning. The primary tasks will be focused on systems engineering, test					
	61.289	129.521	91.535	-	91.535

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
planning, prototype hardware procurement, software development, logistics planning, and TDP development. Final hardware will be used for component qualification testing.					
FY 2019 to FY 2020 Increase/Decrease Statement: The decrease in SEP V4 funding results from being complete with the design phase and purchase of many long lead items. In FY 2020 many of the items that were procured with FY 2019 dollars begin arriving for component qualification testing and early prototype vehicle build.					
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 2019 Plans: Continue Government Systems Engineering and Program Management office support in FY 2019. This includes labor, training, travel, supplies, and equipment to effectively manage the program.					
FY 2020 Base Plans: Will continue Government Systems Engineering and Program Management office support in FY 2020. This will include labor, training, travel, supplies, and equipment to effectively manage the program.					
FY 2019 to FY 2020 Increase/Decrease Statement: Program Management has decreased due to completion of the SEP V4 design phase in early FY 2020 and completion of the SEP V3 contract in mid FY 2020.					
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.					
FY 2019 Plans:					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	6.567	7.873	7.473	-	7.473
	12.780	14.520	3.660	-	3.660

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The USG will complete Live Fire Test and Evaluation (LFT&E) and Follow-on Operational Test and Evaluation (FOT&E). The USG will continue Production Qualification Testing (PQT). FY 2020 Base Plans: The USG will complete any remaining SEP V3 and AMP testing. FY 2019 to FY 2020 Increase/Decrease Statement: The decrease is due to the completion of SEP V3 testing in mid FY 2020.					
Title: Test & Evaluation - Engineering Change Proposal M1A2SEP V4/ECP 1B Description: Comprises government and contractor test and evaluation of the SEP V4. Testing will cover component qualification testing, detailed vehicle test planning, and initial test site preparation. FY 2020 Base Plans: Begin SEP V4 testing and evaluation. Testing will include component qualification testing, detailed vehicle test planning, and initial test site preparation (spares, test equipment, instrumentation, etc.). FY 2019 to FY 2020 Increase/Decrease Statement: Begin SEP V4 testing.	-	-	3.268	-	3.268
Title: Lethality and Survivability Enhancements Description: Enhances lethality primarily through integration of improved munitions (smart rounds). Survivability enhancements will focus on improved sensors, 360 Situational Awareness, active protection systems, or other vehicle protection system technologies. FY 2019 Plans: Abrams will continue integration of next generation smart rounds. PM Abrams will complete the integration of the Advanced Multi-Purpose (AMP) round into the Abrams family of vehicles (FOV). AMP efforts will focus on laser development and qualification, vehicle testing, and tech data development. Other efforts include integration of survivability sensors and enhancements such as Laser Warning Receivers, 360 SA, or other emerging technologies. FY 2020 Base Plans:	1.500	1.000	2.000	-	2.000

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Abrams will continue the integration of next generation smart rounds, survivability enhancements, and improved sensors (such as 360 SA, Laser Warning Receiver, or other emerging technology). FY 2019 to FY 2020 Increase/Decrease Statement: Additional work reflecting AROC guidance received Summer FY 2018. Increase in FY 2020 supports initial integration of next generation smart rounds, vehicle testing and survivability enhancements.					
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer	-	5.967	-	-	-
FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	93.739	165.655	119.645	-	119.645

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• GA0750: <i>Abrams Upgrade Program</i>	1,088.300	1,527.243	1,752.784	-	1,752.784	797.444	1,074.597	1,429.138	1,499.122	Continuing	Continuing
• GA0700: <i>M1 Abrams Tank (MOD)</i>	602.026	959.041	348.800	13.100	361.900	399.314	369.166	386.422	370.544	Continuing	Continuing

Remarks

D. Acquisition Strategy
Abrams Power M1A2: Research & Development Contract - Sole Source, Cost Plus Incentive Fee (CPIF); M1A2D - Research & Development Contract - Sole Source, Cost Plus Incentive Fee (CPIF)

E. Performance Metrics
N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>
--	--	---

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Abrams SEP V3	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	331.132	3.900	Dec 2017	3.642	Feb 2019	11.709	Feb 2020	-		11.709	Continuing	Continuing	Continuing
SEP V3 Training Device Upgrades	MIPR	PEO, STRI : Orlando, FL	-	3.761	Jul 2018	0.491	Dec 2018	-		-		-	Continuing	Continuing	Continuing
Abrams SEP V4	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	34.293	61.289	Oct 2017	129.521	Nov 2018	91.535	Nov 2019	-		91.535	Continuing	Continuing	Continuing
Advanced Multi-Purpose (AMP) Round	SS/CPIF	General Dynamics Land Systems : Sterling Heights, MI	7.128	-		-		-		-		-	Continuing	Continuing	-
Lethality and Survivability Enhancements	Option/CPFF	General Dynamics Land Systems (GDLS) : Sterling Heights, MI	51.888	1.500	Apr 2018	1.000	Apr 2019	2.000	Mar 2020	-		2.000	Continuing	Continuing	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		5.967	Nov 2018	-		-		-	0.000	5.967	-
Subtotal			424.441	70.450		140.621		105.244		-		105.244	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Office (PMO)Support	MIPR	PMO Support Offices : Various	72.427	6.567	Jan 2018	7.873	Jan 2019	7.473	Jan 2020	-		7.473	Continuing	Continuing	Continuing
Program Management Office (PMO) Support - Survivability Enhancements	MIPR	PMO Support Offices : Various	2.207	-		-		-		-		-	0.000	2.207	-
Subtotal			74.634	6.567		7.873		7.473		-		7.473	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>
--	--	---

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Testing	MIPR	Aberdeen Proving Ground; Yuma Proving Ground; White Sands Missile Range, : Various	35.602	12.780	Jan 2018	14.520	Jan 2018	2.000	Jan 2020	-		2.000	Continuing	Continuing	Continuing
Government Testing SEP V3	MIPR	Various : Various	-	-		-		1.239	Jan 2020	-		1.239	Continuing	Continuing	-
Contractor Testing SEP V3	Various	Various : Various	34.961	3.942	Dec 2017	2.641	Feb 2019	1.660	Feb 2020	-		1.660	Continuing	Continuing	Continuing
Contractor Testing SEP V4	Various	Various : Various	-	-		-		2.029	Feb 2020	-		2.029	Continuing	Continuing	-
Government Testing - Survivability Enhancements	Various	Various : Various	24.491	-		-		-		-		-	0.000	24.491	-
Subtotal			95.054	16.722		17.161		6.928		-		6.928	Continuing	Continuing	N/A
Project Cost Totals			594.129	93.739		165.655		119.645		-		119.645	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SEP V3 Production Prove-Out Testing	██████████																											
SEP V3 Live Fire Test & Evaluation (LFT&E)	██████████																											
SEP V3 Production Qualification Testing (PQT)	██████████																											
SEP V3 Logistics Demo	██████████																											
SEP V3 Follow-on Test and Evaluation (FOT&E)	██████████																											
SEP V3 Fielding Start Date (First Unit Equipped)	██████████																											
SEP V4 Preliminary Design Review (PDR)	██████████																											
SEP V4 Critical Design Review (CDR)	██████████																											
SEP V4 Test Rediness Review	██████████																											
SEP V4 USG Testing	██████████																											
SEP V4 Log Demo	██████████																											
SEP V4 Material Release	██████████																											
SEP V4 First Unit Equipped	██████████																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 330 / <i>Abrams Tank Improve Prog</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Abrams Engineering Change Proposal SEP V3	4	2011	4	2011
SEP V3 Component Qualification Testing	4	2014	1	2017
SEP V3 Contractor Prototype Proveout	3	2015	1	2016
SEP V3 Production Prove-Out Testing	1	2016	2	2018
SEP V3 Live Fire Test & Evaluation (LFT&E)	1	2018	3	2019
SEP V3 Production Qualification Testing (PQT)	4	2018	2	2020
SEP V3 Logistics Demo	4	2018	1	2019
SEP V3 Follow-on Test and Evaluation (FOT&E)	3	2019	3	2019
SEP V3 Fielding Start Date (First Unit Equipped)	4	2020	4	2020
Abrams Engineering Change Proposal SEP V4	4	2017	4	2017
SEP V4 Preliminary Design Review (PDR)	1	2019	1	2019
SEP V4 Critical Design Review (CDR)	1	2020	1	2020
SEP V4 Test Rediness Review	4	2021	4	2021
SEP V4 USG Testing	2	2020	4	2023
SEP V4 Log Demo	2	2023	3	2023
SEP V4 Material Release	3	2024	3	2024
SEP V4 First Unit Equipped	4	2024	4	2024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 371 / <i>Bradley Improve Prog</i>
--	--	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Bradley Family of Vehicles is at or exceeds Space, Weight, and Power-Cooling (SWAP-C) limitations. To restore lost platform capability and to host other Army existing program of records, the Bradley Fighting Vehicle program shall execute a series of Engineering Change Proposals (ECPs). The track and suspension ECP improves the vehicle's track and suspension while the Bradley A4 (Mobility) ECP improves the power train and electrical system to enable the Bradley fleet to host inbound technologies from Army program of records, including mission command systems. The Bradley A4 development effort led to a production decision in FY 2017. Product Manager Bradley will characterize a Non Developmental Item (NDI) to develop force protection and survivability improvements to counter evolving threats to include, but not limited to Active Protection System. A separate integration effort began in FY 2018 for an underbelly armor kit for improved survivability against blast threats.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Bradley A4 Engineering Change Proposal (ECP) Program</p> <p>Description: The Bradley Fighting Vehicle System (BFVS) improvements implemented through the Engineering Change Proposal (ECP) Program will focus on restoring lost platform capability and provide capacity to support Army inbound technologies and to facilitate integration of technologies currently in development under other existing programs of record.</p> <p>FY 2019 Plans: The Bradley A4 ECP program will continue reliability upgrades identified in government developmental testing in order to meet or exceed the reliability requirement.</p> <p>FY 2020 Base Plans: Provides funding for the development of maintenance training devices related to A4 (Mobility).</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in FY 2020 funds the training device requirement for fielding A4.</p>	23.513	0.250	11.443	-	11.443
<p>Title: Bradley A5 Engineering Change Proposal (ECP) Program</p> <p>Description: Continues Third Generation Forward Looking Infrared (3GEN FLIR) and other necessary technology integration efforts.</p>	5.000	-	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 371 / <i>Bradley Improve Prog</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Survivability Enhancements</p> <p>Description: Developing force protection and survivability improvements to counter evolving threats to include, but not limited to the underbelly interim solution (UBIS). The Bradley Family of Vehicles (BFV) will integrate underbelly armor for improved survivability against underbelly blast events.</p> <p>FY 2019 Plans: Engineering, logistics, test, and program management will continue development; begin contractor testing; conduct USG testing; and the logistics support Maintenance Allocation Chart (MAC), provisioning plan, test support package, MWO development, and Logistics Demonstration (LOGDEMO) of the Underbelly Interim Solution (UBIS). Development of software upgrades such as, but not limited to, rearview sensor system and installation of a man portable short range air defense (SHORAD).</p> <p>FY 2020 Base Plans: Engineering, logistics, test, and program management to continue development; complete contractor testing; conduct USG testing; and complete the logistics support Maintenance Allocation Chart (MAC), provisioning plan, test support package, MWO development, and Logistics Demonstration (LOGDEMO) of the Underbelly Interim Solution (UBIS). Integration analysis, installation assessment and engineering support for execution of Bradley modifications.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding has decreased since the underbelly interim solution development is scheduled to complete in FY 2020.</p>	-	22.400	2.249	-	2.249
<p>Title: Program Management Office (PMO) Support</p> <p>Description: Program Management Office Support includes systems engineering, government and contractor salaries, travel, training and other support costs required to effectively manage the program.</p> <p>FY 2019 Plans: 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, engineering phases of Bradley A5 ECP (Lethality), and execute UBIS and other development activities.</p> <p>FY 2020 Base Plans:</p>	8.393	9.084	5.560	-	5.560

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 371 / <i>Bradley Improve Prog</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>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 execute UBIS and other development activities.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Program Management has increased slightly in FY 2020 due to the fluctuations in support costs.</p>					
<p>Title: Test & Evaluation</p> <p>Description: Test & Evaluation efforts support developmental and operational test events. These events include test planning, system and subsystem testing, and development of test documentation.</p> <p>FY 2019 Plans: Conduct Bradley A4 ECP operational testing and will continue MWO test activities.</p> <p>FY 2020 Base Plans: Will conduct Bradley A4 Operational Testing and continue MWO, current fleet enhancement, and Bradley improvement test activities.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Test and Evaluation has decreased in FY 2020 due to the cancellation of SAPA transmission testing and A4 Production Verification Testing will be procurement funded.</p>	9.937	17.125	16.235	-	16.235
<p>Title: Current Fleet Enhancements</p> <p>Description: Current fleet enhancement efforts support development and integration of capabilities to the current Bradley Family of Vehicles fleet to maintain the Bradley's battlefield dominance against current and future threats.</p> <p>FY 2019 Plans: Conduct integration activities for Army directed improvements such as, but not limited to, rear view sensor system, vehicle generated smoke, and upgrade and maintain software for the current fleet of vehicles.</p> <p>FY 2020 Base Plans:</p>	-	32.158	41.918	-	41.918

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 371 / <i>Bradley Improve Prog</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Will continue to conduct integration activities for Army directed improvements such as, but not limited to, rear view sensor system, vehicle generated smoke, and upgrade and maintain software for the current fleet of vehicles. FY 2019 to FY 2020 Increase/Decrease Statement: Funding added in FY 2020 will allow Bradley to enhance the architecture with the current fleet.					
Title: Bradley Improvements Description: Provides funding for the analysis, engineering, development, and integration to support Army directed inbound technologies and other improvements to the Bradley Family of Vehicles.	34.531	-	12.292	-	12.292
FY 2020 Base Plans: Will conduct integration activities for Army directed improvements and inbound technologies such as, but not limited to, diagnostics and powertrain issues, force protection and system survivability enhancements, and increased situational awareness. FY 2019 to FY 2020 Increase/Decrease Statement: Funding added in FY 2020 will allow Bradley to improve vehicle diagnostics and user interface, increased situational awareness, and improved powertrain performance and reliability.					
Title: FY 2018 Congressional Rescission	40.000	-	-	-	-
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer	-	5.860	-	-	-
FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	121.374	86.877	89.697	-	89.697

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• GZ2400: <i>Bradley Program (MOD)</i>	585.851	515.424	638.781	-	638.781	715.310	487.603	60.919	55.913	0.000	3,059.801

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 371 / <i>Bradley Improve Prog</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>			<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• G80718: <i>BRADLEY PROGRAM</i>	483.050	205.000	0.000	-	0.000	-	-	-	-	0.000	688.050

Remarks

D. Acquisition Strategy

Product Manager Bradley will execute a series of Engineering Change Proposals (ECP) reestablishing Space, Weight, Power and Cooling (SWAP-C) to facilitate integration of technologies being developed under existing Programs of Record (POR). The Track and Suspension ECP production contract was awarded in FY 2014, and began fielding in FY 2015. Bradley A4 development has been executed on a sole source cost plus incentive fee contract to the current platform Original Equipment Manufacturer. Bradley A4 (Mobility) ECP is scheduled to begin fielding in FY 2020 to address powertrain and electrical power upgrades, which will enable the vehicle to host inbound technologies from Army program of records, including mission command systems, with no further performance degradation to the vehicle. Product Manager Bradley will characterize a Non-Developmental Item (NDI) Active Protection System in order to develop force protection and survivability improvements to counter evolving threats.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 371 / <i>Bradley Improve Prog</i>
--	--	---

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Bradley A4 Engineering Change Proposal (ECP) Program	SS/CPIF	PMO : Warren	79.009	-		0.250	Feb 2019	-		-		-	0.000	79.259	-
Non Recurring Engineering-Bradley A4 ECP	SS/FFP	L3COM : Muskegon, MI	16.223	-		-		-		-		-	0.000	16.223	-
Non Recurring Engineering- Bradley A4 ECP	SS/CPIF	BAE : Sterling Heights, MI	253.017	23.513	Nov 2017	-		-		-		-	0.000	276.530	-
Non Recurring Engineering- Bradley A4 ECP TADDS	TBD	TBD : TBD	-	-		-		11.443	Mar 2020	-		11.443	Continuing	Continuing	Continuing
Bradley A5 ECP (Lethality)	SS/CPIF	BAE : Sterling Heights, MI	39.817	5.000	Nov 2017	-		-		-		-	0.000	44.817	-
Survability Enhancements - Underbelly Armor	SS/CPIF	TBD : TBD	0.182	-		20.400	Sep 2019	2.249	Sep 2020	-		2.249	0.000	22.831	-
Current Fleet Enhancements	C/TBD	TBD : TBD	-	-		34.158	Aug 2019	41.918	Dec 2020	-		41.918	Continuing	Continuing	Continuing
Bradley Improvements	C/TBD	TBD : TBD	-	34.531		-		12.292	Mar 2020	-		12.292	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		5.860	Nov 2018	-		-		-	0.000	5.860	-
FY 2018 Congressional Recission	SS/ Various	TBD : TBD	-	40.000	Nov 2018	-		-		-		-	0.000	40.000	-
Subtotal			388.248	103.044		60.668		67.902		-		67.902	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMO/PEO Support/OGA	MIPR	PMO/PEO : Bradley ECP Program	27.314	4.622	Dec 2017	6.903	Dec 2019	3.360	Dec 2020	-		3.360	Continuing	Continuing	Continuing

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army													Date: March 2019		
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>					Project (Number/Name) 371 / <i>Bradley Improve Prog</i>						
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering Support	MIPR	Various : Bradley ECP Program	44.433	3.771	Dec 2017	2.181	Dec 2018	2.200	Dec 2020	-		2.200	Continuing	Continuing	Continuing
Subtotal			71.747	8.393		9.084		5.560		-		5.560	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Testing	MIPR	Various : Test Sites	33.054	9.937	Dec 2017	17.125	Jan 2019	16.235	Jul 2020	-		16.235	Continuing	Continuing	Continuing
Subtotal			33.054	9.937		17.125		16.235		-		16.235	Continuing	Continuing	N/A
Project Cost Totals			493.049	121.374		86.877		89.697		-		89.697	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 371 / <i>Bradley Improve Prog</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Bradley M2A4 Engineering Change Proposal (ECP) Program																												
Production Qualification Test (PQT) - Bradley A4 ECP																												
Production Contract Award - Bradley A4 ECP			▲ 1																									
1st Vehicle Delivery - Bradley A4 ECP												▲ 5																
Production Verification Testing (PVT) - Bradley A4 ECP																												
Operational Test and Evaluation - Bradley A4 ECP																												
First Unit Equipped (FUE) - Bradley A4 ECP																												
Development Contract - UBIS																												
Test Readiness Review - UBIS																												
Engineer Change Proposal/ Engineering Release Record- UBIS																												
RFP Release - UBIS																												
Production Contract Award - UBIS																												
Production Decision Point - UBIS																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 371 / <i>Bradley Improve Prog</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Bradley M2A4 Engineering Change Proposal (ECP) Program	1	2012	2	2019
Production Qualification Test (PQT) - Bradley A4 ECP	2	2016	2	2019
Production Contract Award - Bradley A4 ECP	3	2018	3	2018
1st Vehicle Delivery - Bradley A4 ECP	1	2020	1	2020
Production Verification Testing (PVT) - Bradley A4 ECP	2	2020	4	2020
Operational Test and Evaluation - Bradley A4 ECP	4	2020	4	2020
First Unit Equipped (FUE) - Bradley A4 ECP	4	2022	4	2022
Development Contract - UBIS	2	2019	2	2019
Test Readiness Review - UBIS	4	2019	4	2019
Engineer Change Proposal/ Engineering Release Record- UBIS	1	2020	1	2020
RFP Release - UBIS	2	2020	3	2020
Production Contract Award - UBIS	3	2020	3	2020
Production Decision Point - UBIS	2	2020	2	2020

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 431 / M113 IMPROVEMENTS
--	--	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
431: M113 IMPROVEMENTS	-	0.000	7.905	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	7.905
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

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

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Product Development</p> <p>Description: Design, fabrication and testing of Engineering Change Proposals (ECPs). Program cancelled in FY 2018.</p> <p>FY 2019 Plans: Program has been canceled.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Program has been canceled.</p>	-	6.015	-	-	-
<p>Title: Government Program Management</p> <p>Description: Program Management Office Support includes Systems Engineering, support to logistics development, Government salaries, travel, training and other support costs required to effectively manage the program.</p> <p>FY 2019 Plans: Program has been canceled.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Program has been canceled.</p>	-	1.600	-	-	-
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>Description: FY 2019 SBIR / STTR Transfer</p>	-	0.290	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 431 / M113 IMPROVEMENTS

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<i>FY 2019 Plans:</i> FY 2019 SBIR / STTR Transfer					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	-	7.905	-	-	-

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 431 / <i>M113 IMPROVEMENTS</i>
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	C/FFP	TBD : TBD	-	-		6.015	May 2019	-		-		-	0.000	6.015	-
Program Management Support	MIPR	TBD : TBD	-	-		1.600	May 2019	-		-		-	0.000	1.600	-
Subtotal			-	-		7.615		-		-		-	0.000	7.615	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.290	Nov 2018	-		-		-	0.000	0.290	-
Subtotal			-	-		0.290		-		-		-	0.000	0.290	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-	7.905	-	-	-	0.000	7.905	N/A

Remarks
Program has been cancelled.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 431 / <i>M113 IMPROVEMENTS</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
RFP Release	■																											
Contract Award			■																									
Test				■																								

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) 431 / M113 IMPROVEMENTS

Schedule Details

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

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>
--	--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EE2: <i>Stryker Improvement</i>	-	63.032	50.314	56.369	-	56.369	47.560	22.405	12.989	14.505	0.000	267.174
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

PE Number 0203735A/Project EE2 funds development efforts for the Stryker Double V-Hull A1 (DVH A1) Engineering Change Proposal (ECP) (formerly named Stryker ECP 1), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS) (formerly named Stryker ONS Lethality), Stryker Survivability Enhancements, and Stryker Lethality ECPs (formerly referred to as Stryker ECP 2).

A. Mission Description and Budget Item Justification

Stryker Improvement will address the development of Lethality, Survivability, Mobility, and Communication, Command and Control (C3) improvements within the Stryker Family of Vehicles (FoV). Principal development efforts include upgrades associated with the Stryker Double V-Hull (DVH) A1 Engineering Change Proposal (ECP), Stryker 30mm Infantry Carrier Vehicle Dragoon (ICVD) Operational Needs Statement (ONS), Common Remotely Operated Weapon Station-Javelin (CROWS-J) ONS, Stryker Survivability Enhancement, and Stryker Lethality ECPs. DVH A1 ECP power generation, suspension, and network upgrades restores Stryker DVH Space, Weight, and Power-Cooling (SWaP-C) lost as a result of incorporating vehicle changes to counter threats encountered during deployment operations while allowing the future network to be hosted without further degradation in vehicle protection and mobility. The Stryker 30mm ICVD and CROWS-J ONS efforts addressed Urgent Operational Need to increase the firepower of Stryker Infantry Carrier Vehicles (ICV) within the US Army European Command (USAREUR). The 30mm ICVD ONS effort integrates a 30mm-equipped weapon station providing, USAREUR with precision direct firepower to overwhelm the enemy in encounter actions and suppressive fire to preserve mounted and dismounted freedom of movement. The Stryker Survivability Enhancement will address evolving threats by assessing survivability improvements, to include passive protection systems, active protection systems, and an under-armor fire capability for Stryker-equipped reconnaissance troops. Stryker Lethality ECP efforts focus on the integration of a suite of complementary Mission Equipment Package (MEP) lethality upgrades (medium caliber weapon ECP, CROWS-J ECP, Anti-Tank Guided Missile (ATGM) ECP, common masted sensor ECP, and other capabilities) that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's Stryker Brigade Combat Teams (SBCTs) and address Remote Weapon Station (RWS) and Modified Improved Target Acquisitions System (MITAS) obsolescence issues that will impact fleet sustainment beginning in FY 2020. The ATGM ECP will upgrade the MITAS, incorporate a far target locator and disseminate target acquirement information utilizing network lethality, providing a common operating picture.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Stryker DVH A1 ECP Development (Engineering/Prototypes)	3.102	1.000	3.941	-	3.941
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					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
20% growth potential in gross vehicle weight and power generation capacity posturing these vehicles for efficient upgrades in the future. FY 2019 Plans: Continue DVH A1 ECP engineering efforts, to include finalization of In-Vehicle Network (IVN) design, development, validation/verification and logistic demonstration of revisions to Stryker Operator and Maintenance Manuals, provisioning of DVH A1 ECP-unique parts, and incorporation of DVH A1 ECP design changes resulting from deficiencies identified during prototype build and development testing. FY 2020 Base Plans: Will complete DVH A1 ECP verification and logistic demonstration, revisions to Stryker Operator and Maintenance Manuals, provisioning of DVH A1 ECP-unique parts, and incorporation of DVH A1 ECP design changes resulting from deficiencies identified during prototype build and development testing. FY 2019 to FY 2020 Increase/Decrease Statement: Increase for the DVH A1 ECP logistics products.					
Title: Stryker DVH A1 ECP Testing Description: Government developmental, operational and live fire testing in support of DVH A1 ECP. FY 2019 Plans: Complete the DVH A1 ECP test execution and development of final assessment/report. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to completion of DVH A1 ECP testing in FY 2019.	15.304	0.810	-	-	-
Title: Stryker DVH A1 ECP Training Device Updates Description: Development and redesign of training devices to ensure devices are concurrent with latest upgrades to Stryker vehicles resulting from DVH A1 ECP.	0.250	-	-	-	-
Title: Stryker DVH A1 ECP Contractor Support to Test Description: Contractor support to developmental, operational and live fire testing in support of DVH A1 ECP. FY 2019 Plans:	6.702	0.235	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: March 2019	
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>		Project (Number/Name) EE2 / <i>Stryker Improvement</i>		
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continued contractor technical support (system troubleshooting, maintenance and repair of prototypes during execution of tests) to ECP 1. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to completion of DVH A1 ECP test in FY 2019.					
Title: Stryker ONS Lethality Development (Engineering / Prototypes) Description: The Stryker 30mm Infantry Carrier Vehicle ?Dragoon? (ICVD) integrates a 30mm remotely operated turret onto an existing flat bottom Infantry carrier vehicle chassis in response to 2CR Operational Needs Statement (30 MAR 15).	5.636	-	-	-	-
Title: Stryker ONS Lethality Testing Description: Government developmental, operational and live fire testing in support of 30mm ICVD ONS.	1.955	-	-	-	-
Title: Stryker ONS Lethality Training Device Updates Description: Development and redesign of training devices to ensure devices are concurrent with upgrades to Stryker vehicles resulting from 30mm ICVD ONS .	0.125	-	-	-	-
Title: Stryker ONS Lethality Contractor Support to Test Description: Contractor support to government developmental, operational and live fire testing of the 30mm ICVD ONS.	0.024	-	-	-	-
Title: Stryker Lethality ECPs Development (Engineering/Protoypes) Description: Lethality ECPs will integrate a medium caliber weapon, under armor Javelin fire capability, improved optics and targeting systems, and other capabilities into the Stryker fleet. These improvements will provide for increased under armor fire capability, target identification range, provide overmatch against peer threats and supporting infantry assault, and address obsolescence within the targeting and reconnaissance systems utilized on the Stryker Family of Vehicle (FoV). FY 2019 Plans:	14.489	16.927	38.457	-	38.457

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Continued Stryker Lethality ECPs developmental engineering to include completion of CROWS-J ECP integration, continuation of ATGM ECP integration, and initiation of the design and procurement of the early order items supporting prototype build of the medium caliber weapon system.</p> <p>FY 2020 Base Plans: Continuing Stryker Lethality ECPs developmental engineering to include completion of CROWS-J ECP test fixes and logistic products, continuation of ATGM ECP integration, and continuation of the design and procurement of additional early order items supporting prototype build of the medium caliber weapon system.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to increasing developmental engineering for the medium caliber weapon design effort.</p>					
<p>Title: Stryker Lethality ECPs Testing</p> <p>Description: Government and Contractor Support for developmental, operational and live fire testing in support of Lethality ECP.</p> <p>FY 2019 Plans: Continued developmental test, to include safety, performance and environmental test planning and execution activities for the CROWS-J ECP.</p> <p>FY 2020 Base Plans: Continuation of developmental test, to include safety, performance and environmental test planning and execution activities for the CROWS-J and ATGM ECPs.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to the completion of some developmental tests for the CROWS-J and ATGM ECP test activities.</p>	1.625	12.394	8.706	-	8.706
<p>Title: Stryker Lethality ECPs Training Device Updates</p> <p>Description: Update of the Stryker training devices and to ensure they are concurrent with the Lethality upgrades. This includes updates for both gunnery and maintenance trainers.</p> <p>FY 2020 Base Plans:</p>	-	-	0.383	-	0.383

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Incorporate Lethality updates to Stryker training devices. This includes gunnery updates to the platform's Embedded Training software and Desk Top Trainer for the CROWS-J ECP and Maintenance Hands-on Trainer for the ATGM ECP.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in Lethality ECPs training devices cost is due to design solutions for CROWS-J ECP and ATGM ECP completion in FY 2019 allowing for the initiation of the training device solution.</p>					
<p>Title: Government Systems Engineering and Project Management</p> <p>Description: Government Systems Engineering and Program Management includes salaries, travel and other support costs required to effectively manage all RDTE efforts.</p> <p>FY 2019 Plans: Continued Government Systems Engineering and Program Management support (labor, travel, training, supplies, and equipment) for Stryker DVH A1 ECP, 30mm ICVD ONS, Survivability Enhancement, and Lethality ECP (CROWS-J ECP, ATGM ECP, medium caliber weapon system) development efforts.</p> <p>FY 2020 Base Plans: Continuing Government Systems Engineering and Program Management support (labor, travel, training, supplies, and equipment) for Stryker DVH A1 ECP, Survivability Enhancement, and Lethality ECP (CROWS-J ECP, ATGM ECP, medium caliber weapon system) development efforts. Convene a medium caliber weapon system Source Selection and Evaluation Board (SSEB).</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to completion DVH A1 and CROWS-J ECP efforts.</p>					
	13.820	8.867	4.882	-	4.882
<p>Title: Wireless Intercom System</p> <p>Description: Develop a performance specification for a common Wireless Intercom System. This is a Congressional add.</p> <p>FY 2019 Plans: Begin assessment of wireless intercom systems, determining key attributes needed for ground combat systems. Developing a common Wireless Intercom system performance specification.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>					
	-	5.000	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Completion of the system performance specification.					
Title: Stryker Power System Description: Development of a non-primary power solution for the Stryker platform. The non-primary power enhancement incorporates, but not limited to, the battery box container, Auxiliary Power Unit (APU) and interface kits. This a Congressional add. FY 2019 Plans: Develop and test the potential non-primary power solutions. Development of logistics products for the selected solution. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to the completion of the non-primary solution development.	-	3.000	-	-	-
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	2.081	-	-	-
Accomplishments/Planned Programs Subtotals	63.032	50.314	56.369	-	56.369

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• GM0100: <i>Stryker (Mod)</i>	285.320	127.301	144.387	4.100	148.487	164.269	283.913	286.396	303.480	Continuing	Continuing
• G85200: <i>Stryker Upgrade</i>	633.000	265.290	550.000	-	550.000	550.000	550.000	550.000	550.000	Continuing	Continuing

Remarks
23 March 2018 Army Requirements Oversight Council 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 to include Infantry Carrier Vehicle Dragoon (ICVD) production and fielding in FY 2016-2018 and Lethality ECP retrofits in FY 2019-2023.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>

D. Acquisition Strategy

The Stryker Engineering Change Proposal (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 Double-V Hull (DVH) variants. In March 2013, Phase II was approved continuing design and integration of ECP 1 mechanical power, electrical power generation, chassis upgrades, and the in-vehicle network upgrades. Based on additional testing conducted in the summer of 2013, the decision was made to focus ECP 1 efforts on the DVH platform and defer efforts on flat-bottom Strykers. The effort has subsequently been renamed the Stryker DVH A1 ECP. The DVH A1 ECP Phase II contract, awarded November 25, 2013, continues development engineering, prototype build test and evaluation. The initial DVH A1 ECP production contract was awarded in October 2016 (Sole-Source Firm Fixed Price arrangement). A second and third buy of DVH A1 ECP vehicles was awarded as a Fixed Price Incentive Fee arrangement.

On July 2, 2015, ASARC authorization was granted to execute the Stryker 30mm ICVD Operational Needs Statement (ONS) effort. 30mm ICVD Engineering, Manufacturing, and Development (EMD) contracts for Non-Recurring Engineering (NRE) and Logistics Products Development/Test Support were awarded in January 2016 and May 2016, respectively (Cost Plus Incentive-Fee basis). The 30mm ICVD ONS Production/Retrofit contract was awarded in May 2016 through an Undefinitized Contract Action (UCA). Definitization of the Fixed Price Incentive Fee (FPIF) Production contract occurred in March 2017.

The Stryker Lethality ECP efforts will focus on the integration of a suite of complementary Mission Equipment Package (MEP) lethality upgrades (medium caliber weapon system, Common Remotely Operated Weapon Station-Javelin (CROWS-J), common masted sensor, Anti-Tank Guided Missile (ATGM) target acquisition optics, and other capabilities) that will improve the suppressive fire and armored vehicle engagement capabilities across the Army's Stryker Brigade Combat Teams (SBCTs). Army Acquisition Executive (AAE) approval to initiate the Stryker CROWS-J ECP and ATGM ECP efforts was received in a September 30, 2016 Acquisition Decision Memorandum (ADM). A medium caliber weapon decision is planned for February 2019.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Stryker 30mm ICVD ONS Lethality Project Management	MIPR	PEO GCS/TACOM : Sterling Heights, MI	10.833	-		-		-		-		-	0.000	10.833	-
Survivability Enhancement Government Engineering and Project Management	MIPR	PEO GCS/TACOM : Various	0.843	-		-		-		-		-	0.000	0.843	-
Project Management Office (PMO)	MIPR	PEO GCS/TACOM : Various	16.226	13.820	Jan 2018	12.244	Jan 2019	4.882	Jan 2020	-		4.882	14.386	61.558	-
Subtotal			27.902	13.820		12.244		4.882		-		4.882	14.386	73.234	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Stryker DVH A1 ECP Development	SS/CPIF	GDLS, MI : Various	172.147	3.102	Aug 2018	1.000	Dec 2018	3.941	Dec 2019	-		3.941	0.000	180.190	-
Stryker DVH A1 ECP Training Device Updates	MIPR	PEO STRI, FL : Various	-	0.250	Aug 2018	-		-		-		-	0.000	0.250	-
Stryker 30mm ICVD ONS Development	SS/CPIF	GDLS, MI : Various	79.220	5.636	Jan 2018	-		-		-		-	0.000	84.856	-
Stryker 30mm ICVD ONS Lethality Training Device Updates	MIPR	PEO STRI, FL : Various	0.393	0.125	Jan 2018	-		-		-		-	0.000	0.518	-
Stryker Lethality ECPs Development	C/Various	PM CSW; PM CCWS : Various	26.517	14.489	Aug 2018	21.550	Jan 2019	38.457	Jan 2020	-		38.457	42.918	143.931	-
Stryker Lethality ECPs Training Device Updates	MIPR	PEO STRI, FL : Various	-	-		-		0.383	Jan 2020	-		0.383	0.000	0.383	-
Stryker Survivability Enhancement	Various	US Army TARDEC, Various : Sterling Heights, MI	21.230	-		-		-		-		-	0.000	21.230	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		2.081	Nov 2018	-		-		-	0.000	2.081	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>
--	--	--

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			299.507	23.602		24.631		42.781		-		42.781	42.918	433.439	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Stryker DVH A1 ECP Testing	MIPR	Army Test Centers : Various	31.183	15.304	Oct 2017	0.810	Dec 2018	-		-		-	0.000	47.297	-
Stryker DVH A1 ECP Contractor Support to Test	SS/CPFF	GDLS, MI : Various	35.454	6.702	Feb 2018	0.235	Dec 2018	-		-		-	0.000	42.391	-
Stryker 30mm ICVD ONS Test	MIPR	Army Test Centers : Various	23.546	1.955	Jan 2018	-		-		-		-	0.000	25.501	-
Stryker 30mm ICVD ONS Contractor Support to Test	SS/CPFF	GDLS, MI : Various	26.570	0.024	Aug 2018	-		-		-		-	0.000	26.594	-
Stryker Lethality ECPs Testing	MIPR	Army Test Centers : Various	3.851	1.625	Aug 2018	12.394	Dec 2018	8.372	Dec 2019	-		8.372	20.613	46.855	-
Stryker Lethality ECPs Contractor Support to Test	MIPR	Various : Various	1.015	-		-		0.334	Dec 2019	-		0.334	19.542	20.891	-
Stryker Survivability Enhancement	MIPR	Army Test Centers : Various	6.629	-		-		-		-		-	0.000	6.629	-
Subtotal			128.248	25.610		13.439		8.706		-		8.706	40.155	216.158	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals		455.657	63.032	50.314	56.369	-	97.459	722.831	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Stryker CROWS-J ECP First Unit Equipped (FUE)									4																			
Stryker ATGM ECP Design/Prototype/Logistics Products																												
Stryker ATGM ECP Safety/Perf./Elec. Test																												
Stryker ATGM ECP Production/Retrofit																												
Stryker ATGM ECP First Unit Equipped (FUE)													5															
Stryker Medium Caliber Weapon Design/Prototype/Logistic Products																												
Stryker Medium Caliber Weapon Trade Study/Cost Benefit Analysis/SSEB																												
Stryker Medium Caliber Weapon Safety/Perf./Live Fire/Electronics Testing																												
Stryker Medium Caliber Weapon Production/Retrofit																												
Stryker Medium Caliber Weapon First Unit Equipped (FUE)																												6

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Stryker DVH A1 ECP (Phase II)	1	2014	2	2020
Stryker DVH A1 ECP Tropic Region Test	3	2016	1	2017
Stryker DVH A1 ECP Cold Region Test	1	2016	3	2016
Stryker DVH A1 ECP Safety/Performance/RAM Test	4	2015	2	2019
Stryker DVH A1 ECP Production (Phase III)	4	2017	4	2020
Stryker DVH A1 ECP Follow-on Operational Test & Evaluation	4	2018	4	2018
Stryker 30mm ICVD ONS Effort	1	2016	2	2018
Stryker 30mm ICVD ONS Safety/RAM/Live Fire Test/Ammo qualification	2	2016	2	2018
Stryker 30mm ICVD ONS Early User Test & Evaluation	2	2018	2	2018
Stryker 30mm ICVD ONS Production	4	2017	3	2018
Stryker Survivability Enhancement	1	2017	4	2018
Stryker Lethality Decision	2	2019	2	2019
Stryker CROWS-J ECP Design/Prototype/Logistic Products	1	2019	4	2020
Stryker CROWS-J ECP Safety/Software/Performance Test	1	2019	2	2020
Stryker CROWS-J ECP Production/Retroft	3	2019	4	2027
Stryker CROWS-J ECP First Unit Equipped (FUE)	4	2020	4	2020
Stryker ATGM ECP Design/Prototype/Logistics Products	1	2018	3	2021
Stryker ATGM ECP Safety/Perf./Elec. Test	4	2019	2	2021
Stryker ATGM ECP Production/Retrofit	1	2021	4	2023
Stryker ATGM ECP First Unit Equipped (FUE)	2	2021	2	2021
Stryker Medium Caliber Weapon Design/Prototype/Logistic Products	2	2019	1	2025
Stryker Medium Caliber Weapon Trade Study/Cost Benefit Analysis/SSEB	2	2020	3	2020

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) EE2 / <i>Stryker Improvement</i>
--	--	--

Events	Start		End	
	Quarter	Year	Quarter	Year
Stryker Medium Caliber Weapon Safety/Perf./Live Fire/Electronics Testing	2	2022	2	2023
Stryker Medium Caliber Weapon Production/Retrofit	2	2021	4	2028
Stryker Medium Caliber Weapon First Unit Equipped (FUE)	4	2024	4	2024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) FD8 / <i>Light Armored Vehicle Improvement</i>
--	--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FD8: <i>Light Armored Vehicle Improvement</i>	-	2.976	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.976
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Light Armored Vehicle improvement program will design, test and modify two Light Armored Vehicles (LAV-25A2s) for Low Velocity Air Drop (LVAD) to inform operational concepts for Infantry Brigade Combat Teams (IBCT) in support of Global Response Force early entry operations. This directly supports the expeditionary maneuver excursion conducted by the XVIII Airborne Corps in FY 2017- FY 2018.

The Light Armored Vehicle improvement program will also execute a Company-size LAV-25 excursion that will inform the development of initial Company Tactics, Techniques, and Procedures (TTP) to be utilized during the FY 2020 Mobile Protected Firepower (MPF) Soldier Vehicle Assessment (SVA).

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Government Systems Engineering and Project Management	0.300	-	-	-	-
Description: Government systems engineering and program management support completion of LAV-25A2 LVAD testing and execution of the LAV-25 Company excursion.					
Title: LAV-25 Company Excursion	2.676	-	-	-	-
Description: Procurement of initial spares, special tools, and test equipment, New Equipment Training (NET), and field technical support to support execution of a Company-size LAV-25 excursion that will inform the development TTPs for the MPF system.					
Accomplishments/Planned Programs Subtotals	2.976	-	-	-	-

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

N/A

Remarks

D. Acquisition Strategy

N/A

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) FD8 / <i>Light Armored Vehicle Improvement</i>

<u>E. Performance Metrics</u> N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) FD8 / <i>Light Armored Vehicle Improvement</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Air Certification Testing																																
Airborne & Special Ops Test Directorate Airdrop Testing																																
NSRDEC Airdrop Design Support & Roller Load Testing																																
LAV-25 Company Excursion																																

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203735A / <i>Combat Vehicle Improvement Programs</i>	Project (Number/Name) FD8 / <i>Light Armored Vehicle Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Prototype Build	2	2017	3	2017
Air Certification Testing	3	2017	1	2018
Airdrop Certification Test	3	2017	4	2017
ATC Suspension Load Testing	4	2017	4	2017
Airborne & Special Ops Test Directorate Airdrop Testing	3	2017	2	2018
NSRDEC Airdrop Design Support & Roller Load Testing	4	2017	2	2018
LAV-25 Company Excursion	1	2019	4	2020

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0203740A / <i>Maneuver Control System</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	6.443	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.443
484: <i>Maneuver Control System</i>	-	6.443	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.443

A. Mission Description and Budget Item Justification

Tactical Mission Command (TMC) is a suite of products and services that provide commanders and their staff executive decision making capability in a collaborative environment. The suite of products currently in development consist of Command Web (CW), Tactical Services Infrastructure (TSI), and an Army Voice Communication System (WAVE). TMC satisfies requirements and capabilities identified in the Maneuver Control System (MCS) 6.4 Capability Production Document. The overarching capability includes a user-defined Common Operating Picture (COP) with integrated Command and Control (C2) and Situational Awareness (SA), map-centric collaboration, Army Mission Command Systems (and others) enabling system interoperability, data management, and enterprise services. TMC contributes to Mission Command (MC) Convergence for commanders and staff to effectively conduct collaborative mission planning and execution across a range of operations and spectrum of conflict. Legacy products supported by this Budget Item include Command Post of the Future (CPOF) and Battle Command Common Services (BCCS).

<u>B. Program Change Summary (\$ in Millions)</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	6.639	0.000	0.000	-	0.000
Current President's Budget	6.443	0.000	0.000	-	0.000
Total Adjustments	-0.196	0.000	0.000	-	0.000
• Congressional General Reductions	-0.004	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.192	-			

Change Summary Explanation

TMC (MCS) will be transitioning into sustainment in FY 2019.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203740A / <i>Maneuver Control System</i>			Project (Number/Name) 484 / <i>Maneuver Control System</i>				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
484: <i>Maneuver Control System</i>	-	6.443	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.443
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Tactical Mission Command (TMC) is a portfolio of products and services that enable commanders and their staff with collaborative environment, planning tools, and Common Operation Picture (COP) management and other maneuver functional tools. The overarching capability includes above platform level user-defined COP with integrated Command and Control (C2) and Situational Awareness (SA), map-centric collaboration, Army Mission Command System and other enabling system interoperability, data management and enterprise services. Products include:

Command Web is a set of modular software widgets served up over the web providing engineering functionality, improved supportability and ease-of-use in robust network environments.

Tactical Server Infrastructure (TSI) provides the network available services critical to ensuring system and software can transmit the network effectively. Additionally, TSI serves as the hosting platform for many other enabling software systems, as well as multiple Warfighter Functional Area Applications (WFAs) such as Intel, Air Missile Defense Workstations and Fires gateway, providing efficiencies in the Command Post via decreased size, weight and power.

WAVE is the voice of the internet protocol common voice solution for the CPOF portfolio of programs. It provides real-time voice interoperability between radios, intercom and other previously fielded technologies in support of the Commander's update briefing and other Mission Command tasks.

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

	FY 2018	FY 2019	FY 2020
Title: Program Management Office	0.639	-	-
Description: Codification of program operational requirements into discrete technical packages for development, testing, deployment, and support over the systems lifecycle.			
Title: Test and Evaluation	0.512	-	-
Description: Encompasses formal test (operational assessment/test, joint certification, interoperability, and information assurance) and informal testing such as acceptance testing and risk reduction testing.			
Title: WAVE MIP / Development / Intergration	5.292	-	-
Description: Developing and integrating voice over IP solutions into the CPOF portfolio of programs. It provides real-time voice interoperability between radios,			
Accomplishments/Planned Programs Subtotals	6.443	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203740A / <i>Maneuver Control System</i>	Project (Number/Name) 484 / <i>Maneuver Control System</i>
--	--	--

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• BA9320: <i>Maneuver Control System (MCS)</i>	72.672	29.144	0.260	-	0.260	-	-	-	-	0.000	102.076
• BS9710: <i>MCS SPARES</i>	2.869	-	0.000	-	0.000	-	-	-	-	0.000	2.869

Remarks

D. Acquisition Strategy

In accordance with the Training and Doctrine Command (TRADOC) requirements document approved in 2008, Maneuver Control System Capabilities Production Document, software capability will be developed in 3-year increments in support of Common Operating Environment (COE) Guidance designed to deploy specified Mission Command Essential Capabilities to operating force commanders and their integrated battle staffs. This strategy accounts for subsequent Army directives and continued migration to the Army COE; designed to optimize opportunities for improved interoperability. The products developed under this funding line are an integral part of the Army Mission Command System of Systems.

TMC (MCS) will be transitioning into sustainment in FY 2019.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203740A / Maneuver Control System	Project (Number/Name) 484 / Maneuver Control System
--	---	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Office Mgmt	Various	PM Mission Command : Aberdeen Proving Grounds, MD	20.310	0.639		-		-		-		-	0.000	20.949	-
Subtotal			20.310	0.639		-		-		-		-	0.000	20.949	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Tactical Applications (TacApps)/ CPOF Maintenance	IA	Software Development: WSEC : Picatinny Arsenal, NJ	19.107	0.736		-		-		-		-	0.000	19.843	-
Command Web Development	Various	CECOM SEC : APG, MD	1.999	-		-		-		-		-	0.000	1.999	-
Log Widget Development	TBD	Development: Government Agency : TBD	3.665	-		-		-		-		-	0.000	3.665	-
Misc Contracts	Various	Various : Various	24.931	-		-		-		-		-	0.000	24.931	-
ABCS SoS Contract (Joint Convergence Development)	Various	Lockheed Martin : Tinton Falls, NJ	6.404	-		-		-		-		-	0.000	6.404	-
Technical Support	Various	PM Mission Command/SEC : Various	27.251	-		-		-		-		-	0.000	27.251	-
CPOF Development	Various	General Dynamics : Scottsdale, AZ	137.255	-		-		-		-		-	0.000	137.255	-
ABCS SoS Contract (Joint Convergence Development) Follow-on	Various	General Dynamics : Scottsdale, AZ	1.025	-		-		-		-		-	0.000	1.025	-
Mission Command Convergence Development & Integration	Various	Various : Various	42.698	-		-		-		-		-	0.000	42.698	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203740A / <i>Maneuver Control System</i>	Project (Number/Name) 484 / <i>Maneuver Control System</i>
--	--	--

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Mission Command Convergence - CP CE Software Development & Integration (Common Software)	Various	software development Future Skies : APG, MD	11.055	-		-		-		-		-	0.000	11.055	-
Mission Command Convergence Development & Integration (TAIS)	Various	software development SED : Redstone Arsenal, AL	2.103	-		-		-		-		-	0.000	2.103	-
Software Development & Technical Support for BCCS	Various	CECOM Software Engineering Center : APG, MD	71.362	2.126		-		-		-		-	0.000	73.488	-
PAL Integration	IA	SRI : AZ	11.000	-		-		-		-		-	0.000	11.000	-
WAVE / MIP Development & Integration	Various	TBD : APG	0.600	2.430		-		-		-		-	0.000	3.030	-
Subtotal			360.455	5.292		-		-		-		-	0.000	365.747	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Misc Engineering Support	Various	PM Mission Command/SEC : Aberdeen Proving Ground, MD	10.340	-		-		-		-		-	0.000	10.340	-
Misc Contracts	Various	PM Mission Command : Aberdeen Proving Ground	5.743	-		-		-		-		-	0.000	5.743	-
Subtotal			16.083	-		-		-		-		-	0.000	16.083	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203740A / <i>Maneuver Control System</i>	Project (Number/Name) 484 / <i>Maneuver Control System</i>
--	--	--

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Systems Integration Effort																												
Arch, System Engineering, & Dev																												
Windows 10 Test and Integration																												
AWA 18.1																												
Joint Interoperability Testing																												
WFX 18-4																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203740A / <i>Maneuver Control System</i>	Project (Number/Name) 484 / <i>Maneuver Control System</i>
--	--	--

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
COE V2	2	2012	2	2017
COE v2 Arch, System Engineering, & Dev	2	2012	2	2016
COE V2 Development & Test	1	2015	2	2017
Systems Integration Effort	4	2014	2	2019
Arch, System Engineering, & Dev	4	2014	3	2018
Windows 10 Test and Integration	2	2017	2	2019
AWA 18.1	3	2018	3	2018
Joint Interoperability Testing	1	2018	3	2018
WFX 18-4	1	2018	3	2018

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity	R-1 Program Element (Number/Name)											
2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	PE 0203743A / 155mm Self-Propelled Howitzer Improvements											
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	39.154	37.155	214.246	-	214.246	393.712	301.576	87.291	33.689	0.000	1,106.823
FF9: <i>PIM Improvement Program</i>	-	39.154	37.155	214.246	-	214.246	393.712	301.576	87.291	33.689	0.000	1,106.823

A. Mission Description and Budget Item Justification

The current Paladin Integrated Management (PIM) is an ACAT1C Acquisition program. The PIM improvement program is intended to address the current Howitzer capability gap based on a capability needs assessment performed by the user community to restore indirect fires support overmatch to the US Army. This effort will evaluate developing technologies to determine which configuration will add optimal value to the Army. This effort will consist of multiple increments to spiral technology as it matures and may include, but is not limited, to the integration of a new cannon, gun mount, gun drive systems, fire control systems, autoloader, and optionally-manned capability into the M109A7 Howitzer. Analysis will be required to evaluate the impact of the new cannon technology and modifications required to support ammunition automation, remote firing, and remote movement on current platform chassis, cab, suspension, mobility, and electronic architecture. This evaluation will be the foundation to inform the level of effort needed to integrate this capability into the current SPHS.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	40.784	40.676	33.953	-	33.953
Current President's Budget	39.154	37.155	214.246	-	214.246
Total Adjustments	-1.630	-3.521	180.293	-	180.293
• Congressional General Reductions	-0.033	-0.046			
• Congressional Directed Reductions	-	-3.475			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.597	-			
• Adjustments to Budget Years	-	-	180.293	-	180.293

Change Summary Explanation

Funding has changed to bring program more in line with the 804 Acquisition Strategy

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FF9: PIM Improvement Program	-	39.154	37.155	214.246	-	214.246	393.712	301.576	87.291	33.689	0.000	1,106.823
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program supports the Cross Function Team (CFT).

A. Mission Description and Budget Item Justification

The current Paladin Integrated Management (PIM) is an ACAT1C Acquisition program. The PIM improvement program is intended to address the current Howitzer capability gap based on a capability needs assessment performed by the user community to restore indirect fires support overmatch to the US Army. This effort will evaluate developing technologies to determine which configuration will add optimal value to the Army. This effort may include but is not limited to the integration of a new cannon, gun mount, gun drive systems, fire control systems and autoloader into the M109A7 Howitzer. Analysis will be required to evaluate the impact of the new cannon technology on current platform chassis, cab, suspension, mobility, and electronic architecture. This evaluation will be the foundation to inform the level of effort needed to integrate this capability into the current SPHS.

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

	FY 2018	FY 2019	FY 2020
Title: PIM Improvement Program	39.154	-	-
Description: Funding is provided to support Cost Benefit Analysis (CBA) and associated following on activities, and range requirements			
Title: Extended Range Cannon Artillery (ERCA)	-	31.198	177.022
Description: Funds support the Extended Range Cannon Artillery development costs to include risk reduction and the technical acceleration of building the ERCA prototypes.			
FY 2019 Plans: Focus on executing the plan to begin Integration of improved armament configuration developed by ARDEC Science & Technology (S&T) effort onto the M109A7. Purchase long lead hardware and prototype build. Develop testing strategy, systems engineering documentation and logistics input.			
FY 2020 Plans: Will purchase long lead materials for the ERCA prototypes to be integrated onto the M109A7 platform. Use ARDEC Other Transaction Agreement (OTAs) to bring non traditional contractors to burn down risk. System Level Critical Design Review (CDR) in 2Q FY 2020.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
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 2018	FY 2019	FY 2020
Increase from FY 2019 to FY 2020 is due to the purchase of long lead materials for prototype builds.				
<p>Title: Program Management</p> <p>Description: Funding is provided for all Program Management efforts on the Extended Range Cannon Artillery effort.</p> <p>FY 2019 Plans: Begin the development for all required documents, office staff and engineering Integrated Product Team (IPT) development.</p> <p>FY 2020 Plans: Continue the development for all required documents, office staff and engineering Integrated Product Team (IPT) development. Use ARDEC OTAs to bring non traditional contractors to burn down risk.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease funding in FY 2020 is due to a reduction in support costs.</p>		-	3.723	3.896
<p>Title: Test and Evaluation</p> <p>Description: Funding is provided for all training efforts on the Extended Range Cannon Artillery effort</p> <p>FY 2019 Plans: Establish procedures for logistical development, production engineering and test.</p> <p>FY 2020 Plans: Government Test support to include all test execution, data collection and logistic support. To include tests of Mobility, Reliability and Test Firings. Use ARDEC OTAs to bring non traditional contractors to burn down risk. TDP Development through 3Q FY 2020.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase from FY 2019 to FY 2020 due to expected ramp up in testing during FY 2020. Those include Mobility testing, Reliability Testing and Test firings.</p>		-	0.760	33.328
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>Description: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 Plans: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>		-	1.474	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
FY 2019 SBIR / STTR Transfer			
Accomplishments/Planned Programs Subtotals	39.154	37.155	214.246

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

N/A

Remarks

D. Acquisition Strategy

PdM Self Propelled Howitzer will use, once approved, a series of NDAA Section 804 middle tier acquisition programs and rapid fielding that include development, integration, test and sustainment actions as the program moves forward and transitions to a program of record to field the ERCA system.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203743A / 155mm Self-Propelled Howitzer Improvements	Project (Number/Name) FF9 / PIM Improvement Program
--	---	---

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PIM Improvement Program	MIPR	Various - OGAs : PEO	-	22.161	Sep 2018	-		-		-		-	0.000	22.161	-
Extended Range Cannon Artillery Effort - Government	MIPR	ARDEC : Picatinny	-	8.396	Jun 2018	18.682	Dec 2018	86.040	Jan 2020	-		86.040	0.000	113.118	-
Extended Range Cannon Artillery Effort - Contractor	SS/CPFF	Various Contractors : Various Locations	-	5.948	Jun 2018	12.516	Dec 2018	90.982	Feb 2020	-		90.982	0.000	109.446	-
Test and Evaluation	MIPR	Various - OGAs : Various	-	-		0.760	Dec 2018	-		-		-	0.000	0.760	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.474	Nov 2018	-		-		-	0.000	1.474	-
Subtotal			-	36.505		33.432		177.022		-		177.022	0.000	246.959	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMO/PEO Support	MIPR	PM/PEO PIM : Various	-	2.649	Jul 2018	3.723	Dec 2018	3.896	Dec 2019	-		3.896	0.000	10.268	-
Subtotal			-	2.649		3.723		3.896		-		3.896	0.000	10.268	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	MIPR	Various - OGAs : Various	-	-		-		33.328	Apr 2020	-		33.328	0.000	33.328	-
Subtotal			-	-		-		33.328		-		33.328	0.000	33.328	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
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 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	39.154		37.155		214.246		-		214.246	0.000	290.555	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
804 Initiation Review				2 804																								
System Requirements Review (SRR/SFR)					3 SRR																							
Execution Development Phase																												
Preliminary Pre-Design Review (PDR)			1 PDR																									
Demo Test									Demo Test																			
Preliminary Design Review (PDR)					6 PDR																							
Critical Design Review (CDR)									7 CDR																			
ARDEC Subcontractor Award					4 Award																							
TDP Development																												
Prototype Builds																												
Test																												
System Level TRR													8 TRR															
Safety Confirmation																									11 Safety			

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

Events	Start		End	
	Quarter	Year	Quarter	Year
Initial Analysis of Alternatives	1	2017	3	2017
804 Initiation Review	4	2018	4	2018
System Requirements Review (SRR/SFR)	2	2019	2	2019
Execution Development Phase	1	2019	1	2022
Preliminary Pre-Design Review (PDR)	3	2018	3	2018
Demo Test	1	2020	3	2020
Preliminary Design Review (PDR)	3	2019	3	2019
Critical Design Review (CDR)	2	2020	2	2020
ARDEC Subcontractor Award	2	2019	2	2019
TDP Development	1	2019	2	2020
Prototype Builds	2	2021	1	2022
Test	4	2020	1	2023
System Level TRR	1	2021	1	2021
Safety Confirmation	1	2023	1	2023
FUE	2	2023	3	2023
2UE	2	2024	3	2024
Increment 2 Initiation Decision	2	2019	2	2019
Tradoc Analysis Center (TRAC) Study	3	2018	4	2019
Inc 2 Execution Development Phase	4	2019	4	2021
Inc 2 SRR/SFR	2	2021	2	2021
Inc 2 Preliminary Design Review (PDR)	4	2021	4	2021
Inc 2 Demo Test	2	2021	4	2021

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

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
--	---	---

Events	Start		End	
	Quarter	Year	Quarter	Year
Inc 2 CDR	2	2023	2	2023
Inc 2 System Level TRR	2	2024	2	2024
Inc 2 Prototype Builds	2	2023	3	2024
Inc 2 Test	3	2024	4	2026
Inc 2 TDP Development	4	2020	4	2026

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	34.228	17.684	16.486	-	16.486	13.904	11.307	9.187	7.188	Continuing	Continuing
EB6: MQ-1C Gray Eagle MODS	-	34.228	17.684	16.486	-	16.486	13.904	11.307	9.187	7.188	Continuing	Continuing

A. Mission Description and Budget Item Justification

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

The Fiscal Year (FY) 2020 Aircraft Modification/Product Improvement funding of \$16.486 million will integrate alternate munitions, support GPS denied development and testing, improve aircraft survivability, and improve propulsion reliability.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	39.358	17.706	6.686	-	6.686
Current President's Budget	34.228	17.684	16.486	-	16.486
Total Adjustments	-5.130	-0.022	9.800	-	9.800
• Congressional General Reductions	-0.032	-0.022			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.557	-			
• SBIR/STTR Transfer	-1.541	-			
• Adjustments to Budget Years	-	-	9.800	-	9.800

Change Summary Explanation

FY 2020 Current President's Budget increase of \$9.8M provides additional funding to support investments in propulsion reliability. This effort will reduce MQ-1C Gray Eagle Return to Base events and decrease the likelihood of engine related aircraft mishaps. Additionally, this effort will increase operational readiness for the Operational Commander. A portion of the increase will be used to develop alternate navigation technologies.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EB6: MQ-1C Gray Eagle MODS	-	34.228	17.684	16.486	-	16.486	13.904	11.307	9.187	7.188	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

FY 2020 Aircraft Modification/Product Improvement funding of \$16.486 million integrates alternate munitions and related weapons support functionality. Additionally, funding supports GPS denied development and testing, aircraft survivability improvements, propulsion reliability development.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Global Positioning System (GPS) Denied Description: GPS Denied FY 2019 Plans: Funding continues development of an electronic warfare capability that provides the system the ability to continue operations during periods of GPS outage as well as the ability to identify Global Positioning System (GPS) jammer position location. Funding will support re-architecture of system processor modules that support current and future GPS-Denied enhancements and alternative navigation technology, for example vision-based navigation. FY 2020 Base Plans: Funding continues support to system processor re-architecture, as well as development of an alternate navigation technology that enables operations during periods of GPS outage using terrestrial and/or celestial data to include engineering support activities.	3.917	4.000	4.000	-	4.000
Title: Universal Ground Control Station (UGCS) Improvement Description: UGCS Improvement	7.454	-	-	-	-
Title: Alternate Munitions Integration	14.379	3.987	2.643	-	2.643

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Alternate Munitions Integration</p> <p>FY 2019 Plans: Funding supports Longbow integration. Funding also initiates development of a Universal Armament Interface / Universal Payload Interface (UAI/UPI), enabling a faster and more cost effective method of integrating future weapons and payloads. Funding also supports weapons Decision Aids development.</p> <p>FY 2020 Base Plans: Funding continues Universal Armament Interface/Universal Payload Interface development.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Completed Longbow flight test event in FY 2019.</p>					
<p>Title: Ground Base Sense and Avoid (GBSAA) Block II</p> <p>Description: GBSAA Block II</p> <p>FY 2019 Plans: Funding supports the development and Integration for Block II to provide GBSAA display moved to Ground Control Station (GCS). Maneuver Recommendation to Aircraft Operator (AO).</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Effort completed.</p>	8.330	6.699	-	-	-
<p>Title: Survivability</p> <p>FY 2019 Plans: Funding for survivability requirements for the MQ-1C Gray Eagle will be used to develop prototype solutions against known threat vulnerabilities. The prime contractor will be funded to provide survivability solutions for both software and hardware features. Funding will support re-architecture of system processor modules that support current and future Survivability enhancements, datalinks modernization, and modular open-system architecture requirements.</p> <p>FY 2020 Base Plans: Funding continues development of system processor modules that support current and future Survivability enhancements, datalinks modernization, and modular open-system architecture requirements.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>	0.148	2.350	2.943	-	2.943

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funding remains constant.					
Title: Propulsion Reliability Description: Propulsion Reliability FY 2020 Base Plans: Funding provides development , testing, and qualification of various propulsion reliability improvements aimed at reducing Return to Base events and decreasing propulsion related aircraft mishaps. FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to initiating a propulsion reliability improvement program.	-	-	6.900	-	6.900
Title: FY2019 SBIR STTR Transfer Description: SBIR STTR Transfer FY 2019 Plans: SBIR STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: Increase to SBIR STTR transfer.	-	0.648	-	-	-
Accomplishments/Planned Programs Subtotals	34.228	17.684	16.486	-	16.486

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• A00005: MQ-1 UAV	224.506	163.326	0.000	54.000	54.000	54.000	-	-	-	0.000	495.832
• AA6601: Gray Eagle Mods2	74.291	129.781	14.699	-	14.699	14.089	1.662	1.548	1.495	Continuing	Continuing
• 0305219A: MQ-1 Gray Eagle UAV	10.531	-	0.000	-	0.000	-	-	-	-	0.000	10.531

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

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019

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
--	---	---

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.

The RDTE funded elements for GPS Denied, Alternate Munitions Integration, Survivability, and Propulsion Reliability addressed in this submission are planned for award on the Gray Eagle Technical Services contract as a Technical Services Memorandum (TSM) task order, and as Military Interdepartmental Purchase Requisitions (MIPRs) to various other Government Agencies. The purpose of the TSMs are to mature the respective designs to a level that Engineering Change Requests (ECR) are submitted to the Government via the Configuration Control Board (CCB). Following successful completion of the TSM and CCB approval, a contract modification to retrofit and/or cut-in the respective engineering change will be awarded on the appropriate Performance Based Logistics (PBL) or production contract.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0203744A / Aircraft Modifications/ Product Improvement Programs				EB6 / MQ-1C Gray Eagle MODS							
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY2019 SBIR/STTR Transfer	TBD	HQDA : Washington D.C	-	-		0.648	Jan 2019	-		-		-	0.000	0.648	-
Subtotal			-	-		0.648		-		-		-	0.000	0.648	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Global Positioning System (GPS) Denied	SS/CPFF	General Atomics/ ASI : San Diego, CA	2.741	3.917	May 2018	4.000	Mar 2019	4.000	Jan 2020	-		4.000	Continuing	Continuing	-
Universal Ground Control Station (UGCS) Improvements	SS/CPFF	General Atomics/ ASI : San Diego, CA	7.825	7.454	Aug 2018	-		-		-		-	0.000	15.279	-
Alternate Munitions Integration	SS/CPFF	General Atomics-ASI : Poway, CA	8.577	10.029	Jan 2018	3.452	Mar 2019	2.643	Jan 2020	-		2.643	0.000	24.701	-
Ground Base Sense and Avoid Block II	SS/CPFF	Various : Various	10.688	8.330	Oct 2017	6.699	Oct 2018	-		-		-	0.000	25.717	-
Survivability	MIPR	Various : Various	-	0.148	Apr 2018	2.350	Mar 2019	2.943	Nov 2019	-		2.943	Continuing	Continuing	-
Propulsion Reliability	SS/CPFF	General Atomics/ ASI : San Diego, CA	-	-		-		6.900	Mar 2020	-		6.900	Continuing	Continuing	-
Subtotal			29.831	29.878		16.501		16.486		-		16.486	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support - GBSAA	MIPR	Various : Various	2.163	-		-		-		-		-	0.000	2.163	-
Subtotal			2.163	-		-		-		-		-	0.000	2.163	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Engineering and Manufacturing Development - GBSAA	[Redacted]				[Redacted]																							
Alternate Munitions Integration	[Redacted]				[Redacted]																							
Universal Ground Control Station Improvements	[Redacted]				[Redacted]																							
Global Positioning System Denied	[Redacted]				[Redacted]																							
Engineering and Software Development - MQ-1 Gray Eagle	[Redacted]				[Redacted]																							
Engineering and Software Development - GBSAA	[Redacted]				[Redacted]																							
Training Development and Software/System Testing - MQ-1 Gray Eagle	[Redacted]				[Redacted]																							
Critical Design Review - GBSAA	[Redacted]				[Redacted]																							
Training Development and Software/System Testing - GBSAA	[Redacted]				[Redacted]																							
Materiel Release - GBSAA	[Redacted]				[Redacted]																							
Survivability	[Redacted]				[Redacted]																							
First Unit Equipped - GBSAA	[Redacted]				[Redacted]																							
Propulsion Reliability	[Redacted]				[Redacted]								[Redacted]															

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

Events	Start		End	
	Quarter	Year	Quarter	Year
Engineering and Manufacturing Development - GBSAA	4	2017	2	2018
Alternate Munitions Integration	2	2017	4	2021
Universal Ground Control Station Improvements	2	2017	4	2018
Global Positioning System Denied	2	2017	4	2024
Engineering and Software Development - MQ-1 Gray Eagle	2	2017	4	2024
Engineering and Software Development - GBSAA	1	2018	1	2019
Training Development and Software/System Testing - MQ-1 Gray Eagle	3	2017	4	2024
Critical Design Review - GBSAA	3	2018	3	2018
Training Development and Software/System Testing- GBSAA	4	2018	4	2019
Materiel Release - GBSAA	4	2018	4	2019
Survivability	2	2018	4	2024
First Unit Equipped - GBSAA	4	2019	4	2019
Propulsion Reliability	2	2020	4	2021

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203752A / <i>Aircraft Engine Component Improvement Program</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.139	0.146	0.144	-	0.144	0.145	0.145	0.145	0.145	0.000	1.009
106: <i>A/C Compon Improv Prog</i>	-	0.139	0.146	0.144	-	0.144	0.145	0.145	0.145	0.145	0.000	1.009

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.145	0.146	0.144	-	0.144
Current President's Budget	0.139	0.146	0.144	-	0.144
Total Adjustments	-0.006	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.006	-			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
106: A/C Compon Improv Prog	-	0.139	0.146	0.144	-	0.144	0.145	0.145	0.145	0.145	0.000	1.009
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 2018	FY 2019	FY 2020
<p>Title: UAV Engine</p> <p>Description: UAV Gray Eagle Engine Investigation at U.S. Army Research Laboratory (ARL) Vehicle Technology Directorate (VTD) at Aberdeen Proving Ground, MD. Provide research to support airworthiness, reliability and performance improvements of UAV engines. Investigate and research the technology challenges (i.e. engine performance, engine durability, engine life, and engine modifications) for reliable engine operation using JP-8 fuel and readily available MIL-spec lubricants.</p> <p>FY 2019 Plans: Continue to research improvements to address service related deficiencies to improve safety and reduce O&S Costs.</p> <p>FY 2020 Plans: Will continue to research improvements to address service related deficiencies to improve safety and reduce O&S Costs.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease to FY 2020 funding due to economic adjustment.</p>	0.079	0.086	0.084
<p>Title: In-House Support</p> <p>Description: In-house support for the CIP engineers. Contracting support for CIP contracts.</p> <p>FY 2019 Plans: Continue to provide in-house engineering support for engine CIP programs.</p> <p>FY 2020 Plans: Will continue to provide in-house engineering support for UAV engine CIP programs.</p>	0.060	0.060	0.060
Accomplishments/Planned Programs Subtotals	0.139	0.146	0.144

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0203752A / Aircraft Engine Component Improvement Program				106 / A/C Compon Improv Prog							
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
In-house Engineering	Allot	US Army AMRDEC : Redstone Arsenal, AL	2.890	0.060	Sep 2018	0.060	Oct 2018	0.060	Oct 2019	-		0.060	Continuing	Continuing	Continuing
Subtotal			2.890	0.060		0.060		0.060		-		0.060	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	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
UAV Engine	Various	ARL-Vehicle Technology Directorate : TBD	0.933	0.079	Sep 2018	0.086	Sep 2019	0.084	Sep 2020	-		0.084	Continuing	Continuing	Continuing
APU's	SS/IDIQ	Air Force : Hill AFB, UT	2.319	-		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			108.839	0.079		0.086		0.084		-		0.084	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
T-62T-2B Vibration Test	Various	Redstone Technical Text Center : Redstone Arsenal, AL	0.050	-		-		-		-		-	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
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	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
UAV Shadow Engine																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

Events	Start		End	
	Quarter	Year	Quarter	Year
T700 Engine Spit Pit Testing	1	2011	4	2012
T700 Engine Temperature Survey	2	2014	4	2015
T55 Engine 1553 Engine Control Unit (ECU)	2	2012	1	2013
T55 Engine N1 Drive Line Redesign	1	2010	4	2012
T55 Engine ECU Block Upgrade	2	2013	4	2015
Auxiliary Power Units (APUs)	1	2014	4	2015
UAV Shadow Engine	2	2014	4	2024
T700 CSI Update	1	2017	4	2017

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0203758A / Digitization
--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	4.611	6.308	5.270	-	5.270	4.520	4.200	4.200	4.200	0.000	33.309
374: HOR Battlefield Digitizn	-	4.611	6.308	5.270	-	5.270	4.520	4.200	4.200	4.200	0.000	33.309

A. Mission Description and Budget Item Justification

Army Futures Command provides a unique opportunity and a corresponding requirement to fully integrate and synchronize decision support data from across the modernization domain including key processes such as requirements (JCIDS / CARDS), resource programming (PPBE / AE2S and cProbe), Force Management (BOIP Development/FMS/AOS Data) synchronization will ensure an on demand Structure and Composition System (SACS) File, capability to plan, project, and in the current year see and understand equipment demand changes and respond efficiency. Synchronization and integration of FM systems (requirements) with AE2S (Resources) will enable this. This is also key enabler of Dynamic Force Employment as outlined in the 2019 National Defense Strategy. Acquisition (ACWS), financial execution (GFEBs) and systems sustainment (AESIP/ LIW). The major efforts included in the program element are: 1) Integration and synchronization of the Army's interoperability efforts; between joint and multi-national forces, combat materiel, and training efforts. 2) Systems engineering and integration of programmed and prioritized force structure data to digitize the modernization life-cycle from requirements, through PPBE, to divestiture. 3) Further develop Army Equipping Enterprise System (AE2S) to support the Army Modernization enterprise to include Army Futures Command and other Headquarters elements.

Digitization efforts are in support of the Army Equipping Strategy, National Defense Authorization Act 804, and OSD reports to Congress.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	4.803	6.316	6.020	-	6.020
Current President's Budget	4.611	6.308	5.270	-	5.270
Total Adjustments	-0.192	-0.008	-0.750	-	-0.750
• Congressional General Reductions	-0.004	-0.008			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.188	-			
• Adjustments to Budget Years	-	-	-0.750	-	-0.750

Change Summary Explanation

The FY 2020 funding request for Army Digitization was reduced to support other Army requirements.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203758A / Digitization				Project (Number/Name) 374 / HOR Battlefield Digitizn			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
374: HOR Battlefield Digitizn	-	4.611	6.308	5.270	-	5.270	4.520	4.200	4.200	4.200	0.000	33.309
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project allows the Army to further develop improved business practices as it relates to automation, transparency, and auditability, and collaboration. This project includes the funding of ongoing improvement to the Army Equipping Enterprise System (AE2S). AE2S provides the Army staff the ability to execute its planning, programming, budget, and execution (PPBE) mission as it pertains to equipment procurement and fielding. AE2S aggregates authoritative data from multiple Army databases to provide a common operating picture for the Army staff to use in developing funding and fielding solutions for the Army's equipment. It is the tool that Army senior leaders use to develop, review, and approve equipment funding positions. It is used extensively to answer congressional inquiries regarding equipment funding, unit on-hand quantities, projected fielding, and Transparency. This project allows the Army to improve its data architecture and software across systems in order to ensure accurate data is presented appropriately within AE2S. Additionally, this program element funds various Federally Funded Research and Development Center (FFRDC) projects that provide system engineering expertise to provide unbiased advice, formulate course of actions, analyze programs and make technical support and process recommendations to create efficiencies and improve systems. Specifically, these FFRDC projects support financial system and process improvement, equipment management and data visualization, equipment fill projections and automation recommendations. Funding provides independent technical analysis, special studies, and acquisition process improvement. In accordance with the National Defense Authorization Act (NDAA) 804 and support of the Office of the Secretary of Defense's (OSD) report to Congress, the Army is poised to implement an incremental approach to software development and hardware/software capability integration. This process will improve effectiveness in the management of resources, synchronization of programs and improve the auditability of funding to equipment delivery improving transparency and predictability in the equipping process.

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

	FY 2018	FY 2019	FY 2020
Title: Interoperability and Integration	0.781	1.095	0.914
Description: Funds are to be used for the following efforts			
FY 2019 Plans: Continue to conduct independent analyses of Army, joint, and multinational interfaces, adherence to standards, implementation profiles and interoperability baselines			
FY 2020 Plans: FFRDC contractor will continue conduct independent analyses of Army, joint, and multinational interfaces, adherence to standards, implementation profiles and interoperability baselines			
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease from FY 2019 to FY 2020 due to variances in scope of planned accomplishments.			
Title: Operational Capability Analysis and Evaluation	0.825	1.158	0.966

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / Digitization	Project (Number/Name) 374 / HOR Battlefield Digitizn

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: Funds are to be used for the following efforts</p> <p>FY 2019 Plans: Continue to conduct iterative capability analyses and assessments consistent with CJCSI 3170 (JCIDS) and 6212 (Net Readiness) to ensure Army and joint program technical and operational requirements are consistent. Efforts support army and joint initiatives.</p> <p>FY 2020 Plans: FFRDC contractor will continue to conduct iterative capability analyses and assessments consistent with CJCSI 3170 (JCIDS) and 6212 (Net Readiness) to ensure Army and joint program technical and operational requirements are consistent. Efforts support Army and joint initiatives.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease from FY 2019 to FY 2020 due to variances in scope of planned accomplishments.</p>			
<p>Title: Systems Architecture Development</p> <p>Description: Funds are to be used for the following efforts</p> <p>FY 2019 Plans: Continue to conduct broad concept studies with emphasis on interoperability and joint/coalition operations.</p> <p>FY 2020 Plans: FFRDC contractor will continue to conduct broad concept studies with emphasis on interoperability and joint/coalition operations.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease from FY 2019 to FY 2020 due to variances in scope of planned accomplishments.</p>	0.674	0.945	0.783
<p>Title: AE2S Software</p> <p>Description: Procures AE2S software integration and enhancements for the single program language, single platform system that incorporates FDIIS, CEaVa, COP and AFM.</p> <p>FY 2019 Plans: Continue to integrate existing code-base for FDIIS, AFM and FDKC to reduce overall cost and maintenance footprint and incorporate the development of new applications to satisfy Long-Range Investment Requirements Analysis (LIRA), Sustainment Program Evaluation Group (SS PEG), and Equipping PEG (EE PEG) Manpower.</p> <p>FY 2020 Plans:</p>	1.658	1.684	1.684

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / Digitization	Project (Number/Name) 374 / HOR Battlefield Digitizn		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Will continue to integrate existing code-base for FDIIS, AFM and FDKC to reduce overall cost and maintenance footprint and incorporate the development of new applications to satisfy Strategic Portfolio Analysis Review (SPAR), Sustainment Program Evaluation Group (SS PEG), and Equipping PEG (EE PEG) Manpower.				
<p>Title: Technical Reviews and Technical Performance Analysis</p> <p>Description: Funds are to be used for the following efforts</p> <p>FY 2019 Plans: 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.</p> <p>FY 2020 Plans: FFRDC 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.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease from FY 2019 to FY 2020 due to variances in scope of planned accomplishments.</p>		0.673	0.944	0.783
<p>Title: Academic Research</p> <p>Description: Apply university academic and research resources to the integration of Army complex modeling, simulation, and training in support of modernized forces.</p> <p>FY 2019 Plans: Apply university academic and research resources to the integration of Army complex modeling, simulation, and training in support of modernized forces.</p> <p>FY 2020 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.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease from FY 2019 to FY 2020 due to variances in scope of planned accomplishments.</p>		-	0.251	0.140
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>Description: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 Plans:</p>		-	0.231	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / <i>Digitization</i>	Project (Number/Name) 374 / <i>HOR Battlefield Digitizn</i>
--	---	---

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
FY 2019 SBIR / STTR Transfer			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2019 SBIR / STTR Transfer			
Accomplishments/Planned Programs Subtotals	4.611	6.308	5.270

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

N/A

Remarks

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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / Digitization	Project (Number/Name) 374 / HOR Battlefield Digitizn
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Digitization Technical Integration	Various	Various : Various	5.556	-		-		-		-		-	0.000	5.556	-
Joint & Coalition Interoperability	Various	Various : Various	5.091	-		-		-		-		-	0.000	5.091	-
Subtotal			10.647	-		-		-		-		-	0.000	10.647	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Army Equipping Enterprise SYstem (AE2S) Software	C/CPFF	TBD : TBD	6.939	1.658		1.684		1.684		-		1.684	Continuing	Continuing	Continuing
Cross-Platform Development	Various	TBD : TBD	3.605	-		-		-		-		-	0.000	3.605	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.231		-		-		-	0.000	0.231	-
Subtotal			10.544	1.658		1.915		1.684		-		1.684	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Interoperability and Integration	Various	Various : Various	6.215	0.781		1.095		0.914		-		0.914	0.000	9.005	-
Operational Capability Analysis and Evaluation	Various	VAR : VAR	5.447	0.825		1.158		0.966		-		0.966	0.000	8.396	-
Academic Research	Various	Various : Various	3.231	-		0.251		0.140		-		0.140	0.000	3.622	-
Operational Capability Analysis and Evaluation	Various	Various : Various	5.608	-		-		-		-		-	0.000	5.608	-
Systems Architecture Development	Various	VAR : VAR	5.167	0.674		0.945		0.783		-		0.783	0.000	7.569	-

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / Digitization	Project (Number/Name) 374 / HOR Battlefield Digitizn
--	--	--

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Interoperability and Integration																												
Operational Capability Analysis and Evaluation																												
Systems Architecture Development 3.0																												
Systems Architecture Development 4.0																												
Systems Architecture Development 5.0																												
Army Equipping Enterprise System (AE2S) Software SW 3.0																												
Army Equipping Enterprise System (AE2S) Software SW 4.0																												
Army Equipping Enterprise System (AE2S) Software SW 5.0																												
Technical Reviews and Technical Performance Analysis																												
Academic Research																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203758A / Digitization	Project (Number/Name) 374 / HOR Battlefield Digitizn
--	--	--

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Interoperability and Integration	1	2016	4	2023
Operational Capability Analysis and Evaluation	1	2016	4	2022
Systems Architecture Development 1.0	2	2015	2	2016
Systems Architecture Development 2.0	3	2016	3	2017
Systems Architecture Development 3.0	4	2017	4	2018
Systems Architecture Development 4.0	1	2019	1	2020
Systems Architecture Development 5.0	2	2020	4	2021
Army Equipping Enterprise System (AE2S) Software SW 1.0	2	2015	2	2016
Army Equipping Enterprise System (AE2S) Software SW 2.0	3	2016	3	2017
Army Equipping Enterprise System (AE2S) Software SW 3.0	4	2017	4	2018
Army Equipping Enterprise System (AE2S) Software SW 4.0	1	2019	1	2020
Army Equipping Enterprise System (AE2S) Software SW 5.0	2	2020	4	2021
Technical Reviews and Technical Performance Analysis	1	2015	4	2022
Academic Research	3	2015	4	2022

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	43.615	3.641	1.287	-	1.287	1.289	0.128	1.500	1.500	0.000	52.960
038: <i>Avenger PIP</i>	-	2.615	3.641	1.287	-	1.287	1.289	0.128	1.500	1.500	0.000	11.960
DT5: <i>Stinger Product Improvement</i>	-	41.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	41.000

A. Mission Description and Budget Item Justification

The Avenger Air Defense System is a lightweight, ground-to-air missile and gun weapon system mounted on a High Mobility Multi-purpose Wheeled Vehicle. The Avenger's mission is to protect fixed critical assets and Corps/Echelons above Corps Maneuver forces from Fixed Wing (FW) Aircraft, Rotary Wing (RW) Aircraft, Unmanned Aircraft Systems (UAS) and Cruise Missiles (CM). Avenger provides day/night adverse weather operations, shoot on the move capability, rapid target engagement, and remote firing capability.

The Avenger Modification - Service Life Extension Program (MOD-SLEP) consists of Project 038: Avenger Production Improvement Program (PIP) and Program Element CE8710: Avenger MODS. FY 2020 funding of \$1.287 million ensures that Avenger is viable and sustainable through the end of program life. Avenger MOD-SLEP maintains operational capability of Avenger until FY 2031.

The Stinger missile is an advanced, fire-and-forget, short-range, man-portable, shoulder-fired and platform mounted guided missile that provides the maneuver force and point defense assets air defense protection. Stinger's mission is to provide the force with low-altitude air defense against FW, RW, UAS and CM. The Stinger missile is deployable from a variety of platforms that includes vehicles, helicopters, UAS and Man Portable Air Defense System (MANPADS). The missile is delivered as a certified round and requires no field testing or maintenance.

Stinger Product Improvement completes the design, development, test and integration of the Proximity Fuze (PROX) and addresses obsolescence. This will make PROX available for incorporation into the existing Stinger Block I missile. The PROX will improve effectiveness by eliminating the need for a hit-to-kill against UAS threats. UAS defense is a requirement of the Operational Requirements Document (ORD) for the Stinger Guided Missile System and validated by the Deputy Chief of Staff, G-3/5/7, Current and Future Warfighting Capabilities Division (DAMO-CIC) in a memo dated 28 May 2013.

Stinger Product Improvement also includes the following efforts: redesign of Stinger missile components to address obsolescence and improve performance; integration of the Javelin Lightweight Command Launch Unit (CLU) onto the Stinger MANPADS to improve target acquisition capabilities; and redesign of Stinger Training Aids, Devices, Simulators and Simulations (TADSS) to address obsolescence.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0203801A / Missile/Air Defense Product Improvement Program
--	---

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	17.723	3.643	1.287	-	1.287
Current President's Budget	43.615	3.641	1.287	-	1.287
Total Adjustments	25.892	-0.002	0.000	-	0.000
• Congressional General Reductions	-0.002	-0.002			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	26.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.106	-			

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

Project: DT5: Stinger Product Improvement

Congressional Add: Stinger Component Redesign, Integrate Javelin CLU with MANPADS, TADSS

Congressional Add Subtotals for Project: DT5

Congressional Add Totals for all Projects

	FY 2018	FY 2019
	26.000	-
	26.000	-
	26.000	-

Change Summary Explanation

The FY 2018 increase of \$25.892 million is a \$26.000 million Congressional Add titled "Stinger PIP Congressional Add" with a reduction for the SBIR/STTR transfer.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	Project (Number/Name) 038 / <i>Avenger PIP</i>
--	--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
038: <i>Avenger PIP</i>	-	2.615	3.641	1.287	-	1.287	1.289	0.128	1.500	1.500	0.000	11.960
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Avenger Air Defense System is a lightweight, ground-to-air missile and gun weapon system mounted on a High Mobility Multi-purpose Wheeled Vehicle. The Avenger's mission is to protect fixed critical assets and Corps/Echelons above Corps Maneuver forces from Fixed Wing (FW) Aircraft, Rotary Wing (RW) Aircraft, Unmanned Aircraft Systems (UAS) and Cruise Missiles (CM). Avenger provides day/night adverse weather operations, shoot on the move capability, rapid target engagement, and remote firing capability.

Avenger PIP consists of the ongoing Avenger Modification - Service Life Extension Program (MOD-SLEP). Avenger MOD-SLEP provides development and testing of six key components to ensure Avenger maintains operational capability through FY 2031. The six components are: Targeting Console (TC), .50 Caliber Machine Gun (M3P), Avenger Fire Control Computer (AFCC), Mode 5 Identification Friend or Foe (IFF), Vehicle Internal Communications (VIC-5) and the Environmental Control Unit/Prime Power Unit (ECU/PPU) governor and starter.

FY 2020 Base dollars in the amount of \$1.287 million supports activities to ensure the Avenger is viable and sustainable through FY 2031. The funding will complete the Materiel Release package for the AFCC, IFF, VIC-5 and ECU/PPU governor and starter.

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

Title: Avenger MOD-SLEP

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 2019 Plans:

Complete test requirements and initiate Materiel Release package.

FY 2020 Base Plans:

Funding will complete the Materiel Release package for MOD-SLEP. This effort's funding will be executed by Program Executive Office Missiles & Space.

FY 2019 to FY 2020 Increase/Decrease Statement:

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	2.615	3.588	1.287	-	1.287

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	Project (Number/Name) 038 / <i>Avenger PIP</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Decrease from FY 2019 to FY 2020 is due to the completion of testing in FY 2019.					
Title: FY 2019 SBIR / STTR Transfer	-	0.053	-	-	-
FY 2019 Plans: FY 2019 SBIR / STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	2.615	3.641	1.287	-	1.287

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• CE8710: AVENGER MODS	62.931	31.093	0.000	14.107	14.107	13.958	11.394	-	-	0.000	133.483

Remarks
The 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, the M3P machine gun, and the ECU/PPU governor and starter. The M3P machine gun and the ECU/PPU governor will be fielded through attrition. The other MOD-SLEP Phase II components will be installed in the field as a single installation package.

E. Performance Metrics
N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	Project (Number/Name) 038 / <i>Avenger PIP</i>
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Avenger Modification Management Services	Various	Various : Redstone Arsenal, AL	1.006	0.673	Jul 2018	0.164	Nov 2018	0.187	Oct 2019	-		0.187	0.540	2.570	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.053		-		-		-	0.000	0.053	-
Subtotal			1.006	0.673		0.217		0.187		-		0.187	0.540	2.623	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Avenger Modification Product Development	PO	Raytheon, The Boeing Company and others : Aberdeen Proving Grounds, MD and Huntsville, AL	7.698	0.602	Jul 2018	1.945	Nov 2018	0.512	Oct 2019	-		0.512	2.227	12.984	-
Subtotal			7.698	0.602		1.945		0.512		-		0.512	2.227	12.984	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Avenger Modification Test Support	Various	The Boeing Company, Aviation and Missile Research Development and Engineering Center (AMRDEC) and others : Huntsville, AL and Redstone Arsenal, AL	4.167	1.340	Jul 2018	1.479	Oct 2018	0.588	Oct 2019	-		0.588	1.650	9.224	-
Subtotal			4.167	1.340		1.479		0.588		-		0.588	1.650	9.224	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	Project (Number/Name) 038 / <i>Avenger PIP</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Integration and Testing (MOD-SLEP Phase II)	System Integration and Testing																											
Live Fire Testing (MOD-SLEP Phase II)					Flight Test																							
Logistics Demo (MOD-SLEP Phase II)					Log Demo																							
Materiel Release (MOD-SLEP Phase II)									Materiel Release																			
Future Modifications to Address Evolving Threat									Evolving Threat Mods																			

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	Project (Number/Name) 038 / <i>Avenger PIP</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integration and Testing (MOD-SLEP Phase II)	2	2018	1	2019
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)	4	2020	4	2020
Future Modifications to Address Evolving Threat	1	2020	4	2024

Note

MOD-SLEP Phase II components are the AFCC, IFF, VIC-5, M3P machine gun, and ECU/PPU governor and starter.
 AFCC: Avenger Fire Control Computer
 ECU/PPU: Environmental Control Unit/Prime Power Unit
 IFF: Identification Friend or Foe
 MOD-SLEP: Modification - Service Life Extension Program
 VIC: Vehicle Internal Communications

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>				Project (Number/Name) DT5 / <i>Stinger Product Improvement</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DT5: <i>Stinger Product Improvement</i>	-	41.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	41.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Stinger missile is an advanced, fire-and-forget, short-range, man-portable, shoulder-fired and platform mounted guided missile that provides the maneuver force and point defense assets air defense protection. Stinger's mission is to provide the force with low-altitude air defense against Fixed Wing (FW) and Rotary Wing (RW) Aircraft, Unmanned Aircraft Systems (UAS) and Cruise Missiles (CM). The Stinger missile is deployable from a variety of platforms that includes vehicles, helicopters, UAS and Man Portable Air Defense System (MANPADS). The missile is delivered as a certified round and requires no field testing or maintenance.

Stinger Product Improvement completes the design, development, test and integration of the Proximity Fuze (PROX) and addresses obsolescence. This will make PROX available for incorporation into the existing Stinger Block I missile. The PROX will improve effectiveness by eliminating the need for a hit-to-kill against UAS threats. UAS defense is a requirement of the Operational Requirements Document (ORD) for the Stinger Guided Missile System and validated by the Deputy Chief of Staff, G-3/5/7, Current and Future Warfighting Capabilities Division (DAMO-CIC) in a memo dated 28 May 2013.

Stinger Product Improvement also provides for the following efforts: redesign of Stinger missile components to address obsolescence and improve performance; integration of the Javelin Lightweight Command Launch Unit (CLU) with the Stinger MANPADS to improve target acquisition capabilities; and redesign of Stinger Training Aids, Devices, Simulators and Simulations (TADSS) to address obsolescence.

Stinger Product Improvement does not have FY 2020 funding.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: PROX Development, Test and Integration	15.000	-	-	-	-
Description: Development, test and integration of the PROX which will be incorporated into existing Stinger Block I missiles during Stinger SLEP.					
Accomplishments/Planned Programs Subtotals	15.000	-	-	-	-
	FY 2018	FY 2019			
Congressional Add: Stinger Component Redesign, Integrate Javelin CLU with MANPADS, TADSS	26.000	-			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	Project (Number/Name) DT5 / <i>Stinger Product Improvement</i>

	FY 2018	FY 2019
FY 2018 Accomplishments: Stinger Component Redesign, Integrate Javelin CLU with MANPADS, TADSS		
Congressional Adds Subtotals	26.000	-

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• C21300: <i>STINGER</i> <i>BLK I UPGRADES</i>	83.061	94.756	0.000	89.115	89.115	1.457	3.072	-	-	0.000	271.461

Remarks

Stinger Block 1 Upgrades program (Procurement) C21300 provides for SLEP of Stinger Block I missiles and the addition of the PROX.

D. Acquisition Strategy

In FY 2012, the Stinger Based Systems (SBS) Product Office utilized Picatinny Arsenal to award the PROX development contract for the design, development, test and integration of the PROX capability. This capability will be incorporated into the existing Stinger Block I missile SLEP.

Using FY 2018 funds, the SBS Product Office utilizes an Other Transactional Authority (OTA) with Defense Ordnance Technology Consortium (DOT-C) for the redesign of Stinger missile components to address obsolescence. The SBS Product Office used an existing contract through Joint Attack Munitions Systems (JAMS) Project Office for the Javelin Lightweight CLU integration. The SBS Product Office used the existing Stinger Engineering Services contract to redesign TADSS to address obsolescence.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	Project (Number/Name) DT5 / <i>Stinger Product Improvement</i>
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Mgt/Admin	Various	Trident, Intuitive Research and others : Redstone Arsenal, AL	0.981	5.126	Jul 2018	-		-		-		-	0.000	6.107	-
Subtotal			0.981	5.126		-		-		-		-	0.000	6.107	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Proximity Fuze (PROX) Development and Integration	Various	Aviation and Missiles Research Development and Engineering Center, Redstone Test Center and others : Redstone Arsenal, AL	22.977	-		-		-		-		-	0.000	22.977	-
Stinger Component Redesign	C/CPAF	Defense Ordnance Technology Consortium (DOTC) (Raytheon Missile Systems) : Tuscon, AZ	-	15.000	Jan 2019	-		-		-		-	0.000	15.000	-
Javelin Lightweight Command Launch Unit (CLU)	Option/FFP	Raytheon/Lockheed Martin Javelin Joint Venture : Tucson, AZ	-	4.991	Jul 2018	-		-		-		-	0.000	4.991	-
Javelin Lightweight CLU (AMRDEC)	C/CPAF	DOTC : TBD	-	2.000	Jul 2018	-		-		-		-	0.000	2.000	-
Stinger Engineering Services (includes TADSS redesign)	SS/IDIQ	Raytheon Missile Systems : Tuscon, AZ	-	4.968	Jan 2018	-		-		-		-	0.000	4.968	-
Subtotal			22.977	26.959		-		-		-		-	0.000	49.936	N/A

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203801A / <i>Missile/Air Defense Product Improvement Program</i>	Project (Number/Name) DT5 / <i>Stinger Product Improvement</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Proximity Fuze (PROX) Test	4	2017	1	2020
PROX Urgent Materiel Release (UMR)	3	2019	3	2019
Stinger Missile Component Redesign	4	2018	3	2020

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203802A / <i>Other Missile Product Improvement Programs</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	4.800	4.941	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.741
788: <i>ATACMS PIP</i>	-	4.800	4.941	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.741

Program MDAP/MAIS Code: PRE

A. Mission Description and Budget Item Justification

Army Tactical Missile System (ATACMS) is the United States (U.S.) Army's primary all-weather, surface-to-surface long-range artillery precision guided missile used by Combatant Commanders to shape the battlefield with long-range fires against hard & soft targets in open, complex, and urban environments.

788: ATACMS Product Improvement Program (PIP) focuses on safety, cost reduction, reliability, deficiency corrections, standardization, and new or improved operational capabilities. There is no funding in FY 2020.

<u>B. Program Change Summary (\$ in Millions)</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	5.000	4.947	4.943	-	4.943
Current President's Budget	4.800	4.941	0.000	-	0.000
Total Adjustments	-0.200	-0.006	-4.943	-	-4.943
• Congressional General Reductions	-0.004	-0.006			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.196	-			
• Adjustments to Budget Years	-	-	-4.943	-	-4.943

Change Summary Explanation

FY 2020 funding change is due to completion of ATACMS PIP (PE 0203802A, Project #: 788).

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / Other Missile Product Improvement Programs	Project (Number/Name) 788 / ATACMS PIP
--	--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
788: ATACMS PIP	-	4.800	4.941	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	9.741
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

ATACMS Product Improvement Program (PIP) focuses on safety, cost reduction, reliability, deficiency corrections, standardization, and new or improved operational capabilities. There is no funding in FY 2020.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Improvement Program (PIP) Activities	4.800	4.760	-	-	-
Description: PIP focuses on safety, cost reduction, reliability, deficiency corrections, standardization, and new or improved operational capabilities for ATACMS.					
FY 2019 Plans: Complete Height-of-Burst capability testing and activities for production cut-in and fielding, GPS M-code study and prototyping, Insensitive Munitions study, Cost Reduction study, and flight test support/equipment.					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 is the last year of funding.					
Title: FY 2019 SBIR / STTR Transfer	-	0.181	-	-	-
Description: FY 2019 SBIR / STTR Transfer					
FY 2019 Plans: FY 2019 SBIR / STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	4.800	4.941	-	-	-

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• CA6700: ATACMS MODS	337.440	397.236	0.000	85.320	85.320	282.791	233.510	105.500	106.555	0.000	1,548.352

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / <i>Other Missile Product Improvement Programs</i>	Project (Number/Name) 788 / <i>ATACMS PIP</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

Remarks
CA6700 is the ATACMS Mods procurement funding line.

D. Acquisition Strategy
After successful OT and DOT&E approval is received for the height-of-burst capability, a proximity sensor will be inserted into the ongoing ATACMS SLEP production. Future improvements, such as M-code and other capabilities, will be inserted into future production once those technologies are matured, tested, and approved for fielding.

E. Performance Metrics
N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / Other Missile Product Improvement Programs	Project (Number/Name) 788 / ATACMS PIP
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	MIPR	AMRDEC : RSA	-	0.300	Nov 2017	0.250	Nov 2018	-		-		-	0.000	0.550	-
Subtotal			-	0.300		0.250		-		-		-	0.000	0.550	N/A

Remarks
AMRDEC - U.S Army Research, Development and Engineering Command; RSA - Redstone Arsenal, Alabama

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Studies	Various	Various : Various	-	-		1.390	Nov 2018	-		-		-	0.000	1.390	-
Prototyping	C/CPFF	LMMFC : Dallas, TX	-	-		1.787	Mar 2019	-		-		-	0.000	1.787	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.181		-		-		-	0.000	0.181	-
Subtotal			-	-		3.358		-		-		-	0.000	3.358	N/A

Remarks
LMMFC - Lockheed Martin Missiles and Fire Control

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support	Various	Various : Various	-	4.500	Jan 2018	1.333	Nov 2018	-		-		-	0.000	5.833	-
Subtotal			-	4.500		1.333		-		-		-	0.000	5.833	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	4.800	4.941	-	-	-	0.000	9.741	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / Other Missile Product Improvement Programs	Project (Number/Name) 788 / ATACMS PIP

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Operational Test Planning & Execution																												
Develop Test & Evaluation Master Plan (TEMP) for Height of																												
HWIL Models & Simulation																												
Conduct Operational Test Flight Preparations & OT Flight Testing																												
Operational Test Reports																												
Prox Sensor Cut-In Decision																												
Insensitive Munitions Study																												
GPS M-Code Study, Qualification & Integration																												
Flight Test Support/Equipment (HWIL, Flight Termination Systems, Modeling & Sim)																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203802A / <i>Other Missile Product Improvement Programs</i>	Project (Number/Name) 788 / <i>ATACMS PIP</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Operational Test Planning & Execution	1	2018	1	2019
Develop Test & Evaluation Master Plan (TEMP) for Height of Burst	1	2018	2	2018
HWIL Models & Simulation	2	2018	3	2018
Conduct Operational Test Flight Preparations & OT Flight Testing	2	2018	3	2018
Operational Test Reports	4	2018	4	2018
Prox Sensor Cut-In Decision	2	2019	2	2019
Insensitive Munitions Study	1	2019	4	2019
GPS M-Code Study, Qualification & Integration	1	2019	4	2019
Flight Test Support/Equipment (HWIL, Flight Termination Systems, Modeling & Sim)	1	2019	4	2019

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0203808A / <i>TRACTOR CARD</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	37.883	34.050	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	71.933
DS1: <i>TRACTOR BARN</i>	-	6.000	13.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.000
DS2: <i>Tractor Puma</i>	-	16.532	5.432	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.964
E11: <i>DELL</i>	-	15.351	15.618	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.969

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

B. Program Change Summary (\$ in Millions)

	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	37.883	34.050	21.871	-	21.871
Current President's Budget	37.883	34.050	0.000	-	0.000
Total Adjustments	0.000	0.000	-21.871	-	-21.871
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-21.871	-	-21.871

Change Summary Explanation

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1) in the Special Access Program Annual Report to Congress.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203808A / TRACTOR CARD				Project (Number/Name) DS1 / TRACTOR BARN			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DS1: TRACTOR BARN	-	6.000	13.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	19.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1).

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203808A / TRACTOR CARD				Project (Number/Name) DS2 / Tractor Puma			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DS2: <i>Tractor Puma</i>	-	16.532	5.432	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.964
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1).

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0203808A / TRACTOR CARD				Project (Number/Name) E11 / DELL			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
E11: <i>DELL</i>	-	15.351	15.618	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.969
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This program is reported in accordance with Title 10, United States Code, Section 119(a)(1).

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0205402A / Integrated Base Defense - Operational System Dev
--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	8.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.000
EF2: Integrated Base Defense	-	0.000	8.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.000

Note
Beginning in FY 2017 Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E) funding is under PE0605033A Project EQ3. Beginning in FY 2017 Integrated Ground Security, Surveillance and Response Capability (IGSSR-C) funding is under PE0605029A Project EQ2.

Beginning in FY 2020 Integrated Base Defense (IBD) and Counter Vehicle Borne Improvised Explosive Device (CVBIED) efforts are funded under PE0604785A Project DS4.

A. Mission Description and Budget Item Justification
Integrated Base Defense (IBD): The purpose of IBD Kitting is to harvest and refurbish physical security and Force Protection (FP) Non-Standard Equipment (NS-E) and package them into integrated and interoperable IBD Capabilities. IBD provides integration of software and analytical capability to support the integration of systems in the field. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base and Installation Protection (IUBIP) framework. In support of JUONS 0540 to address the Vehicle Borne Improvised Explosive Device (VBIED) threat. Additional capabilities are being developed and integrated to the current Force Protection structure.

Justification: There is no FY 2020 PB Request.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	8.000	0.000	-	0.000
Current President's Budget	0.000	8.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	Project (Number/Name) EF2 / <i>Integrated Base Defense</i>
--	---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EF2: <i>Integrated Base Defense</i>	-	0.000	8.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
Beginning in FY 2017 Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E) funding is under PE0605033A Project EQ3. Beginning in FY 2017 Integrated Ground Security, Surveillance and Response Capability (IGSSR-C) funding is under PE0605029A Project EQ2.

Beginning in FY 2020 Integrated Base Defense (IBD) / Counter Vehicle Borne Improvised Explosive Device (CVBIED) program funding is under PE0604785A Project DS4.

A. Mission Description and Budget Item Justification
Integrated Base Defense (IBD): The purpose of IBD is to harvest and refurbish physical security and FP Non-Standard Equipment and package them into integrated and interoperable IBD Capabilities. IBD provides integration of software and analytical capability to support the integration of systems in the field. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base and Installation Protection framework. Additionally, IBD is being updated in response to JUONS 0540 to address the Vehicle Borne Improvised Explosive Device (VBIED) threat. These capabilities are being developed and integrated into the current Force Protection infrastructure.

FY 2020: No funding requested.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: IBD JUONS 0540	-	8.000	-	-	-
Description: This funding supports JUONS 0540. This funding is OCO.					
FY 2019 Plans: FY 2019 OCO PB Request in the amount of \$8.000 million supports JUONS 0540 to perform system and sensor improvements to counter the Vehicle Borne Improvised Explosive Device (VBIED) threat.					
FY 2019 to FY 2020 Increase/Decrease Statement: Funds for FY20-24 are budgeted in PE 644785 Project DS4.					
Accomplishments/Planned Programs Subtotals	-	8.000	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	Project (Number/Name) EF2 / <i>Integrated Base Defense</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• M90115: <i>INTEG BASE DEF NONSTAND EQUIP (IBD NS-E) KITTING</i>	25.926	39.200	0.000	47.110	47.110	47.581	24.028	24.028	24.509	0.000	232.382

Remarks

D. Acquisition Strategy

The IBD acquisition strategy is to leverage existing IBD-related government organizations and to competitively award multiple contracts in support of IBD objectives for the development of holistic IBD architectures and products to support interoperability of fielded and emerging IBD-related systems.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205402A / Integrated Base Defense - Operational System Dev	Project (Number/Name) EF2 / Integrated Base Defense
--	--	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
G-BOSS(E) Project Management	MIPR	PM EOIR : Fort Belvoir, VA	0.288	-		-		-		-		-	0.000	0.288	-
IGSSR-C Project Management	MIPR	PM EOIR : Fort Belvoir, VA	0.175	-		-		-		-		-	0.000	0.175	-
IBD Engineering and Management Services	Allot	Joint Project Manager Guardian Joint Product Manager Force Protection Services : Fort Belvoir, VA	0.630	-		-		-		-		-	0.000	0.630	-
JUONS 0540 PMO	TBD	PdM FPS : Fort Belvoir, VA	-	-		0.460	Dec 2018	-		-		-	0.000	0.460	-
Subtotal			1.093	-		0.460		-		-		-	0.000	1.553	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
G-BOSS(E) Design	MIPR	NSWC Crane : Crane, IN	1.985	-		-		-		-		-	0.000	1.985	-
G-BOSS(E) Prototypes	MIPR	RDECOM CERDEC : Fort Belvoir, VA	2.733	-		-		-		-		-	0.000	2.733	-
IGSSR-C Design	C/CPFF	TBD : TBD	2.653	-		-		-		-		-	0.000	2.653	-
IBD Architecture and Software Development	C/CR	AMRDEC : Huntsville, AL	4.985	-		-		-		-		-	0.000	4.985	-
IBD Design and Build	C/CR	AMRDEC : Huntsville, AL	0.750	-		-		-		-		-	0.000	0.750	-
JUONS 0540 integration	C/CR	AMRDEC : Huntsville, AL	-	-		4.040	Jan 2019	-		-		-	0.000	4.040	-
Subtotal			13.106	-		4.040		-		-		-	0.000	17.146	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	Project (Number/Name) EF2 / <i>Integrated Base Defense</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
IBD Development Integration and Testing	[Redacted]				[Redacted]																							
IBD JUONS 540 Integration	[Redacted]				[Redacted]																							
IBD JUONS 540 ATEC Testing					[Redacted]																							

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205402A / <i>Integrated Base Defense - Operational System Dev</i>	Project (Number/Name) EF2 / <i>Integrated Base Defense</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
IBD CONOPS & Architecture	2	2016	1	2017
IBD Development Integration and Testing	3	2017	1	2018
IBD JUONS 540 Integration	1	2017	3	2019
IBD JUONS 540 ATEC Testing	1	2019	4	2019

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0205410A / Materials Handling Equipment
--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	1.519	1.462	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
EE9: Material Handling Equipment - Advance Development	-	1.519	1.462	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program element supports component development and Material Handling Equipment (MHE) prototyping, and stays abreast of emerging and available technologies to be integrated into military MHE to address identified capability gaps and warfighter objectives. This project enables the development of selected technologies and transition to system integration and development or production of MHE products. MHE includes Rough Terrain Forklifts, Rough Terrain Container Handlers (RTCH) and Cranes, as well as ancillary MHE equipment, to support distribution of critical supplies in the theater of operations.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	1.582	1.464	0.743	-	0.743
Current President's Budget	1.519	1.462	0.000	-	0.000
Total Adjustments	-0.063	-0.002	-0.743	-	-0.743
• Congressional General Reductions	-0.001	-0.002			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.062	-			
• Adjustments to Budget Years	-	-	-0.743	-	-0.743

Change Summary Explanation

Funding realigned from 603804A Project G14

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i>			Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i>				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EE9: <i>Material Handling Equipment - Advance Development</i>	-	1.519	1.462	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports component development and Material Handling Equipment (MHE) prototyping and stays abreast of emerging and available technologies to be integrated into military MHE to address identified capability gaps and warfighter objectives. This project enables the development of selected technologies and transition to system integration and development or production of MHE products. MHE includes Rough Terrain Forklifts, Rough Terrain Container Handlers (RTCH) and Cranes, as well as ancillary MHE equipment, to support distribution of critical supplies in the theater of operations.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Robotic Assist on Material Handling Equipment (MHE) Enhancement	0.816	0.530	-	-	-
Description: Integrate and demonstrate Commercial-off-the-Shelf (COTS) technologies to enhance Material Handling Equipment (MHE) operations. System technologies will include obstacle detection, electronic control systems, electric-hydraulic controls, driveline control technology, and work tool automation.					
FY 2019 Plans: Continue to Integrate Commercial-off-the-Shelf (COTS) obstacle detectors, similar to collision sensors, to increase situational awareness of MHE operator. Integrate COTS controllers, similar to gaming devices to enable MHE operator to control machine from outside the cab. Research the integration and replacement of levers with joysticks for improved operator efficiency. Research steering and driving control devices which will allow semi or full autonomous control. Research and integrate COTS technology such as self-aligning forks and boom extension for telescoping boom forklift.					
FY 2019 to FY 2020 Increase/Decrease Statement: No funding received in FY 2020, project will come to an end.					
Title: System Engineering/Program Management	0.456	0.493	-	-	-
Description: Fund for Material Handling Equipment System Engineering and Program Management.					
FY 2019 Plans:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i>	Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Provide funding for Material Handling Equipment System Engineering and Program Management. FY 2019 to FY 2020 Increase/Decrease Statement: No funding received in FY 2020					
Title: Driver Assist Description: Research and demonstrate technologies which would enhance operation such as the inclusion of cameras, collision sensors, and lifting aids. FY 2019 Plans: Integrate COTS cameras, similar to backup cameras, to increase situational awareness of MHE operator. Integrate COTS collision warning sensors to increase situational awareness of MHE operator. Integrate discrete lifting aids to assist rough terrain forklifts with non-pallet lift missions. FY 2019 to FY 2020 Increase/Decrease Statement: No funding received in FY 2020.	-	0.392	-	-	-
Title: Atlas II Enhancement Description: The purpose of the project is to develop and integrate an Automated Material Handling Technology (AMHT) kit for the Army's ATLAS II 10,000 pound capability forklift. This includes the hardware and software necessary for the vehicle to conduct its missions both autonomously and semi-autonomously, and to demonstrate the AMHT kit through a series of tests and obstacle courses that were developed from the vehicle's performance specification and were designed to imitate its mission profile.	0.247	-	-	-	-
Title: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer.	-	0.047	-	-	-
Accomplishments/Planned Programs Subtotals	1.519	1.462	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i>	Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i>

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• G41001: <i>Family Of Forklifts</i>	9.000	12.901	14.864	5.152	20.016	13.564	18.960	20.393	17.162	Continuing	Continuing
• MA4501: <i>MODIFICATION KITS</i>	20.980	25.201	34.587	4.234	38.821	16.407	16.840	16.354	7.393	0.000	141.996

Remarks

D. Acquisition Strategy

Procure prototype component items for engineering tests and demonstrations with subject matter experts. Conduct trades between cost and improved maintainability and environmental risk reduction. Process engineering change proposals, update technical manuals and training materials, and prepare supporting acquisition documents and data to procure new training aids.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0205410A / Materials Handling Equipment				EE9 / Material Handling Equipment - Advance Development							
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Robotic Assist on Material Handling Equipment Enhancement	MIPR	TARDEC : Warren, MI	0.461	0.816	May 2019	0.530	Mar 2019	-		-		-	0.000	1.807	-
Operational Energy Technologies	MIPR	Various : Various	0.143	-		-		-		-		-	0.000	0.143	-
Driver Assist	Various	Various : Various	-	-		0.392	Mar 2019	-		-		-	0.000	0.392	-
Atlas II Enhancement	MIPR	TARDEC : Warren, MI	-	0.247	Jun 2018	-		-		-		-	0.000	0.247	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.047		-		-		-	0.000	0.047	-
Subtotal			0.604	1.063		0.969		-		-		-	0.000	2.636	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering/ Program Management	MIPR	Various : Warren, MI	0.240	0.456	Jan 2019	0.493	Jan 2019	-		-		-	0.000	1.189	-
Subtotal			0.240	0.456		0.493		-		-		-	0.000	1.189	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Lightweight Armor for ATLAS II	Various	Various : Various	0.170	-		-		-		-		-	0.000	0.170	-
Subtotal			0.170	-		-		-		-		-	0.000	0.170	N/A
Project Cost Totals			1.014	1.519		1.462		-		-		-	0.000	3.995	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army							Date: March 2019			
Appropriation/Budget Activity 2040 / 7			R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i>			Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i>				
	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i>	Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i>	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Material Handling Equipment Enhancement (Robotic Assist)																												
Driver Assist																												
System Engineering/Program Management																												
Atlas II Enhancement																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i>	Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Material Handling Equipment Enhancement (Robotic Assist)	2	2019	4	2019
Driver Assist	2	2019	4	2019
System Engineering/Program Management	2	2019	4	2019
Atlas II Enhancement	3	2018	4	2019

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.187	0.249	0.732	-	0.732	0.259	0.265	0.776	0.283	0.000	2.751
EE6: <i>Environmental Information Tech Modernization</i>	-	0.187	0.249	0.732	-	0.732	0.259	0.265	0.776	0.283	0.000	2.751

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.195	0.249	0.732	-	0.732
Current President's Budget	0.187	0.249	0.732	-	0.732
Total Adjustments	-0.008	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.008	-			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>				Project (Number/Name) EE6 / <i>Environmental Information Tech Modernization</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EE6: <i>Environmental Information Tech Modernization</i>	-	0.187	0.249	0.732	-	0.732	0.259	0.265	0.776	0.283	0.000	2.751
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Environmental Information Technology Management (EITM) program includes support for the Defense Environment, Safety & Occupational Health Network and Information Exchange (DENIX) defense business system, as well as its database and reporting application, the Knowledge Based Corporate Reporting System (KBCRS). This request for research, development, test, and evaluation (RDTE) is to implement necessary enhancements to facilitate DENIX's Platform-as-a-Service (PaaS) capabilities, with additional modernizations that will improve the DoD's ESOH system of record and reporting tool set. This also includes upgrades to incorporate ongoing cybersecurity, cloud computing, and other information technology requirements.

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

	FY 2018	FY 2019	FY 2020
Title: Environmental Information Technology Modernization	0.187	0.249	0.732
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 2019 Plans: Upon completing the BCAC process via CMO approval of Part 2 of the DENIX CRD, the EITM program will accomplish the following with FY18 and FY19 RDTE funding: The current architecture of the DENIX platform will be expanded from one Level 4 container (Controlled Unclassified Information) to add a separate Level 2 container (Non-Controlled Unclassified Information) within the cloud Infrastructure-as-a-Service (IaaS) model. These efforts will provide DENIX the architecture and bandwidth required to support large-scale web conferencing and implement necessary user experience updates to the platform.			
FY 2020 Plans: The DENIX platform will 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 2019 to FY 2020 Increase/Decrease Statement:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>	Project (Number/Name) EE6 / <i>Environmental Information Tech Modernization</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Increase in RDTE funding for subsequent years will be allocated to comply with Cybersecurity Service Provider and Risk Management Framework requirements for the system.				
Accomplishments/Planned Programs Subtotals		0.187	0.249	0.732
C. Other Program Funding Summary (\$ in Millions)				
N/A				
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.				
E. Performance Metrics				
N/A				

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>	Project (Number/Name) EE6 / <i>Environmental Information Tech Modernization</i>	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Split architecture prototype																												
User experience and containerization																												
Webinars/virtual conferencing prototype and development																												
Machine learning algorithms																												
Machine learning prototype																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205412A / <i>Environmental Quality Technology - Operational System Dev</i>	Project (Number/Name) EE6 / <i>Environmental Information Tech Modernization</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Split architecture prototype	2	2019	2	2020
User experience and containerization	3	2019	3	2021
Webinars/virtual conferencing prototype and development	1	2020	4	2020
Machine learning algorithms	1	2020	4	2021
Machine learning prototype	4	2020	4	2022

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	Continuing	Continuing
EF9: System Integration and Test	-	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	Continuing	Continuing

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.

FY 2020 base dollars in the amount of \$107.746 million supports the continuance of program development with the integration of missile and ground system software and hardware in support of complete Post Deployment Build-8.1 (PDB-8.1). Continues the testing program to support the Test and Evaluation Master Plan (TEMP) and system testing/analysis long lead activities for PDB-8.1 Development Test and Evaluation (DTE) and Limited User Test (LUT).

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	78.926	79.283	107.785	-	107.785
Current President's Budget	69.558	77.188	107.746	-	107.746
Total Adjustments	-9.368	-2.095	-0.039	-	-0.039
• Congressional General Reductions	-0.058	-0.095			
• Congressional Directed Reductions	-6.500	-2.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.810	-			
• Adjustments to Budget Years	-	-	-0.039	-	-0.039

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0205456A / <i>Lower Tier Air and Missile Defense (AMD) System</i>	
Change Summary Explanation FY 2018 decrement of \$9.4 million citing prior year carryover and for Small Business Innovation Research.		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EF9: System Integration and Test	-	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Program Development, Integration, and Support	29.800	38.684	33.465	-	33.465
Description: Funding is provided for the following effort:					
FY 2019 Plans: -Continue program development. -Continue integration of missile and ground system hardware and software to complete PDB-8.1 activities.					
FY 2020 Base Plans: -Will continue program development through system level modeling, simulation, integration and testing support. -Will continue integration of missile and ground system hardware and software to complete PDB-8.1 activities.					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 to FY 2020 spending in Program Development, Integration, and Support decreases by \$5.2 million as peak testing and development activities related to PDB 8.0 completed.					
Title: Testing, Targets, Modeling and Simulation	39.758	35.629	74.281	-	74.281
FY 2019 Plans: -Continue the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts.					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
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			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>-Continue test activities to support the TEMP.</p> <p>-Continue system testing/analysis for PDB-8.1 DTE and LUT.</p> <p>-Continue planning, integration and testing of missile and ground system hardware and software to complete PDB 8.1 activities.</p> <p>-Continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements.</p> <p>-Planning, design, and acquisition of long lead Targets for PDB 8.1 Testing.</p> <p>-Begin Ballistic Missile Defense System (BMDS) Integration Testing.</p> <p>FY 2020 Base Plans:</p> <p>-Will continue the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts.</p> <p>-Will continue test activities to support the TEMP.</p> <p>-Will continue system testing/analysis for PDB-8.1 DTE and LUT.</p> <p>-Will continue planning, integration and testing of missile and ground system hardware and software to complete PDB 8.1 activities.</p> <p>-Will continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements.</p> <p>-Will continue planning, design, and acquisition of long lead Targets for PDB 8.1 Testing.</p> <p>-Will continue Ballistic Missile Defense System (BMDS) Integration Testing.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p> <p>Testing, Targets, Modeling and Simulation increase of \$38.7 million from FY 2019 to FY 2020 will provide for purchase of targets and additional PDB 8.1 testing.</p>					
<p>Title: SBIR/STTR</p> <p>Description: FY 2019 SBIR/STTR TRANSFER</p> <p>FY 2019 Plans: FY 2019 SBIR/STTR TRANSFER</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR TRANSFER</p>	-	2.875	-	-	-
Accomplishments/Planned Programs Subtotals	69.558	77.188	107.746	-	107.746

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• C53101: MSE Missile	1,103.040	1,131.276	0.000	736.541	736.541	767.495	749.530	999.731	898.131	793.430	7,179.174
• C50016: System Integration and Test Procurement	136.579	105.395	0.000	113.857	113.857	105.044	107.288	86.178	87.410	Continuing	Continuing
• 0604319A: Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	10.871	40.979	0.000	-	0.000	-	-	-	-	0.000	51.850
• C62002: IFPC INC 2-I BLOCK 1 SYSTEM	-	31.286	0.000	9.337	9.337	241.387	446.464	424.568	446.541	0.000	1,599.583
• C62001: IFPC Inc 2-I Block 1 Missile 1	50.056	145.636	0.000	-	0.000	-	-	-	-	0.000	195.692
• E10: Sentinel	31.651	39.289	105.243	-	105.243	103.427	105.394	65.574	69.407	0.000	519.985
• S40: Army Integrated Air and Missile Defense	339.051	322.263	208.938	-	208.938	130.859	63.738	33.193	94.845	0.000	1,192.887
• BZ5075: IAMD Battle Command System	-	-	29.629	-	29.629	254.834	353.929	417.426	413.775	Continuing	Continuing
• 0604741A: Air Defense Command, Control and Intelligence - Eng Dev	190.385	212.373	43.502	-	43.502	24.944	7.068	1.228	3.405	0.000	482.905
• AD5070: AIR & MSL Defense Planning & Control Sys	132.713	29.913	24.730	14.331	39.061	49.147	106.671	63.143	0.075	0.000	420.723
• EX2: Lower Tier Air Missile Defense (LTAMD) Capability	57.437	89.248	427.772	-	427.772	376.738	332.322	241.461	87.500	0.000	1,612.478
• EY7: IFPC Increment 2 - Block 1	156.361	132.283	243.228	-	243.228	101.000	58.000	45.000	5.000	0.000	740.872

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.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	MIPR	Various : Huntsville, Alabama	3.272	1.156	Dec 2017	1.186	Dec 2018	2.258	Dec 2019	-		2.258	Continuing	Continuing	-
PAC-3 Product Office	RO	Project Office : Huntsville, AL	2.316	1.188	Oct 2017	1.663	Oct 2018	1.700	Oct 2019	-		1.700	Continuing	Continuing	-
Subtotal			5.588	2.344		2.849		3.958		-		3.958	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Integration MSE LMMFC	Various	Lockheed Martin Missiles and Fire Control (LMMFC) : Dallas, Texas	26.727	15.456	Feb 2018	13.237	Feb 2019	16.400	Feb 2020	-		16.400	Continuing	Continuing	-
MSE/PAC-3 Raytheon	Various	Raytheon : Waltham, Massachusetts	12.819	5.598	Feb 2018	6.930	Feb 2019	7.700	Feb 2020	-		7.700	Continuing	Continuing	-
SETA Contracts	Various	Multiple : Multiple	5.822	1.069	Feb 2018	1.096	Feb 2019	2.745	Feb 2020	-		2.745	Continuing	Continuing	-
U.S. Other Government Agencies (OGAs)	MIPR	Various : Huntsville, Alabama	17.210	7.677	Dec 2017	9.602	Dec 2018	6.620	Dec 2019	-		6.620	Continuing	Continuing	-
SBIR/STTR	TBD	TBD : TBD	-	-		2.875		-		-		-	0.000	2.875	-
Subtotal			62.578	29.800		33.740		33.465		-		33.465	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Targets/Threats Simulators	MIPR	Various : Huntsville, Alabama	68.124	24.269	Feb 2018	14.833	Feb 2019	35.146	Feb 2020	-		35.146	Continuing	Continuing	-
Modeling and Simulation	MIPR	Various : Huntsville, Alabama	9.789	3.685	Jan 2018	3.779	Jan 2019	3.500	Jan 2020	-		3.500	Continuing	Continuing	-
Contractor T&E	Various	Multiple : Multiple	15.002	1.953	Feb 2018	2.003	Feb 2019	9.730	Feb 2020	-		9.730	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
PATRIOT System Testing, Integration and Evaluation	[Redacted]				[Redacted]																							
Program Development, Integration, and Support																												
Testing, Targets, Modeling and Simulation	[Redacted]				[Redacted]																							
PDB-8.0.5 Agile Build																												
PDB-8 Fielding	[Redacted]				[Redacted]																							
PDB-8 IOC																												
PDB 8.1	[Redacted]				[Redacted]																							
Developmental/Operational Flight Testing																												
Follow-On Flight Testing	[Redacted]				[Redacted]																							

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205456A / <i>Lower Tier Air and Missile Defense (AMD) System</i>	Project (Number/Name) EF9 / <i>System Integration and Test</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PATRIOT System Testing, Integration and Evaluation	1	2015	4	2025
Program Development, Integration, and Support	1	2015	4	2025
Testing, Targets, Modeling and Simulation	1	2015	4	2025
PDB-8.0.5 Agile Build	1	2017	4	2018
PDB-8 Fielding	2	2018	4	2025
PDB-8 IOC	3	2018	3	2018
PDB 8.1	1	2018	4	2022
Developmental/Operational Flight Testing	3	2020	4	2021
Follow-On Flight Testing	3	2022	4	2025

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	93.900	118.955	138.594	-	138.594	54.328	64.789	1.993	2.096	0.000	474.655
EG2: GMLRS Alternative Warheads	-	0.000	0.000	11.566	-	11.566	14.529	24.409	0.000	0.000	0.000	50.504
EG3: Guided MLRS	-	93.900	118.955	127.028	-	127.028	39.799	40.380	1.993	2.096	0.000	424.151

Program MDAP/MAIS Code: 260

A. Mission Description and Budget Item Justification

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 and integrate sensors and seekers into the rocket. These shall be modifications to GMLRS, not new start efforts. Both the existing EG2 and EG3 tasks received augmented funding to pursue these modifications.

The GMLRS program will continue to leverage ongoing Government and Industry research and development efforts to extend range, increase survivability, and enhance lethality. The EG2 funding line will enable the seeker modification. The EG3 funding line enables GMLRS enhancements, including Extended Range (ER) GMLRS modification, statutorily required upgrades, and obsolescence mitigation.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>
---	---

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	102.807	154.102	132.594	-	132.594
Current President's Budget	93.900	118.955	138.594	-	138.594
Total Adjustments	-8.907	-35.147	6.000	-	6.000
• Congressional General Reductions	-0.079	-0.147			
• Congressional Directed Reductions	-5.000	-35.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.828	-			
• Adjustments to Budget Years	-	-	6.000	-	6.000

Change Summary Explanation

FY 2018 funding reflects a congressionally directed reduction of \$5M for prior year carryover, as well as reductions of \$3.828M for SBIR/STTR transfer and \$0.079M for FFRDC.

FY 2019 funding reflects a congressionally directed reduction of \$35M for delay of Extended Range development contract, as well as reduction of \$0.147M for FFRDC

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>					Project (Number/Name) EG2 / <i>GMLRS Alternative Warheads</i>		
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EG2: <i>GMLRS Alternative Warheads</i>	-	0.000	0.000	11.566	-	11.566	14.529	24.409	0.000	0.000	0.000	50.504
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This is a new start program.

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 an advanced seeker into the rocket.

Funding identified in FY 2020 - FY 2022 will support the technology transition, development, and demonstration of an advanced seeker into the GMLRS and will help define a common seeker solution for the entire MLRS Family of Munitions (MFOM). The advanced seeker program will leverage the Extended Range (ER) GMLRS and culminate in a proof of concept demonstration of the advanced seeker capability.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: GMLRS advanced seeker development	-	-	11.566	-	11.566
Description: Integrate an advanced seeker into the GMLRS and conduct a proof of concept demonstration					
FY 2020 Base Plans: Will perform initial trade studies to define System Weight and Performance challenges. Conduct preliminary rocket integration studies. Investigate Tactics, Techniques and Procedures (TTPs) and concept of operations (CONOPS) for an advanced seeker. Perform initial investigation into modifications needed in launcher/rocket software and Command and Control for integration of an advanced seeker.					
FY 2019 to FY 2020 Increase/Decrease Statement: This is a new start program.					
Accomplishments/Planned Programs Subtotals	-	-	11.566	-	11.566

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG2 / <i>GMLRS Alternative Warheads</i>

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

Line Item	FY 2018	FY 2019	FY 2020			FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• C64400: <i>Guided MLRS Rocket (GMLRS)</i>	1,027.968	975.507	0.000	1,228.809	1,228.809	1,239.202	706.644	976.771	991.074	Continuing	Continuing
• EG3: <i>Guided MLRS</i>	93.900	118.955	127.028	-	127.028	39.799	40.380	1.993	2.096	Continuing	Continuing
• C57701: <i>GMLRS MOD</i>	0.531	0.266	0.000	5.094	5.094	42.514	95.058	69.154	72.728	Continuing	Continuing

Remarks

GMLRS missile Army procurement funding (MiPA) includes C65404 and C65406.

D. Acquisition Strategy

Guided Multiple Launch Rocket System (GMLRS) Alternative Warhead (AW) is currently in Full Rate Production. The advanced seeker effort will conclude with a proof of concept demonstration. Design and integration processes will be executed upon receipt of additional funding to allow for maturation of seeker technology and integration into the Extended Range (ER) GMLRS rocket. All GMLRS variants are procured under C64400; procurement of a seeker capable GMLRS variant will be integrated into annual GMLRS production contracts.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	MIPR	PFRMS Project Office, : RSA	4.948	-		-		-		-		-	0.000	4.948	-
Subtotal			4.948	-		-		-		-		-	0.000	4.948	N/A

Remarks
PFRMS-Precision Fires Rocket and Missile Systems; RSA-Redstone Arsenal

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AWP Contracts (Multiple)	Various	NGIS (Plymouth, MN) LMMFC (Dallas, TX) : Systems Integrator	9.955	-		-		-		-		-	0.000	9.955	-
Seeker Contracts	SS/CPIF	LMMFC : Dallas, TX	-	-		-		8.862	Jan 2020	-		8.862	0.000	8.862	-
Other Government Agencies	MIPR	AMCOM/ : AMRDEC, RSA	3.557	-		-		2.296	Oct 2019	-		2.296	0.000	5.853	-
Subtotal			13.512	-		-		11.158		-		11.158	0.000	24.670	N/A

Remarks
AWP-Alternative Warhead Program; Various-Competitive/Firm Fixed Price/Sole Source/Cost Plus Fixed Fee; AMCOM-Army Materiel Command; AMRDEC-U.S. Army Research, Development and Engineering Command; RSA-Redstone Arsenal; NGIS -Northrop Grumman Innovation Systems; MN-Minnesota; LMMFC-Lockheed Martin Missile and Fire Control; TX-Texas

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Support Contracts	C/CPFF	Various : Various	0.237	-		-		0.408	Oct 2019	-		0.408	0.000	0.645	-
Subtotal			0.237	-		-		0.408		-		0.408	0.000	0.645	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG2 / <i>GMLRS Alternative Warheads</i>
--	---	---

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
C/CPFF-Competitive/Cost Plus Fixed Fee

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support	MIPR	WSMR, : NM	14.363	-		-		-		-		-	0.000	14.363	-
Subtotal			14.363	-		-		-		-		-	0.000	14.363	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	33.060	-	0.000	11.566	-	11.566	0.000	44.626	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG2 / <i>GMLRS Alternative Warheads</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Integrate and Demonstrate an advanced seeker																																
Trade Studies																																
Radome Development																																
Seeker Characterization																																
Rocket Integration																																
Concept Demonstration																																

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG2 / <i>GMLRS Alternative Warheads</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integrate and Demonstrate an advanced seeker	1	2020	4	2022
Trade Studies	1	2020	1	2021
Radome Development	1	2021	2	2022
Seeker Characterization	1	2021	4	2022
Rocket Integration	3	2021	4	2022
Concept Demonstration	3	2022	4	2022

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG3 / <i>Guided MLRS</i>
--	---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EG3: <i>Guided MLRS</i>	-	93.900	118.955	127.028	-	127.028	39.799	40.380	1.993	2.096	0.000	424.151
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The United States (U.S.) Army continues to explore ways to enhance Guided Multiple Launch Rocket System (GMLRS) rockets and common components and to mitigate obsolescence issues under the Guided MLRS project code. The Army is requesting funding for the following GMLRS Research, Development, Test and Evaluation (RDT&E) activities: (1) evaluation of enhanced operational capabilities to provide more flexibility across the target set to include increased range, flight performance, and end-game optimization; (2) investigation of potential life cycle cost savings through obsolescence initiatives and second source qualification; (3) development of enhancements to the Multiple Launch Rocket System (MLRS) common test equipment; (4) evaluation and development of technologies to enhance overall product performance and survivability to include Positioning, Navigation and Timing (PNT); and (5) system test and evaluation.

The FY 2020 dollars in the amount of \$127.028 million will continue the design, qualification, and testing of an extended range variant of the GMLRS; and continue qualification of key rocket obsolescence upgrades.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: GMLRS enhancements	4.104	14.850	17.715	-	17.715
Description: Assess and improve GMLRS rockets					
FY 2019 Plans: Continue to assess methods to increase range performance and rocket effectiveness. Qualify the design of a new rocket pod to support future GMLRS production, assess rocket reliability, and reduce collateral damage.					
FY 2020 Base Plans: Will develop and assess methods to improve rocket effectiveness. Continue to assess payload options to meet Objective Additional Performance Attributes (APAs).					
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increase from FY 2019 to FY 2020 is required to support assessment of payload solutions to address objective APAs in the GMLRS Capability Development Document (CDD).					
Title: Insensitive Munitions (IM) Propulsion System (IMPS) development	8.757	-	-	-	-
Description: Conduct qualification and testing for GMLRS IMPS					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG3 / <i>Guided MLRS</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: GMLRS cost savings initiatives and obsolescence mitigation</p> <p>Description: Address obsolescence cost/cost reduction opportunities/second source suppliers/system survivability</p> <p>FY 2019 Plans: Design and qualification of M-Code compliant NAVSTRIKE-M upgrade.</p> <p>FY 2020 Base Plans: Will continue to design and qualify an optimized MFOM-qualified Guidance Set. Continue to develop a second source vendor for the Extended Range GMLRS rocket motor.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease from FY 2019 to FY 2020 is due to the completion of M-Code compliant NAVSTRIKE-M design activity.</p>	9.950	20.715	15.096	-	15.096
<p>Title: Extended Range (ER) GMLRS and complementary rocket pod development</p> <p>Description: Conduct system test and evaluation activities for ER GMLRS and Insensitive Munitions (IM).</p> <p>FY 2019 Plans: Ground and qualification tests of a new GMLRS rocket pod in support of current configuration and extended range variant GMLRS production. Begin component and system-level ground testing and complete initial system qualification flight tests for the extended range GMLRS variant.</p> <p>FY 2020 Base Plans: Will complete ER GMLRS system-level ground testing, including Insensitive Munitions (IM) testing. Continue ER GMLRS System Qualification Flight Testing and conduct a User Demonstration and an In-Theater Flight Demonstration. Conduct Operational Flight Software Functional Qualification Testing (FQT) and Launcher Integration Testing (LIT).</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding increases from FY 2019 to FY 2020 due to continued ER ground testing in FY 2020 and adds flight testing to include an in-theater demo.</p>	2.590	19.709	42.452	-	42.452
<p>Title: Extended Range (ER) GMLRS development</p> <p>Description: Qualification and integration of ER GMLRS.</p>	68.499	58.197	51.765	-	51.765

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG3 / <i>Guided MLRS</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>FY 2019 Plans: Conduct component and system-level design reviews and the system-level software design review. Will complete Cooperative Vulnerability Identification. Conduct facilitation planning, and conduct a proof of concept flight demonstration.</p> <p>FY 2020 Base Plans: Will conduct ER GMLRS component and system-level critical design and the system-level software design. Complete ER GMLRS Cooperative Vulnerability and Penetration Assessment. Continue ER GMLRS facilitation planning, and conduct Production Line Validations (PLVs) at the component and system level.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease from FY 2019 to FY 2020 is due to decrease in effort in software development, fewer quantities of prototype hardware procurement, and a shift from Development to Qualification.</p>					
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>Description: FY 2019 SBIR/STTR TRANSFER</p> <p>FY 2019 Plans: FY 2019 SBIR/STTR TRANSFER</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in FY 2020 due to SBIR / STTR transfer in FY 2019</p>	-	5.484	-	-	-
Accomplishments/Planned Programs Subtotals	93.900	118.955	127.028	-	127.028

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• C64400: <i>Guided MLRS Rocket (GMLRS)</i>	1,027.968	975.507	0.000	1,228.809	1,228.809	1,239.202	706.644	976.771	991.074	Continuing	Continuing
• EG2: <i>GMLRS Alternative Warheads</i>	-	-	11.566	-	11.566	14.529	24.409	-	-	0.000	50.504
• C57701: <i>GMLRS MOD</i>	0.531	0.266	0.000	5.094	5.094	42.514	95.058	69.154	72.728	Continuing	Continuing

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG3 / <i>Guided MLRS</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

Remarks

GMLRS Procurement funding includes C65404 and C65406.

D. Acquisition Strategy

Project EG3 is intended to support, investigate, and develop alternative material changes to improve the GMLRS family of munitions as they are identified by the material developer or combat developer. This project also supports Insensitive Munitions (IM) activities to improve the overall posture of the system down to component level.

The Extended Range (ER) GMLRS effort is pursuing a strategy of modifying the current GMLRS system through the Engineering Change Proposal (ECP) process in order to increase its range. ER GMLRS is a development and qualification effort performed as a modification to the current GMLRS, leveraging existing contract vehicles where practicable.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Government Program Management	MIPR	Various : RSA	4.875	5.425	Oct 2017	5.959	Oct 2018	2.634	Oct 2019	-		2.634	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	Various	Various : Various	-	-		5.484		-		-		-	0.000	5.484	-
Subtotal			4.875	5.425		11.443		2.634		-		2.634	Continuing	Continuing	N/A

Remarks
RSA-Redstone Arsenal, Alabama

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Unitary Contracts/Multiple	SS/FPIF	LMMFC : Dallas, TX	22.135	8.629	Jan 2018	29.606	Jan 2019	36.241	Jan 2020	-		36.241	Continuing	Continuing	Continuing
IM Qualification Contracts/ Multiple	C/FPIF	Orbital ATK, Aerojet Rocketdyne : Rocket Center, WV; Bristow, VA	27.623	8.757	Jan 2018	-		-		-		-	0.000	36.380	-
GMLRS Extended Range	SS/CPFF	LMMFC : Dallas, TX	-	68.499	Jan 2018	58.197	Jan 2019	45.701	Oct 2019	-		45.701	Continuing	Continuing	Continuing
Subtotal			49.758	85.885		87.803		81.942		-		81.942	Continuing	Continuing	N/A

Remarks
SS/FPIF-Sole Source/Fixed-Price Incentive Firm; LMMFC - Lockheed Martin Missile and Fire Control; TX - Texas; C/FPIF - Competitive/Fixed-Price Incentive Firm; WV - West Virginia; VA - Virginia; TBD - To Be Determined

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support	MIPR	Various : Various	13.326	2.590	Oct 2017	19.709	Oct 2018	42.452	Oct 2019	-		42.452	Continuing	Continuing	Continuing
Subtotal			13.326	2.590		19.709		42.452		-		42.452	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG3 / <i>Guided MLRS</i>
--	---	--

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Remarks
 WSMR, NM-White Sands Missile Range, New Mexico
 Performing Activities include Army Research, Development and Engineering Command (AMRDEC), Army Research Laboratory (ARL), and Redstone Test Center (RTC).

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	67.959	93.900	118.955	127.028	-	127.028	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG3 / <i>Guided MLRS</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Assess and improve GMLRS rockets	[Redacted]																											
Obsolescence/Cost Reduction Opportunities and 2nd Source	[Redacted]																											
Second Source ER GMLRS Motor	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
IM/Enhanced Technology Improvements	[Redacted]																											
Configuration System Qualification Ground/Flight Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
M-Code/NAVSTRIKE-M (GPS receiver) Qualification	[Redacted]		[Redacted]		[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
System Qual and testing of Side Mounted Proximity Sensor	[Redacted]		[Redacted]		[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Conduct qualification and testing for program	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Conduct System Test and Evaluation activities for IMPS prog	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Conduct System Test and Evaluation activities	[Redacted]																											
ER GMLRS Design Verification Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
ER GMLRS Ground Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
ER GMLRS System Qualification Flight Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG3 / <i>Guided MLRS</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Assess and improve GMLRS rockets	1	2015	4	2024
Obsolescence/Cost Reduction Opportunities and 2nd Source	1	2015	4	2024
Second Source ER GMLRS Motor	4	2020	4	2022
IM/Enhanced Technology Improvements	1	2015	4	2024
Configuration System Qualification Ground/Flight Testing	4	2015	4	2018
M-Code/NAVSTRIKE-M (GPS receiver) Qualification	3	2018	4	2018
System Qual and testing of Side Mounted Proximity Sensor	1	2018	2	2018
Conduct qualification and testing for program	1	2015	4	2018
Conduct System Test and Evaluation activities for IMPS program	4	2015	4	2018
Conduct System Test and Evaluation activities	4	2015	4	2021
ER GMLRS Design Verification Testing	2	2019	4	2019
ER GMLRS Ground Testing	4	2019	1	2021
ER GMLRS System Qualification Flight Testing	3	2020	3	2021
ER GMLRS Operational Testing	3	2021	1	2022
Flight Termination System Development	3	2018	3	2021
Qualification and Integration of GMLRS extended range effort	3	2018	4	2021
Preliminary Design Reviews	4	2018	2	2019
Critical Design Reviews	1	2020	3	2020
Operational Flight Software Development	3	2018	4	2020
ER GMLRS Cooperative Vulnerability Identification	2	2019	2	2019
ER GMLRS Cooperative Vuln and Penetration Assessment	2	2020	2	2020
ER GMLRS facilitization	3	2019	3	2021

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019	
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205778A / <i>Guided Multiple-Launch Rocket System (GMLRS)</i>	Project (Number/Name) EG3 / <i>Guided MLRS</i>		

Events	Start		End	
	Quarter	Year	Quarter	Year
Engineering Change Proposal (ECP) Cut-in Decision	4	2021	4	2021

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	35.652	35.476	13.845	22.904	36.749	37.570	14.607	14.936	15.102	0.000	190.092
FG2: <i>Counterintelligence & Human Intel Modernization</i>	-	1.825	3.060	1.820	-	1.820	2.394	1.969	2.048	1.796	0.000	14.912
H13: <i>Information Dominance Center (IDC) - Tiara</i>	-	33.827	32.416	12.025	22.904	34.929	35.176	12.638	12.888	13.306	0.000	175.180

A. Mission Description and Budget Item Justification

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

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

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

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	13.807	35.479	14.024	-	14.024
Current President's Budget	35.652	35.476	13.845	22.904	36.749
Total Adjustments	21.845	-0.003	-0.179	22.904	22.725
• Congressional General Reductions	-	-0.003			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	21.845	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.179	22.904	22.725

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>	
<u>Change Summary Explanation</u> Reduction is based on economic adjustments.		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FG2: Counterintelligence & Human Intel Modernization	-	1.825	3.060	1.820	-	1.820	2.394	1.969	2.048	1.796	0.000	14.912
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Insider Threat CE Support	-	1.722	1.820	-	1.820
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 2019 Plans: 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.					
FY 2020 Base 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 2019 to FY 2020 Increase/Decrease Statement:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>	Project (Number/Name) FG2 / <i>Counterintelligence & Human Intel Modernization</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase due to inflation and IT refresh.					
Title: Classified Description: Classified FY 2019 Plans: Classified. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to - Classified.	-	0.799	-	-	-
Title: Identity Intelligence Description: RDT&E funding supports the development of new software code and associated testing necessary to update an instance of the Identity Intelligence Repository (I2AR) -the unique software-based analytic production system used by intelligence analysts and the National Ground Intelligence Center (NGIC) specifically to create the Biometric Enabled Watchlist for worldwide missions. FY 2019 Plans: The developed updates will provide capable to facilitate automated information exchange with complimentary DoD and Intelligence Community programs resident on the IC ITE C2S cloud to facilitate automated linkage of information and intelligence to persons of interest. Specific efforts include the development of Extensible Markup Language (XML) that supports transactional interface between exploitation system, data repositories and, analytic tools. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is the result of a one-year requirement executed in FY 2019.	-	0.467	-	-	-
Title: Counterintelligence Activities Description: The Counterintelligence (CI) and Human Intelligence (HUMINT) Modernization Project supports ongoing rejuvenation and development of new critical CI and HUMINT systems, applications, tools, equipment, and capabilities necessary to defeat the foreign intelligence, international terrorist, and insider threats while enhancing our HUMINT collection capability. The required tools provide Army and DoD leadership, commanders, and warfighters the intelligence necessary for making advantageous operational planning, policies, and timely decisions.	1.825	-	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>	Project (Number/Name) FG2 / <i>Counterintelligence & Human Intel Modernization</i>
--	---	--

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	0.072	-	-	-
Accomplishments/Planned Programs Subtotals	1.825	3.060	1.820	-	1.820

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>	Project (Number/Name) FG2 / <i>Counterintelligence & Human Intel Modernization</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Classified	Classified				Classified																							

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>	Project (Number/Name) FG2 / <i>Counterintelligence & Human Intel Modernization</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Classified	1	2018	1	2019

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
H13: Information Dominance Center (IDC) - Tiara	-	33.827	32.416	12.025	22.904	34.929	35.176	12.638	12.888	13.306	0.000	175.180
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, 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.

INSCOM conducts RDTE of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, NSPD-38, NSPD-54 and HSPD-23. FY 2020 request includes \$22.9 million for these activities in support of Operation Inherent Resolve for ISIL.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Offensive Cyberspace Operations Capability Development	33.827	32.416	12.025	22.904	34.929
Description: INSCOM's RDTE program provides the Army with low-density, high-demand, extremely advanced offensive cyberspace technologies designed to degrade, deny, disrupt, or destroy adversary C4I and shape the operational warfighting environment in order to create conditions favorable to the application of other elements of national power.					
FY 2019 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 2020 Base Plans:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>	Project (Number/Name) H13 / <i>Information Dominance Center (IDC) - Tiara</i>

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Continue to develop and support leading-edge Cyberspace technologies designed to exploit, degrade, deny, disrupt, or destroy threat command, control, communications, computers and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept.</p> <p><i>FY 2020 OCO Plans:</i> Will continue to develop and support leading-edge Cyberspace technologies designed to exploit, degrade, deny, disrupt, or destroy threat command, control, communications, computers and intelligence (C4I) cyber systems to enable commanders in shaping the operational warfighting environment in order to create conditions favorable to the application of other elements of national power. Support the development of offensive Cyberspace technologies in direct support of the full range of missions called for in the National Defense Strategy, Comprehensive National Cyber-Security Initiative, National Security Strategy, National Defense Guidance, Defense Cyber Strategy, Presidential Policy Directive (PPD) 20, National Security Presidential Directive (NSPD) 54, Homeland Defense Presidential Directive (HSPD) 23, and The Army Operating Concept.</p> <p><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2020 increased from FY 2019 due to inflation and program assessment for the need to increase development efforts based on demand signal from supported Offensive Cyberspace Operations subordinate command.</p>					
Accomplishments/Planned Programs Subtotals	33.827	32.416	12.025	22.904	34.929

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Mobile Objects/ PHAEDRUS	C/Various	Multiple : Multiple	4.100	-		-		-		-		-	0.000	4.100	-
Subtotal			4.100	-		-		-		-		-	0.000	4.100	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Offensice Cyberspace Operations Capability Development	Various	TBD : TBD	71.778	33.827		32.416		12.025		22.904		34.929	Continuing	Continuing	Continuing
Subtotal			71.778	33.827		32.416		12.025		22.904		34.929	Continuing	Continuing	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			75.878	33.827		32.416		12.025		22.904		34.929	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>	Project (Number/Name) H13 / <i>Information Dominance Center (IDC) - Tiara</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
IP-Based Cyber Operations Platforms	[Redacted]				[Redacted]				[Redacted]																			
Aerial/Ground-Based Cyber Operations Platforms	[Redacted]				[Redacted]				[Redacted]																			
Remote Access Capabilities	[Redacted]				[Redacted]				[Redacted]																			
Close Access Capabilities	[Redacted]				[Redacted]				[Redacted]																			
Platform C2 and Visualization Capabilities	[Redacted]				[Redacted]				[Redacted]																			
Testing and Evaluation Support of Cyberspace RDTE Capabilities	[Redacted]				[Redacted]				[Redacted]																			

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303028A / <i>Security and Intelligence Activities</i>	Project (Number/Name) H13 / <i>Information Dominance Center (IDC) - Tiara</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
IP-Based Cyber Operations Platforms	1	2018	1	2020
Aerial/Ground-Based Cyber Operations Platforms	1	2018	1	2020
Remote Access Capabilities	1	2018	1	2020
Close Access Capabilities	1	2018	1	2020
Platform C2 and Visualization Capabilities	1	2018	1	2020
Testing and Evaluation Support of Cyberspace RDTE Capabilities	1	2018	1	2020

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	108.755	42.520	29.185	-	29.185	29.299	28.855	21.245	17.125	Continuing	Continuing
491: Information Assurance Development	-	9.787	10.159	8.368	-	8.368	8.017	7.604	7.645	5.600	0.000	57.180
DV4: Key Management Infrastructure (KMI)	-	4.508	2.702	13.187	-	13.187	13.470	13.351	3.413	3.477	Continuing	Continuing
DV5: Crypto Modernization (Crypto Mod)	-	26.055	7.943	7.630	-	7.630	7.812	7.900	10.187	8.048	Continuing	Continuing
ET9: Embedded Crypto Modernization (CRYPTO MOD)	-	48.914	20.745	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	69.659
FF8: Unit Activity Monitoring (UAM)	-	19.491	0.971	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.462

A. Mission Description and Budget Item Justification

The Information Systems Security Program funding line supports the Army's Network Modernization Strategy Line of Effort (LOE) 1, Unified Network.

Project 491: Information Assurance (IA) Development supports the implementation of the National Security Agency (NSA) developed Communications Security (COMSEC) technologies within the Army by providing COMSEC system capabilities through encryption, trusted software or standard operating procedures, and integrating these mechanisms into specific systems in support of securing the Army Tactical and Enterprise Networks. This entails architecture studies, system integration and testing, developing installation kits, and certification and accreditation of Automation Information Systems. The program assesses, develops and integrates Cyber Security (CS)/COMSEC tools (hardware and software) which provide protection for fixed infrastructure post, camp and station networks as well as tactical networks. The cited work is consistent with Strategic Planning Guidance (SPG) and the Army Modernization and Strategy Plan (AMSP).

IA Development funding implements and establishes functional and technical boundaries of cryptographic, key management and IA capabilities in coordination with the NSA, the DISA, and Joint Services, to secure National Security Systems (NSS), and National Security Information (NSI). Technical evaluations assess the security, operational effectiveness and network interoperability of advanced concept technologies to develop policies, standards, and fundamental building blocks for Army COMSEC capabilities that reduce the risk of future material solutions that could underperform and disrupt classified operations. Develop and publish the COMSEC Implementation Planning Guidance to identify, standardize, and govern the insertion of CS capabilities to bridge operational gaps and support the DoD and NSA mandated requirements to enhance network capacity while providing for secure information exchange of voice, video, and data in accordance with the Army Network 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.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	
<p>The Defensive Cyberspace Operations (DCO) program provides initial capabilities that enable passive and active cyberspace defense operations to preserve friendly cyberspace capabilities and protect data, networks, net-centric capabilities, and other designated systems. Big Data Pilot provides an advanced analytics capability capable of ingesting structured, semi-structured, and unstructured data from multiple data sources (e.g., Joint Regional Security Stacks (JRSS), intrusion detection systems, intrusion prevention systems, network device log files, trouble tickets, firewalls, proxies, web and applications server log files, etc) and proves situational awareness of cyberspace battlefield. It provides the computer network defense provider with common analytic platform which informs and reduces risk associated with future material solutions and forms a blueprint for future Big Data Analytics. Big Data (analysis-of-all DoD Information Network sensor data) provides two optimized and accredited clusters deployed in support of JRSS and Defense Research and Engineering Network (DREN) with a tools suite accessible to Cyber Mission Forces via secure remote access. The Army's DCO activities are a construct of active cyberspace defenses which provide synchronized, real-time capability to discover, detect, analyze, and mitigate threats to and vulnerability of DoD networks and systems.</p> <p>Project DV4 & 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. The Army's Mission Command Network Modernization implementation Plan, date 17 April 2018, states that LOE 1 to be a Unified Network which includes the attributes of being, "Protected, Resilient, Survivable" (p. 11) COMSEC is the Army's implementation of NSA protections to achieve LOE 1.</p> <p>Project DV4: The Army Key Management Infrastructure (AKMI) is the Army's implementation of the 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, Intelligence (C4I) systems. The AKMI System of Systems (SoS) systems components are the Management Client (MGC), Automated Communications Engineering Software (ACES) and Next Generation Load Device (NGLD) Family of fill devices. The AKMS SoS components are the Local COMSEC Management Software (LCMS), ACES, and Simple Key Loader (SKL).</p> <p>Project DV5: The Army COMSEC program supports using NSA developed COMSEC technologies within the Army providing encryption, trusted software, or standard operating procedures, and integrating these mechanisms into National Security Systems (NSS), and National Security Information (NSI) systems in support of securing the Army network (which is made up of tactical and enterprise networks). This entails architecture studies, system integration and testing, developing installation kits, and certification and accreditation of Automation Information Systems. The program assesses, develops and integrates emerging 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 SPG and the AMSP.</p> <p>Project ET9: Embedded Cryptographic Modernization Initiative (ECMI) program was cancelled FY 2018. No FY 2020 funding is requested.</p> <p>Project FF8: User activity monitoring (UAM) automation/analytics will provide technical capability to enhance Army UAM analysis effectiveness and efficiency. The UAM mission is to observe and record the actions and activities of an individual, at any time, on any device accessing Army information on classified networks in order to detect insider threats and to support authorized investigations. Army UAM is a component of the Army Insider Threat (InT) Program. Army's InT Program and UAM are conducted in accordance with the National Defense Authorization Act for Fiscal Year 2012, section 922., Insider Threat Detection; Presidential Memorandum, National</p>		

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>
---	---

Insider Threat Policy and Minimum Standards for Executive Branch Insider Threat Programs, dated 21 November 2012; Executive Order 13587, Structural Reforms to Improve the Security of Classified Networks and the Responsible Sharing and Safeguarding of Classified Information, (Reference b) dated 7 October 2011, and Army Directive 2013-18 (Army Insider Threat Program), 31 July 2013. Innovative enhancements are required to improve UAM analysis productivity, data visualization, and workflow management. The analysis productivity objective is to develop and implement user behavior models that use UAM and other network data to identify anomalous user behavior over time, and to integrated new data sources into the UAM analytical data store and processing system. Data visualization advances will present UAM analysts behavior model processing results in an intuitive format that reduce the time required to review the results. Workflow management improvements will add new capabilities to the UAM workflow management system with the objective of enhancing analysis reporting productivity and metrics collection.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	132.438	68.533	54.714	-	54.714
Current President's Budget	108.755	42.520	29.185	-	29.185
Total Adjustments	-23.683	-26.013	-25.529	-	-25.529
• Congressional General Reductions	-0.074	-0.013			
• Congressional Directed Reductions	-38.000	-26.000			
• Congressional Rescissions	-	-			
• Congressional Adds	18.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.609	-			
• Adjustments to Budget Years	-	-	-25.529	-	-25.529

Change Summary Explanation

FY 2020 funding is reduced by \$25.529 million due to the cancellation of the Embedded Cryptographic Modernization Initiative (ECMI) program. FY 2019 Congressional Reduction of \$26.000 million for program delay (\$25.000 million) and crypto modernization inaccurate contract awards (\$1.000 million). FY 2018 Congressional Reduction of \$38.000 million for excess growth (13.000 million) and excess embedded crypto modernization funding due to program delay (\$25.000 million); Congressional Add of \$18.000 million for Cybersecurity operations center.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>				Project (Number/Name) 491 / <i>Information Assurance Development</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
491: <i>Information Assurance Development</i>	-	9.787	10.159	8.368	-	8.368	8.017	7.604	7.645	5.600	0.000	57.180
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

PE 0303140A, project 491 includes funding for the Army CIO/G6, Project Lead (PL) Network Enablers (Net E), 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 the COMSEC Implementation Planning Guidance to identify, standardize, and govern the insertion of IA capabilities that will bridge operational gaps and support the DoD and NSA mandated requirements to enhance network capacity while providing secure information exchange of voice, video, and data IAW the Army Network Campaign Plan. This will be accomplished by interoperability test and evaluation, standards development, and System of System Network Vulnerability Assessments (SoS NVA) to provide protections for the Army Integrated Tactical Networks.

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 provides situational awareness of the cyberspace battlefield. It provides the computer network defense provider with a common analytic platform which informs and reduces risk associated with future materiel 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.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) 491 / <i>Information Assurance Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Title: Assessing emerging COMSEC hardware and software systems and products (PL Net E)</p> <p>Description: Conduct research and analyses as well as basic testing for meeting specific focused goals that will enhance the functions and support of cryptographic systems improving the security and usability of the Army tactical and enterprise networks. (PL Net E)</p>	1.466	-	-
<p>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)</p> <p>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 Technology Demonstrations to define, improve, develop and publish Cyber Security (CS) standards for new/modernized technology insertion to support the LWN 2025 and Beyond. This effort assesses and defines risk mitigation of CS network vulnerabilities in end-to-end Army network operations and Common Operating Environment. (CIO/G6)</p> <p>FY 2019 Plans: Continue to provide oversight for the executions of the Army's COMSEC Modernization initiatives. Identify and evaluate new CM, TRANSEC and KM technologies for Army implementation in support of ACC updates, KMI migration and S-ICAN/ITN architecture development. Develop end-to-end, tactical-to-strategic COMSEC standardization to meet Army's operational requirements. Test and assess CM and KM technologies to determine the maturity and viability for Army use to protect and strengthen the Army Network posture. Document new fundamental building blocks for IA solutions, perform risk reduction testing of commercial products prior to insertion into Army for use to increase operational availability with documented operational value and rapid integration. Collaborate with the NSA, DoD CIO and Joint Staff to continue to support the ACC device testing and fielding. Provide timely test and evaluate results to enable the Army to make sound investment strategic decisions and to reduce or eliminate duplications. Participate in operational assessment of NSA, DoD, Joint Staff and Service led Joint Capability Technology Demonstrations to align new technologies to documented Army and Service capability gaps and requirements for protecting National Security Systems and National Security Information. Develop strategies and policies to posture Army's operations to implement innovative cryptographic and key management tools and services. Continue to support DoD CM2 efforts.</p> <p>FY 2020 Plans: Will Continue to provide oversight for the executions of the Army's COMSEC Modernization initiatives. Identify and evaluate new CM, TRANSEC and KM technologies for Army implementation in support of ACC updates, KMI migration and S-ICAN/ITN architecture development. Develop end-to-end, tactical-to-strategic COMSEC standardization to meet Army's operational</p>	8.321	9.787	8.368

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) 491 / <i>Information Assurance Development</i>

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

	FY 2018	FY 2019	FY 2020
requirements. Test and assess CM and KM technologies to determine the maturity and viability for Army use to protect and strengthen the Army Network posture. Document new fundamental building blocks for IA solutions, perform risk reduction testing of commercial products prior to insertion into Army for use to increase operational availability with documented operational value and rapid integration. Collaborate with the NSA, DoD CIO and Joint Staff to continue to support the ACC device testing and fielding. Provide timely test and evaluate results to enable the Army to make sound investment strategic decisions and to reduce or eliminate duplications. Participate in operational assessment of NSA, DoD, Joint Staff and Service led Joint Capability Technology Demonstrations to align new technologies to documented Army and Service capability gaps and requirements for protecting National Security Systems and National Security Information. Develop strategies and policies to posture Army's operations to implement innovative cryptographic and key management tools and services. Continue to support DoD CM2 efforts.			
FY 2019 to FY 2020 Increase/Decrease Statement: The decrease from FY 2019 to FY 2020 is in direct support to test and evaluate the maturity of Army's CM devices to meet the ACC standards to provide the Warfighter with the ability to secure, maintain compliance, interoperability and protect National Information. The CM effort will employ common standards and technologies to reduce redundancies and maximize scalable solutions that can respond to cyber threats, mission changes and interoperability. This is IAW the Army Communications Security (COMSEC) Modernization Implementation Planning Guidance FY 2019/2020.			
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	0.372	-
Accomplishments/Planned Programs Subtotals	9.787	10.159	8.368

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u>			<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u>	
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	<u>Total Cost</u>
• DV5: <i>Crypto Modernization (Crypto Mod)</i>	26.055	7.943	7.630	-	7.630	7.812	7.900	10.187	8.048	Continuing	Continuing
• ET9: <i>Embedded Crypto Modernization (CRYPTO MOD)</i>	48.914	20.745	0.000	-	0.000	-	-	-	-	0.000	69.659

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) 491 / <i>Information Assurance Development</i>
--	---	--

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• B96002: <i>CRYPTOGRAPHIC SYSTEMS (CRYPTO SYS)</i>	47.536	26.350	72.457	-	72.457	36.113	26.399	30.776	39.721	Continuing	Continuing
• B96006: <i>Embedded Cryptographic Modernization</i>	-	3.520	0.000	-	0.000	-	-	-	-	0.000	3.520
• BS9716: <i>NON PEO-SPARES</i>	3.135	3.131	3.857	-	3.857	3.901	3.939	3.940	4.000	0.000	25.903

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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) 491 / <i>Information Assurance Development</i>
--	---	--

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
System Engineering (PL Net E)	SS/LH	CECOM RDEC : CECOM RDEC APG, MD	80.317	1.466		-		-		-		-	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			122.022	1.466		-		-		-		-	0.000	123.488	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test Support (PL Net E)	C/CPFF	TBD : TBD	1.598	-		-		-		-		-	0.000	1.598	-
Engineering Support (CIO/G-6)	C/FP	CACI : APG, MD	6.433	2.196		3.377		3.500		-		3.500	Continuing	Continuing	-
System Engineering (CIO/G-6)	SS/LH	AFC CERDEC : APG, MD	4.857	1.496		1.682		2.297		-		2.297	Continuing	Continuing	-
Engineering Support (CIO/G-6)	C/CPFF	Booz Allen Hamilton : APG, MD	7.449	1.737		2.890		1.355		-		1.355	Continuing	Continuing	-
Engineering Support (CIO/G-6)	C/FFP	AASKI : Edgewood, MD	3.427	1.813		1.120		0.400		-		0.400	Continuing	Continuing	-
Service (CIO-G-6)	SS/LH	ARL/SLAD : White Sand Missile Range (WSMR)	5.972	1.079		1.090		0.816		-		0.816	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) 491 / <i>Information Assurance Development</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
TEST OF IINE AND WIRELESS SOLUTION (PL Net E)																												
TECHNOLOGY TEST & EVALUATION (CIO/G6)																												
DEFINE SECURITY & INTEROPERABILITY STANDARDS (CIO/)																												
COMSEC STRATEGY & CRYPTO TECHNOLOGY ROADMAP (C																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) 491 / <i>Information Assurance Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
TEST & EVALUATION OF CRYPTOGRAPHIC SYSTEMS (PL Net E)	1	2014	4	2014
STUDY OF CURRENT AND EMERGING CRYPTO ALGORITHMS AND TECHNOLOGIES (PL Net E)	1	2015	2	2015
TEST OF INE AND WIRELESS SOLUTION (PL Net E)	1	2016	4	2018
BIG DATA PILOT (PD ES-CYBER)	1	2016	4	2016
TECHNOLOGY TEST & EVALUATION (CIO/G6)	1	2017	4	2023
DEFINE SECURITY & INTEROPERABILITY STANDARDS (CIO/G6)	1	2017	4	2023
COMSEC STRATEGY & CRYPTO TECHNOLOGY ROADMAP (CIO/G6)	1	2014	4	2023

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>				Project (Number/Name) DV4 / <i>Key Management Infrastructure (KMI)</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DV4: <i>Key Management Infrastructure (KMI)</i>	-	4.508	2.702	13.187	-	13.187	13.470	13.351	3.413	3.477	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

A. Mission Description and Budget Item Justification

Project DV4, Key Management Infrastructure (KMI) supports the Army's Network Modernization Strategy Lines of Effort (LOE) 1 Network Enablers Functions.

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. The Army's Mission Command Network Modernization Implementation Plan states that LOE 1 to be a Unified Network which includes the attributes of being, "Protected, Resilient, Survivable" which Communications Security (COMSEC) is the Army's implementation of NSA protections to achieve LOE 1. KMI is foundational to the Army's Network Enabling Functions (Key Management Infrastructure).

The Army Key Management Infrastructure (AKMI) is the Army's implementation of the National Security Agency's (NSA) Key Management Infrastructure (KMI) ACAT IAM program. AKMI supports Department of Defense (DoD) Global Information Grid (GIG) Net Centric and Cryptographic Modernization Initiatives (CMI) and supports emerging requirements transitioned from the Army Key Management System (AKMS). AKMI automates the functions of Communications Security (COMSEC) electronic key management, control, planning, and distribution. AKMI supports the Army's ability to communicate and distribute data on the Army's tactical and strategic networks by limiting adversarial access to, and reducing the vulnerability of, Army Command, Control, Communications, Computers, Intelligence (C4I) systems.

The AKMI Program includes the Management Clients (MGC) nodes, Automated Communications Engineering Software (ACES) and Next Generation Load Device (NGLD) Family of devices to include the NGLD Small, Medium and Large. AKMI provides an integrated, operational environment that brings essential key management functions in-band. Objective AKMI will leverage NSA KMI program to provide secure software provisioning, will support legacy and modern End Cryptographic Units (ECU)s, simplifies all aspects of key provisioning and ECU management with traceability to individuals, expands operations to DoD unclassified networks, North Atlantic Treaty Organization (NATO) and Coalition users, automates manual business processes to increase Soldier efficiency, transforms key delivery from manual to an automate enterprise service and will provide an Over the Network Keying (OTNK) capability to support CMI.

One of the major enhancement in the AKMI architecture is the ability to leverage the various capabilities and services from NSA KMI. The end state for the Army is to leverage AKMI capabilities (OTNK, Mission Plan/Mission Support System (MP/MSS), Delivery Only Client (DOC), Client Host Only (CHO)) to increase automation, reduce soldier oversight, manage, and deliver key products to the tactical edge up through strategic ECU's. The objective AKMI capabilities will be found in all of the products across the AKMI product line to include MGC, ACES and NGLD family of fill devices. NGLD family will be an enduring solution to bridge the gap until legacy ECUs are fully modernized.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV4 / <i>Key Management Infrastructure (KMI)</i>

The Next Generation Load Device - Medium (NGLD-M) is scheduled to replace the AN/PYQ-10A and AN/PYQ-10A(C), Simple Key Loader (SKL). The 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). This effort is proposed as an Acquisition Category III (ACAT III). Program of Record (POR). Testing of this device will also require development funds and culminate in a user test during FY22.

The NGLD-Medium (NGLD-M) is reliant on the Reprogrammable Single Chip Universal Encryptor (RESCUE), a new KMI-compliant cryptographic engine that is currently being developed by CERDEC S&TCD. This product culminates in a government owned technical data package supporting Cryptographic Modernization requirements. The NGLD-M is a key transition partner for this technology. Further uses of this product are anticipated across Army and other services require reprogrammable Cryptographic requirements. NSA certification is expected during FY19.

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

	FY 2018	FY 2019	FY 2020
<p>Title: RESCUE Development, Evaluation, and NSA Certification</p> <p>Description: RESCUE creates 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. Fill Devices and ECUs will receive, authenticate, and decrypt OTNK messages and increase WarFighter survivability by minimizing the need for Soldiers to travel to obtain keys. Additionally, Cryptographic Modernization decreases probability of key compromise and therefore, network survivability. Redesign and developmental efforts using modern and readily available components for use in the Army's Next Generation Load Devices (NGLDs) are currently underway. NGLD ? M will also address requirements codified in the NGLD CPD and the AKMI CPD that were technologically unachievable with the legacy KOV 21 card as used in the Army?s SKL.</p> <p>FY 2019 Plans: The follow-on RESCUE technology will continue in FY2019.</p> <p>FY 2020 Plans: The follow-on RESCUE technology will continue through end of FY2020.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Requirements include increased projected developmental and operational test requirement in support of NGLD-M.</p>	4.508	2.702	3.187
<p>Title: NGLD Medium Development and NSA Certification</p> <p>Description: The 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). This effort is proposed as an Acquisition Category III (ACAT III). Program of Record (POR).</p> <p>FY 2020 Plans:</p>	-	-	8.500

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV4 / <i>Key Management Infrastructure (KMI)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Contract award for development, production, and sustainment.			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Requirements include updated projected developmental support for NGLD-M.			
<i>Title:</i> NGLD-M Test & Evaluation <i>Description:</i> The 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). Operational testing of this device will require development funds and culminate in a user test during FY22. <i>FY 2020 Plans:</i> NGLD-M test and evaluation required for development. <i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> NGLD-M operational test and evaluation requirements were reevaluated and adjusted.	-	-	1.500
Accomplishments/Planned Programs Subtotals	4.508	2.702	13.187

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• B96004: <i>KEY MANAGEMENT INFRASTRUCTURE</i>	56.948	35.710	88.442	-	88.442	89.912	81.432	98.363	99.012	0.000	549.819

Remarks

Line Item & Title:
B96004: Key Management Infrastructure (OPA2)
153140: ISSP (TSEC-AKMS) (OMA)

D. Acquisition Strategy

Army Key Management Infrastructure (AKMI) is a Non Program of Record (POR) under Project Lead Network Enablers (PL Net E). AKMI is the Army's implementation of the National Security Agency (NSA) Key Management Infrastructure (KMI) ACAT IAM Program of Record. The AKMI will allow the Army to manage, control, plan, and distribute electronic key for the ~1.5M End Cryptographic Units (ECU)s necessary to communicate and distribute data on the Army's tactical and strategic networks.

AKMI initial Army Acquisition Program Baseline (APB) was approved 2QFY12. The AKMI Program will include the Management Clients (MGC) nodes, Automated Communications Engineering Software (ACES) and Next Generation Load Device (NGLD) Family. Each component of the AKMI Program is in a different phase of the acquisition cycle.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV4 / <i>Key Management Infrastructure (KMI)</i>

The NSA KMI Program is replacing the NSA Electronic Key Management System (EKMS) program. As the DoD Key Management Lead, NSA is dictating the change from EKMS to KMI by a sunset date of December 2017. Components of the AKMI Program will be retained and adapted from the legacy AKMS program while others will be developed and fielded to meet AKMI requirements.

The NGLD family of devices will become the primary Army Tier 3 component of the AKMI Program. The NGLD Capability Production Document (CPD) was signed 4QFY13. The NGLD CPD calls for a family of 3 devices (small, medium and large) to meet the AKMI requirements. The AKMI program has partnered with RDECOM CERDEC to develop a KMI compliant cryptographic engine, the Reprogrammable Single Chip Universal Encryptor (RESCUE). The NGLD-M will undergo full-and-open competition for development, production, and sustainment during FY19 with a projected FY20 award. NGLD-M development will be conducted during FY20-22 culminating in NSA certification and an operational event. NGLD-M projects LRIP and FRP during FY22.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV4 / <i>Key Management Infrastructure (KMI)</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024																																																																																																											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4																																																																																																								
RESCUE																																																																																																																																				
NGLD-M Testing																																																																																																																																				
NGLD-M Development																																																																																																																																				
Milestone B																																																																																																																																				
Development, Production, Sustainment Contract																																																																																																																																				
Fielding and Sustainment																																																																																																																																				
Simplified Acquisition Management Plan																																																																																																																																				

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV4 / <i>Key Management Infrastructure (KMI)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
RESCUE	1	2019	4	2024
NGLD-M Testing	2	2020	4	2023
NGLD-M Development	2	2019	4	2023
Milestone B	1	2021	1	2021
Development, Production, Sustainment Contract	1	2020	4	2024
Fielding and Sustainment	4	2022	4	2024
Simplified Acquisition Management Plan	4	2019	4	2019

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>				Project (Number/Name) DV5 / <i>Crypto Modernization (Crypto Mod)</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
DV5: <i>Crypto Modernization (Crypto Mod)</i>	-	26.055	7.943	7.630	-	7.630	7.812	7.900	10.187	8.048	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project DV5, Crypto Modernization (Crypto Mod) supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 Network Enablers Functions.

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. 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. The Army's Mission Command Network Modernization Implementation Plan states that LOE 1 to be a Unified Network which includes the attributes of being, "Protected, Resilient, Survivable" which Communications Security (COMSEC) is the Army's implementation of NSA protections to achieve LOE 1. Crypto Modernization is foundational to the Army's LOE 1: Network Enabling Functions.

This program supports using 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.

This entails architecture studies, system integration and testing, developing installation kits, and certification and accreditation of Automation Information Systems. The program assesses, develops and integrates emerging Information Assurance (IA)/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 and the Army Modernization and Strategy Plan.

The Embedded Cryptographic Modernization Initiative (ECMI) is designed to investigate Courses Of Action, conduct a Material Solution Analysis, and execute upgrade activities to ensure all enduring Army communications and data equipment that employ embedded cryptographic hardware will utilize modern cryptographic algorithms and keys.

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

	FY 2018	FY 2019	FY 2020
Title: VINSON/ANDVT (Advanced Narrowband Digital Voice Terminal) Cryptograph Modernization (VACM) program	0.820	0.625	0.746
Description: This program researches, assesses, tests, plans and works to integrate VACM products for the Army. 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			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV5 / <i>Crypto Modernization (Crypto Mod)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
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.				
<p>FY 2019 Plans: Continue to test and evaluate any engineering changes to Full Rate Production (FRP) of VACM devices (the KYV-5M) to confirm continued capability and interoperability on Army networks and tactical systems as well as identifying new risk areas for compliance with COMSEC regulations and procedures. The program will continue fielding, performing site surveys and installing at both CONUS and OCONUS locations.</p> <p>FY 2020 Plans: The program will continue to test and evaluate any engineering changes to Full Rate Production (FRP) of VACM devices to confirm continued capability and interoperability on Army networks and tactical systems as well as identifying new risk areas for compliance with COMSEC regulations and procedures. The program will continue fielding, performing site surveys and installing at both CONUS and OCONUS locations.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Additional Devices to be fielded in FY 2020.</p>				
<p>Title: Cryptographic Systems Test and Evaluation</p> <p>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.</p> <p>FY 2019 Plans: 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, CHVP, CSfC Guidance, and new software releases to HAIPE 4.X devices in accordance with AR 700-142 Rapid Action Revision dated October 16, 2008. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure. Additionally, this program evaluates performance of technologies and provides direction to ensure the lowest impact on performance while providing the greatest protection from loss of sensitive data.</p> <p>FY 2020 Plans: The program will continue the testing and evaluation of COMSEC devices to confirm capability and interoperability on Army networks and tactical systems as well as identifying risk areas for compliance with COMSEC regulations and procedures. The program will test and evaluate Crypto Systems compliant devices, Suite B IPsec devices built on commercial standards, CHVP,</p>		2.910	6.372	5.938

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV5 / <i>Crypto Modernization (Crypto Mod)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
CSfC Guidance, and new software releases to HAIPE 4.X devices in accordance with AR 700-142 Rapid Action Revision dated October 16, 2008. The program tests interoperability and provides ways to insert data at rest (DAR) and data in transit (DIT) technology within the existing and future network infrastructure. Additionally, this program evaluates performance of technologies and provides direction to ensure the lowest impact on performance while providing the greatest protection from loss of sensitive data. FY 2019 to FY 2020 Increase/Decrease Statement: Reduction of Test and Evaluation on HAIPE devices.			
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 2019 Plans: 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. This will facilitate the upgrade of the Army HAIPIES to include new cyber sensor functionality for the tactical cell. FY 2020 Plans: 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. This will facilitate the upgrade of the Army HAIPIES to include new cyber sensor functionality for the tactical cell.	1.748	0.946	0.946
Title: FY 2018 Recission	20.577	-	-
Accomplishments/Planned Programs Subtotals	26.055	7.943	7.630

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 491: <i>Information Assurance Development</i>	9.787	10.159	8.368	-	8.368	8.017	7.604	7.645	5.600	Continuing	Continuing
• ET9: <i>Embedded Crypto Modernization (CRYPTO MOD)</i>	48.914	20.745	0.000	-	0.000	-	-	-	-	0.000	69.659
• B96002: <i>CRYPTOGRAPHIC SYSTEMS (CRYPTO SYS)</i>	47.536	26.350	72.457	-	72.457	36.113	26.399	30.776	39.721	Continuing	Continuing

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV5 / <i>Crypto Modernization (Crypto Mod)</i>
--	---	--

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• B96006: <i>Embedded Cryptographic Modernization</i>	-	3.520	0.000	-	0.000	-	-	-	-	0.000	3.520
• BS9716: <i>NON PEO-SPARES</i>	3.135	3.131	3.857	-	3.857	3.901	3.939	3.940	4.000	0.000	25.903

Remarks

Line Item & Title:

491 - Information Assurance Development - RDTE - funding executed by PL Net E, CIO/G6 and PL ES-CYBER
 ET9 - Embedded Crypto Modernization - RDTE
 B96002 - Cryptographic Systems - OPA2
 B96006 - Embedded Cryptographic Modernization - OPA2
 BS9716 - NON PEO-SPARES - OPA4

D. Acquisition Strategy

The objective of this program is to integrate and validate hardware and software solutions to provide COMSEC superiority in order to protect against threats, increase battlefield survivability/lethality, and enable critical Mission Command activities. The objective of the Cryptographic Systems program is to provide adaptive, flexible, and programmable cryptographic systems using best practices, lessons learned and programmatic management to meet the challenge of modernizing the Army's aging cryptographic systems. The effort will support the network operations from end-to-end throughout the force and the Common Operating Environment (COE) thus mitigating networked vulnerabilities to Army information security systems. CDD, approved by CIO/G6, 15 Jul 2010; ICD, approved by JROC, 25 Mar 2011; AAO; approved by G3, 15 Dec 2011 and revised and approved, 19 Jun 2015.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV5 / <i>Crypto Modernization (Crypto Mod)</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
VACM INTEROPERABILITY																												
TEST AND EVALUATION OF LINK/TRUNK ENCRYPTORS SW																												
TEST AND EVALUATION OF SECURE VOICE SW & HW																												
TEST AND EVALUATION OF INE SW & HW																												
HAIBE EXTENSION MANAGER																												
ECMI GPR SW UPGRADE																												
ECMI DEVELOPMENT																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) DV5 / <i>Crypto Modernization (Crypto Mod)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
VACM INTEROPERABILITY	1	2016	4	2018
TEST AND EVALUATION OF LINK/TRUNK ENCRYPTORS SW	1	2016	4	2019
TEST AND EVALUATION OF SECURE VOICE SW & HW	4	2013	4	2024
TEST AND EVALUATION OF INE SW & HW	1	2017	4	2024
HAIPE EXTENSION MANAGER	1	2017	4	2022
ECMI GPR SW UPGRADE	3	2016	2	2018
ECMI DEVELOPMENT	1	2017	2	2018

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>				Project (Number/Name) ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
ET9: <i>Embedded Crypto Modernization (CRYPTO MOD)</i>	-	48.914	20.745	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	69.659
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project ET9, Embedded Crypto Modernization (Crypto Mod) supports the Army's Network Modernization Strategy Lines of Effort (LOE) 1 Network Enablers Functions.

Modernize the AN/ARC-201D Single Channel Ground and Airborne Radio Systems (SINGARS) to meet CJCSI mandated cryptographic requirements through the execution of an engineering change effort to provide a bridging radio solution for Army Aviation rotary wing platforms. Support the Unified Network key near term imperative of achieving air-ground integration. Crypto modernization will ensure compliance with Key Management Infrastructure (KMI), add algorithms that address cyber vulnerabilities, improve 'secure but unclassified' network support, and provide better support to coalition interoperability.

Embedded Cryptographic Modernization Initiative (ECMI) is an upgrade activity that will ensure Army radios remain secure by operating with modern cryptographic algorithms. Tactical radios using legacy embedded cryptographic systems will no longer be able to communicate securely after cease key dates documented in the Chairman of the Joint Chiefs Staff instruction (CJCSI) 6510. In order to ensure Warfighters continue to have secured communications (i.e., encrypted data and voice), Army tactical radios are required to support modern cryptographic capabilities by implementing modern algorithms. If cease key dates are not met, the Army will be forced to communicate at risk.

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

	FY 2018	FY 2019	FY 2020
Title: Embedded Cryptographic Modernization Initiative (ECMI) Development Contracts	0.761	20.745	-
Description: ECMI Non Recurring Engineering (NRE) Contract Prep Work and Execution			
FY 2019 Plans: Support NRE development of ECMI efforts for vendor developmental and production contracts which supports NSA mandated Cease Key Date IAW CJCSI 6510.02E. This capability will ensure Army tactical radios operate with the latest cryptographic solutions.			
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease of FY 2020 funding is due to change in Air-to-Ground radio acquisition strategy. The ARC-201D crypto modernization is no longer required.			
Title: FY 2018 Rescission	48.153	-	-
Accomplishments/Planned Programs Subtotals	48.914	20.745	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</i>
--	---	---

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• 491: <i>Information Assurance Development</i>	9.787	10.159	8.368	-	8.368	8.017	7.604	7.645	5.600	Continuing	Continuing
• DV5: <i>Crypto Modernization (Crypto Mod)</i>	26.055	7.943	7.630	-	7.630	7.812	7.900	10.187	8.048	Continuing	Continuing
• B96002: <i>CRYPTOGRAPHIC SYSTEMS (CRYPTO SYS)</i>	47.536	26.350	72.457	-	72.457	36.113	26.399	30.776	39.721	Continuing	Continuing
• B96006: <i>Embedded Cryptographic Modernization</i>	-	3.520	0.000	-	0.000	-	-	-	-	0.000	3.520
• BS9716: <i>NON PEO-SPARES</i>	3.135	3.131	3.857	-	3.857	3.901	3.939	3.940	4.000	0.000	25.903

Remarks

Line Item & Title:

491 - Information Assurance Development - RDTE - funding executed by PL Net E, CIO/G6 and PL ES-CYBER

DV5 - Crypto Modernization - RDTE

B96002 - Cryptographic Systems - OPA2

B96006 - Embedded Cryptographic Modernization - OPA2

BS9716 - NON PEO-SPARES - OPA4

D. Acquisition Strategy

The objective of the ECMI program is to provide adaptive, flexible, and programmable embedded cryptographic solutions using best practices, lessons learned and programmatic management to meet the challenge of modernizing the Army's aging cryptographic tactical radios. ECMI will design, develop, and execute upgrade activities to ensure non modernized Army tactical radios will be able to accept and utilize modern cryptographic algorithms.

Applicable documents affecting Tactical Radio ONS, ORD, & CPDs requiring crypto:

CDD for Cryptographic Equipment and Services Modernization, Increment 1, dated March 2010.

CJCSI 6510.02E - "Cryptographic Modernization Planning", 01 April 2014.

CNSSP-15 - "National Information Assurance Policy on the Use of Public Standards for the Secure Sharing of Information Among National Security Systems", 01 October 2012.

NSA CSS 3-9 - "Cryptographic Modernization Initiative Requirements for Type 1 Cryptographic Products", dated 28 March 2013.

Memorandum from Army Acquisition Executive with subject "Management and Procurement of Communications Security (COMSEC) Capability, dated 28 Feb 2012.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</i>
--	---	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AMF-ARC-201D Crypto Mod - SE/PM	TBD	TBD : TBD	-	1.639		-		-		-		-	0.000	1.639	-
Subtotal			-	1.639		-		-		-		-	0.000	1.639	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PM TR Program Mgmt Personnel	C/CPFF	TBD : Aberdeen, MD	2.985	4.968		1.037		-		-		-	0.000	8.990	-
PM TR Program Mgmt Personnel	C/CPFF	BAH : Aberdeen, MD	1.424	-		-		-		-		-	0.000	1.424	-
AMF-ARC-201D Crypto Mod - Dev Engineering & Prototyping	TBD	TBD : TBD	-	22.752		19.708		-		-		-	0.000	42.460	-
Subtotal			4.409	27.720		20.745		-		-		-	0.000	52.874	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AMF-ARC-201D Crypto Mod - Test and Evaluation	TBD	TBD : TBD	-	19.555		-		-		-		-	0.000	19.555	-
Subtotal			-	19.555		-		-		-		-	0.000	19.555	N/A

			Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			4.409	48.914	20.745	-	-	-	0.000	74.068	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Market Research																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) ET9 / <i>Embedded Crypto Modernization (CRYPTO MOD)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Market Research	1	2017	4	2018

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>				Project (Number/Name) FF8 / <i>Unit Activity Monitoring (UAM)</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FF8: <i>Unit Activity Monitoring (UAM)</i>	-	19.491	0.971	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	20.462
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

User activity monitoring (UAM) automation/analytics will provide technical capability to enhance Army UAM analysis effectiveness and efficiency. The UAM mission is to observe and record the actions and activities of an individual, at any time, on any device accessing Army information on classified networks in order to detect insider threats and to support authorized investigations. Army UAM is a component of the Army Insider Threat (InT) Program. Army's InT Program and UAM are conducted in accordance with the National Defense Authorization Act for Fiscal Year 2012, section 922., Insider Threat Detection; Presidential Memorandum, National Insider Threat Policy and Minimum Standards for Executive Branch Insider Threat Programs, dated 21 November 2012; Executive Order 13587, Structural Reforms to Improve the Security of Classified Networks and the Responsible Sharing and Safeguarding of Classified Information, (Reference b) dated 7 October 2011, and Army Directive 2013-18 (Army Insider Threat Program), 31 July 2013. Innovative enhancements are required to improve UAM analysis productivity, data visualization, and workflow management. The analysis productivity objective is to develop and implement user behavior models that use UAM and other network data to identify anomalous user behavior over time, and to integrated new data sources into the UAM analytical data store and processing system. Data visualization advances will present UAM analysts behavior model processing results in an intuitive format that reduce the time required to review the results. Workflow management improvements will add new capabilities to the UAM workflow management system with the objective of enhancing analysis reporting productivity and metrics collection.

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

	FY 2018	FY 2019	FY 2020
Title: Unit Activity Monitoring	19.491	0.971	-
Description: FY 2019 Base funds in the total amount of \$.971 million are provided for software engineering development and testing resources to enhance the Army's UAM data processing, analysis, and data visualization capabilities, and its workflow management system, plus the integration of new data sources into the data processing component. All work is focused on the development of new capabilities.			
The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).			
FY 2019 Plans: Continue Unit Activity Monitoring			
FY 2019 to FY 2020 Increase/Decrease Statement: Program receives no funding in FY 2020			
Accomplishments/Planned Programs Subtotals	19.491	0.971	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) FF8 / <i>Unit Activity Monitoring (UAM)</i>

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

Remarks

D. Acquisition Strategy

FY 2019: The planned acquisition strategy to acquire UAM Automation/Analytics software engineering services is to award through the use of competitive acquisition, a Base plus three-option year firm-fixed price contract.

FY 2019: The planned acquisition is to exercise next option year of the software engineering services contract.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) FF8 / <i>Unit Activity Monitoring (UAM)</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Contract Award	1																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303140A / <i>Information Systems Security Program</i>	Project (Number/Name) FF8 / <i>Unit Activity Monitoring (UAM)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Contract Award	3	2018	3	2018

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	45.372	53.855	68.976	-	68.976	67.974	16.083	0.000	0.000	0.000	252.260
083: <i>Global Combat Support Sys - Army</i>	-	0.557	1.297	6.109	-	6.109	28.945	1.141	0.000	0.000	0.000	38.049
EK2: <i>GCSS-A Increment 2</i>	-	44.815	52.558	62.867	-	62.867	39.029	10.001	0.000	0.000	0.000	209.270
EK3: <i>AESIP Increment 2*</i>	-	0.000	0.000	0.000	-	0.000	0.000	4.941	0.000	0.000	0.000	4.941

*This project's R-2a exhibit has been suppressed due to funding not beginning until after FY 2020

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

The Global Combat Support System-Army (GCSS-Army) program has two components; a functional component titled GCSS-Army and a technology enabler component provided by the Army Enterprise Systems Integration Program (AESIP) Hub. The GCSS-Army program, coupled with AESIP, are information and communications technology investments that will provide key enabling support to the transformation of the Army into a network-centric, knowledge-based future force. The GCSS-Army approved Capability Development Document and Capability Production Document require an enterprise approach to replace current logistics and maintenance Standard Army Management Information Systems (STAMIS). GCSS-Army provides the Army's sustainment support for the soldier with a seamless flow of timely, accurate, accessible, and secure information management that gives combat forces a decisive edge. The AESIP program provides the system's enterprise hub services, centralized master data management and cross-functional business intelligence/analytics. 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 1 is now in the Capability Support phase, but requires continuous enhancements and will have a large increase in FY 2021 for particular enhancements for ground disconnected operations (wartime requirement) and enhanced audit initiatives..

Building on the foundation of the GCSS-Army Increment 1, Increment 2 will provide the Army Enterprise Aviation maintenance, enhanced Business Intelligence/Business Warehouse (BI/BW) and Army Pre-Positioned Stock (APS) functional capabilities to deliver greater efficiencies and to improve information flow and accuracy in real time to decision makers. Upon the completion of Increment 2, the Unit Level Logistics System-Aviation (Enhanced) (ULLS-A(E)), Unmanned Aircraft System-Initiative (UAS-I), and Army War Reserve Deployment System (AWRDS) will be eligible for retirement since the necessary functionality will have been replaced by capabilities implemented in GCSS-ARMY, AESIP, and the Logistics Modernization Program.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>
---	---

The FY 2020 funding provides for the blueprinting, design, engineering, integration, and testing of the GCSS-Army Enterprise Aviation software enhancement Release 2. It continues work on the change requests for the baseline system, build out the BI/BW capability, enhance Army logistics common operating picture capability, and continue development of the APS capability in both GCSS-Army and the Logistics Modernization Program (LMP).

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	64.370	68.619	33.630	-	33.630
Current President's Budget	45.372	53.855	68.976	-	68.976
Total Adjustments	-18.998	-14.764	35.346	-	35.346
• Congressional General Reductions	-0.038	-0.067			
• Congressional Directed Reductions	-17.383	-14.697			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.262	-			
• SBIR/STTR Transfer	-1.839	-			
• Adjustments to Budget Years	-	-	35.346	-	35.346

Change Summary Explanation

FY 2020 -+\$35.346 million adjustment to 0303141: \$30.561 million increase to Project EK2 (GCSS-A Increment 2) for acceleration of program; \$4.785 increase to Project 083 to support system change request enhancements.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>				Project (Number/Name) 083 / <i>Global Combat Support Sys - Army</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
083: <i>Global Combat Support Sys - Army</i>	-	0.557	1.297	6.109	-	6.109	28.945	1.141	0.000	0.000	0.000	38.049
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

GCSS-Army is the tactical unit/installation logistics system for the US Army and is essential for combat readiness. GCSS-Army modernizes automated logistics by implementing best business practices to streamline supply operations, maintenance operations, property accountability, tactical logistics and financial management and integration procedures in support of the Future Force transition path of the Army Campaign Plan. GCSS-Army is an Enterprise Resource Planning (ERP) system that tracks unit supplies, spare parts, organizational equipment, maintenance, total cost of ownership, and other financial transactions related to logistics for all Army units. This modernized application subsumes the outdated STAMIS that is not financially compliant and will integrate numerous local supply and logistics databases into a single, enterprise-wide authoritative system. GCSS-Army is financially compliant and is a key component for the Army Enterprise Strategy to be financially auditable. GCSS-Army affects every supply room, motor pool, direct support repair shop, warehouse, Logistics Readiness Center, and property book office in the Army. GCSS-Army is a key component of an ERP integrated solution that optimizes tactical logistics and finance domain business processes into a single approach. Delivering GCSS-Army eliminates the need for extensive maintenance and modification of aging, diverse software systems that are not cyber compliant, resulting in improved and efficient change control and configuration management through implementation of an enterprise system.

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

	FY 2018	FY 2019	FY 2020
Title: Government System Test and Evaluation	0.557	-	-
Description: Plans, conducts, and reports on developmental tests and assists in the planning, conducting, and reporting of operational and interoperability tests, assessments, and experiments in order to provide essential information for the acquisition and fielding of warfighting systems.			
Title: Product Development	-	1.255	6.109
Description: The funds in the GCSS-Army Increment 1 RDT&E line are for continuous enhancements. After transition to capability support phase, the RDT&E funding will be used to execute system change requests to enhance sustainment activities, accountability, auditability, and calculations of total cost of ownership.			
FY 2019 Plans: After transition to capability support phase, RDT&E funding will be used to execute System Change Requests (SCRs) to enhance current capabilities, accountability, auditability, and calculations of total cost of ownership. Implementation of SCRs to improve			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) 083 / <i>Global Combat Support Sys - Army</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>readiness enhances sustainment and effectiveness by synchronizing system data and utilizing enterprise interface tools to eliminate input errors.</p> <p>FY 2020 Plans: After transition to capability support, RDT&E funding will be used to execute System Change Requests (SCRs) to enhance capability support activities, improve readiness, system usability, automated accountability, auditability, and calculations of total cost of ownership. Implementation of SCRs enhance functional capabilities and improve system effectiveness by synchronizing system data and utilizing enterprise interface tools to eliminate input errors.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding was increased above FY 2019 level to fund system change request enhancements. RDTE funds are needed for system integration and test activities, enhancement of current business process activities, accountability, auditability, and calculations of total cost of ownership.</p>			
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>Description: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 Plans: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer</p>	-	0.042	-
Accomplishments/Planned Programs Subtotals	0.557	1.297	6.109

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• W00800: <i>GCSS-A Increment 1</i>	30.637	7.085	0.000	-	0.000	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy
Effective February 2, 2017, the 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."

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) 083 / <i>Global Combat Support Sys - Army</i>

GCSS-Army has an evolutionary acquisition strategy, that defined, developed, and deployed an initial operational capability based upon proven technology, time-phased requirements, projected threat assessments, and demonstrated manufacturing capabilities. Increment 1 is a viable stand alone capability. GCSS-Army Increment I was implemented in two waves:

Wave 1 contains the retail supply and associated financial functions and completed fielding in November 2015.

Wave 2 contains the property book and maintenance and associated financial functions. Fielding was completed in December 2017.

The GCSS-Army Increment I entered the Capability Support phase during FY 2018, and will enhance baseline capabilities using a continuous improvement approach.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army											Date: March 2019				
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>				Project (Number/Name) 083 / <i>Global Combat Support Sys - Army</i>							

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
1. PM GCSS-Army- PMO Operations	Various	PM GCSS-Army : Fort Lee, VA 23805	103.931	-		-		-		-		-	0.000	103.931	62.385
Subtotal			103.931	-		-		-		-		-	0.000	103.931	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
1. Enterprise Resource Planning (ERP) design and development	C/FPAF	Northrop Grumman Information Systems : Chester, VA 23836	465.845	-		1.255		6.109	Oct 2019	-		6.109	0.000	473.209	453.329
Government Developer Subject Matter Experts	IA	ASA (FM&C), CASCOM and GFEBS : Various Locations	22.315	-		-		-		-		-	Continuing	Continuing	19.730
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.042		-		-		-	0.000	0.042	-
Subtotal			488.160	-		1.297		6.109		-		6.109	Continuing	Continuing	N/A

Remarks

FY19 \$1.299 Million RDTE will be used for continuing baseline modernization.
 FY18 \$295K originally intended for Test and Development was actually executed for Product Development.

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
1. PM Support - Independent Verification and Validation (IV&V)	C/T&M	CAP Gemini : 2250 Corporate Park Dr, Herndon, VA 20171	1.031	-		-		-		-		-	0.000	1.031	1.031

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) 083 / <i>Global Combat Support Sys - Army</i>
--	---	---

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
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	25.580
3. PM Support - Program Management Support Services B	C/T&M	Logistics Management Institute : Colonial Heights, VA 23834	42.101	-		-		-		-		-	0.000	42.101	34.531
Subtotal			44.518	-		-		-		-		-	0.000	44.518	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
1. Test and Evaluation - Test and Evaluation	C/IDIQ	Northrop Grumman : McLean VA	39.393	0.557	Mar 2018	-		-		-		-	Continuing	Continuing	-
Subtotal			39.393	0.557		-		-		-		-	Continuing	Continuing	N/A

Remarks

FY18 \$295K originally intended for Test and Development was actually executed for Product Development.

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	676.002	0.557	1.297	6.109	-	6.109	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) 083 / <i>Global Combat Support Sys - Army</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Field Release 1.2 (Wave 2)	[Bar]				[Bar]																							
Continuous Enhancements (Design and Development)	[Bar]																											
Disconnected Operations	[Bar]				[Bar]								[Bar]															

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) 083 / <i>Global Combat Support Sys - Army</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Seg 2 Contract Award	1	2008	1	2008
Increment 1 - Acquisition Review	2	2008	2	2008
Increment 1/Segment 1 Operational Assessment	1	2008	3	2010
Increment 1/Release 1.1 DTOE	3	2010	4	2010
GCSS-Army Release 1.1 Design, Build, Test & Stabilize	1	2011	3	2011
Release 1.1 Intial Operational Test and Evaluation (IOT&E)	1	2012	1	2012
Release 1.1 Stabilization	2	2011	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
Field Release 1.2 (Wave 2)	1	2015	1	2018
Continuous Enhancements (Design and Development)	1	2018	4	2022
Disconnected Operations	1	2021	2	2022

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>				Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EK2: <i>GCSS-A Increment 2</i>	-	44.815	52.558	62.867	-	62.867	39.029	10.001	0.000	0.000	0.000	209.270
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The GCSS-Army program has two components: a functional component titled GCSS-Army and a technology enabler component provided by the AESIP Hub. GCSS-Army, coupled with AESIP, are information and communications technology investments that currently provide key enabling support to the transformation of the Army into a network-centric, knowledge-based future force.

Building on the foundation of GCSS-Army Increment 1, Increment 2 will provide the Army Enterprise Aviation maintenance, enhanced BI/BW and APS functional capabilities to deliver greater efficiencies and to improve information flow and accuracy in real time to decision makers. Upon the completion of Increment 2, the ULLS-A(E), UAS-I, and AWRDS will be retired since the necessary functionality will have been replaced by capabilities implemented in GCSS-ARMY, AESIP Hub, and the Logistics Modernization Program.

Enterprise Aviation capabilities extends timely and accurate visibility and accountability of materiel across the Army Logistics enterprise to Aviation Logistics, will provide capability support to Army aviation airworthiness, and allow auditability of transactions to unit level. Implementation of the BI/BW capabilities provide enhancements in materiel and supply chain readiness analytics that are critical to inform commanders' understanding of weapons systems readiness, helping them make better decisions faster on the battlefield and helping the Army achieve auditability. The APS capabilities directly impacts the speed at which a deploying unit can draw combat equipment while reducing the burden of the day-to-day maintenance and accountability of APS stock in the LMP. Increment 2 will have Research, Development, Test, and Evaluation (RDT&E) requirements until FY 2022.

The FY 2020 funding for GCSS-Army Increment 2 provides RDT&E efforts for Enterprise Aviation Release 2 to complete software development, Limited User Testing, Developmental Test and Evaluation, and begin Operational Test and Evaluation in FY 2020. Release 3 will begin software development to include system design effort, design reviews and provide Development Test and Evaluation. The BI/BW will be funded for incremental development to enhance AESIP Hub data foundation, enhance the Army Readiness Common Operating Picture and perform predictive analytics.

The FY 2020 funding will also provide funds to continue Wave 3 APS design and development in GCSS-Army, AESIP and LMP, and to expand the streamlined LMP business processes associated with the planning and management of war reserve stock and integrate those processes across the ERPs.

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

	FY 2018	FY 2019	FY 2020
Title: Blueprint and Design	43.875	-	-
Description: During this phase, the program develops and demonstrates prototype designs to reduce technical risk, validate design approaches, validate cost estimates, and refine requirements. This phase is an iterative process of maturing technologies and refining user performance parameters to ensure an affordable and executable production program.			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>

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

	FY 2018	FY 2019	FY 2020
<p>Title: System Design, Develop and Build</p> <p>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.</p> <p>FY 2019 Plans: Engineering and Manufacturing Development of Increment 2, to include design, development, and build. Complete all needed hardware and software detailed design; retire any open risks; build and test prototypes or first articles to verify compliance with capability requirements; and establish initial product baseline for all configuration items. Perform design reviews prior to test article fabrication and/or software build or increment coding. Develop and test Release 1.</p> <p>FY 2020 Plans: Enterprise Aviation: PM will field Release 1 to 51,000 users. PM will demonstrate that production/deployment design is stable and will meet stated and derived requirements based on acceptable performance in developmental test events; an operational assessment; mature software capability consistent with the software development schedule; no significant production risks, demonstrated interoperability and demonstrated operational supportability. Release 1 will complete full deployment in FY 2020. Enterprise Aviation Release 2 will be in software development and begin Limited User Testing, Developmental Test and Evaluation (DT&E), and Operational Test and Evaluation (OT&E) in FY 2020. PM will finalize designs for product support elements and integrate them into a comprehensive product support package ready for production and deployment to commence in early FY 2021. EAVN Release 3 will begin software development of Release 3 to include system design effort and a series of design reviews prior to test article fabrication and/or software build or coding. Development Test and Evaluation activities including evaluation of the system for meeting capability requirements, verification of the ability to achieve KPPs and KSAs, and that the system production and deployment and OT&E can be supported. BI/BW elements related to data visualization, reporting and data analytics will complete software development. PM will finalize designs for product support elements and integrate them into a comprehensive product support package ready for production and deployment in early FY 2021. Additional BI/BW capabilities associated with realizing further enhancements in business intelligence, common operating picture and data analytics across the Army logistics enterprise will begin software development to include system design and a series of design reviews prior to test article fabrication and/or software build or coding. Army Prepositioned Stock (APS) will continue the ERP Design and Development phase in FY20. Development will include integration of worldwide APS business processes. The design will also address key Army Materiel Command (AMC) planning requirements and the time critical support for more rapid deployment of Army combat forces already included in GCSS-Army. The APS capability requires development in the tactical logistics ERP, GCSS-Army, and the national logistics ERP, the Logistics Modernization Program (LMP).</p>	-	45.670	56.397

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Army Prepositioned Stock (APS) will continue Design and Development in FY20. Development will include integration of worldwide APS business processes across CONUS and OCONUS APS locations. The design will address critical support for delivery to Army combat forces, capability support, and accountability of APS stock. The LMP in conjunction with GCSS-Army will develop and test APS prototypes to verify compliance with capability requirements for all approved requirements. Design reviews will be conducted prior to testing of any solution. Since the submission of the original schedule and spend plan, the functional sponsor has revised the operational implementation of the Wave 3 APS capability, resulting in a shift of efforts of the development from GCSS-Army to LMP. APS design and development will proceed as a single release with the remaining project milestones and Acquisition reviews planned independently of the other GCSS-Army Increment 2 Waves.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to Army Prepositioned Stock efforts shifting from FY 2019 into FY 2020.</p>				
<p>Title: Program Management Office (PMO) Operations</p> <p>Description: PMO operations are to support engineering and manufacturing development.</p>		0.940	-	-
<p>Title: Government System Test and Evaluation</p> <p>Description: Government System Test and Evaluation</p> <p>FY 2019 Plans: FY 2019 Plans: Begin test and evaluation of Increment 2. Build and test prototypes or first articles to verify compliance with capability requirements; and establish initial product baseline for all configuration items. Perform design reviews prior to test article fabrication and/or software build or increment coding. Preparations for Developmental Test and Evaluation (DT&E) and Operational Test and Evaluation (OT&E).</p> <p>FY 2020 Plans: Wave 1 Enterprise Aviation Release 2 will be in software development and begin LUT, DT&E, and OT&E in FY 2020. The PMO will finalize designs for product support elements and integrate them into a comprehensive product support package ready for production and deployment to commence in early FY 2021. Enterprise Aviation Release 3 will begin software development of Release 3 to include system design effort and a series of design reviews prior to test article fabrication and/or software build or coding. The program will also perform DT&E activities. Wave 2 BI/BW is scheduled to complete development and testing of reporting capabilities in support of Enterprise Aviation Release 1 in FY 2019 provided the Presidents Budget FY 2019 is sustained at the requested level. These Wave 2 BI/BW capabilities will be enabled in FY 2020 to provide leaders at all echelons with the ability to visualize, query, and report on equipment readiness to enable decision-making, and are integral to the Enterprise Aviation accelerated requirement, and critical to building a more lethal force.</p>		-	4.490	6.470

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Wave 2 BI/BW elements related to data visualization, and reporting and data analytics will perform LUT, DT&E, and OT&E in FY 2020. The PMO will finalize designs for product support elements and integrate them into a comprehensive product support package ready for production and deployment in early FY 2021. Additional BI/BW capabilities associated with realizing further enhancements in business intelligence, common operating picture and data analytics across the Army logistics enterprise will begin software development to include system design effort and a series of design reviews prior to test article fabrication and/or software build or increment coding. The DT&E activities including evaluation of the system for capability requirements, and verification of the ability to achieve KPPs and KSAs, and that the system production and deployment and OT&E can be supported. FY 2019 to FY 2020 Increase/Decrease Statement: Increase to testing as program proceeds through the development phase and increases emphasis on testing in FY 2020.			
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	2.398	-
Accomplishments/Planned Programs Subtotals	44.815	52.558	62.867

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• W11011: <i>GCSS-Army Increment 2</i>	3.867	6.841	15.988	-	15.988	21.163	17.110	-	-	0.000	64.969
Remarks											

D. Acquisition Strategy
GCSS-Army Increment 2 continues the evolutionary acquisition strategy of Increment 1 and will define, develop, and deploy additional and enhanced capabilities to GCSS-Army based upon proven technology, time-phased requirements, projected threat assessments, and demonstrated manufacturing capabilities.

GCSS-Army Increment 2 is being implemented in three waves:

Wave 1 provides the Army Enterprise Aviation logistics capability.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>
Wave 2 provides the enhanced BI/BW capability.		
Wave 3 provides the APS capability.		
<u>E. Performance Metrics</u> N/A		

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>
--	---	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMO Operations	Allot	PMO : Huntsville AL	0.920	0.940	Oct 2017	-		-		-		-	2.920	4.780	-
Subtotal			0.920	0.940		-		-		-		-	2.920	4.780	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Blueprint and Design	RO	AMRDEC : Huntsville AL	45.407	43.875	Oct 2017	-		-		-		-	0.000	89.282	-
System Design, Develop and Build	C/CPFF	TBD : TBD	-	-		45.670	May 2019	56.397	Oct 2019	-		56.397	72.847	174.914	115.397
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		2.398		-		-		-	0.000	2.398	-
Subtotal			45.407	43.875		48.068		56.397		-		56.397	72.847	266.594	N/A

Remarks

Finish Design/ blueprinting and begin development (FY 2019) and build of Increment 2. Verify achievement of critical technical performance parameters and the ability to achieve key operational performance parameters, and assess progress toward achievement of critical operational issues. Validate system functionality, identify system capabilities, limitations, and deficiencies and assess system specification compliance, system safety, and compatibility. Enterprise Aviation. Following development and testing of Release 1 in FY 2019, PM will field Release 1 to 51,000 users. PM will demonstrate that production/deployment, design is stable and will meet stated and derived requirements based on acceptable performance in developmental test events; an operational assessment; mature software capability consistent with the software development schedule; no significant manufacturing risks, demonstrated interoperability and demonstrated operational supportability. Release 1 will complete full deployment in FY 2020. Enterprise Aviation Release 2 will be in software development, and begin Limited User Testing, Developmental Test and evaluation, and Operational Test and Evaluation in FY 2020. Release 2 enters production and deployment in early FY 2021. EAVN Release 3 will continue SW development to include system design effort and a series of design reviews prior to test article fabrication and/or software build or coding. Development Test and Evaluation activities including evaluation of the system for capability requirements, and verification of the ability to achieve KPPs and KSAs, and that the system production and deployment and OT&E can be supported. Wave 2 BI/BW is scheduled to complete development and testing of reporting capabilities in support of Enterprise Aviation Release 1 in FY20. These wave 2 BI/BW capabilities will be enabled in FY20 to provide leaders at all echelons with the ability to visualize, query, and report on equipment readiness to enable decision-making, are integral to the EAVN accelerated requirement, and critical to building a more lethal force. BI/BW elements related to data visualization, and reporting and data analytics will complete software development and Limited User Testing in FY 2020. PM will finalize designs for product support elements and integrate them into a comprehensive product support package ready for production and deployment in early FY 2021. Development of additional BI/BW capabilities associated with realizing further enhancements in business intelligence and common operating picture across the Army logistics enterprise begins, which includes system design and a series of design reviews prior to test article fabrication and/or software build or coding. Development Test and

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>
--	---	---

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			

Evaluation activities including evaluation of the system for capability requirements, and verification of the ability to achieve KPPs and KSAs, and that the system production and deployment and OT&E can be supported.
 Wave 3 APS: The LMP and GCSS-Army PMO will commence requirements design including Rapid Design Workshops and will award a contract to augment the PMO to support design, development, and delivery of the Wave 3 APS capability. APS design and development will proceed as a single release with the remaining project milestones and Acquisition reviews planned independently of the other GCSS-Army Increment 2 Waves. The PMO will develop and test APS prototypes to verify compliance with capability requirements for all approved requirements. Design reviews will be conducted prior to testing of any solution.

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation	C/Variou	TBD : TBD	-	-		4.490	Nov 2018	6.470	Oct 2019	-		6.470	39.916	50.876	39.916
Subtotal			-	-		4.490		6.470		-		6.470	39.916	50.876	N/A

Remarks
 Test and evaluation efforts anticipated to begin FY 2019. Includes Developmental Testing, Operational Testing, ATEC and JTIC tests, and various other tests as required by regulation. Enterprise Aviation Release 2 will perform Limited User Testing, Developmental Test and evaluation, and Operational Test and Evaluation in FY 2020. EAVN Release 3 will test article fabrication and/or software build or increment coding. Program will perform Development Test and Evaluation activities including evaluation of the system for capability requirements, and verification of the ability to achieve KPPs and KSAs, and that the system production and deployment and OT&E can be supported.

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	46.327	44.815	52.558	62.867	-	62.867	115.683	322.250	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Full Deployment ATP													▲ 1																			
Capability Support ATP																	▲ 2															
Rel 1 EAVN Blueprinting/ SW Development																																
Rel 1 Testing																																
Rel 1 Deployment													■																			
Release 2/3 EAVN Blueprinting/R2 SW Development											■																					
Rel 2 Testing													■																			
Rel 2 Deployment																	■															
Rel 3 EAVN SW Development													■																			
Rel 3 Testing																	■															
Rel 3 Deployment																					■											
Business Intelligence/Business Warehouse Blueprinting/Development																									■							
APS Blueprinting/Development													■																			

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
APS Testing																												
APS Deployment																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303141A / <i>Global Combat Support System</i>	Project (Number/Name) EK2 / <i>GCSS-A Increment 2</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Full Deployment ATP	4	2021	4	2021
Capability Support ATP	1	2023	1	2023
Rel 1 EAVN Blueprinting/ SW Development	1	2018	4	2019
Rel 1 Testing	1	2018	4	2019
Rel 1 Deployment	4	2019	3	2020
Release 2/3 EAVN Blueprinting/R2 SW Development	3	2018	4	2020
Rel 2 Testing	4	2019	1	2021
Rel 2 Deployment	2	2021	2	2022
Rel 3 EAVN SW Development	3	2020	4	2021
Rel 3 Testing	2	2021	1	2022
Rel 3 Deployment	2	2022	4	2022
Business Intelligence/Business Warehouse Blueprinting/Development	1	2019	2	2022
APS Blueprinting/Development	1	2020	4	2021
APS Testing	1	2022	2	2022
APS Deployment	2	2022	1	2023

Note

The schedule for GCSS-Army Increment 2 is based upon the Army Acquisition Executive (AAE) decision to utilize the Government System Integrator. Schedule reflects three releases for Enterprise Aviation (Wave 1), one release for Business Intelligence/Business Warehouse (Wave 2), and one release for Army Prepositioned Stock (Wave 3). Final blueprinting/development for Wave 3 is anticipated to begin in FY20. Product Manager LMP, in conjunction with GCSS-Army, will plan and lead project milestones and Acquisition reviews independently of the other GCSS-Army Increment 2 Waves.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303150A / <i>WWMCCS/Global Command and Control System</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	10.055	2.031	2.073	-	2.073	2.110	2.157	2.198	0.000	Continuing	Continuing
C86: <i>Army Global C2 System</i>	-	5.786	2.031	2.073	-	2.073	2.110	2.157	2.198	0.000	Continuing	Continuing
EA5: <i>Strategic and Joint Mission Command</i>	-	4.269	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.269

A. Mission Description and Budget Item Justification

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.

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.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0303150A / <i>WWMCCS/Global Command and Control System</i>
---	---

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	10.475	2.034	2.073	-	2.073
Current President's Budget	10.055	2.031	2.073	-	2.073
Total Adjustments	-0.420	-0.003	0.000	-	0.000
• Congressional General Reductions	-0.009	-0.003			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.411	-			

Change Summary Explanation

FY 2020 base funding will support DRRS-A, the Army's capability for unit readiness reporting, unit registration and force planning and projection activities that enable Title 10 reporting to Congress. Specifically the funding will provide program oversight, technical development, testing and training support to enable the readiness and force projection capabilities.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
C86: Army Global C2 System	-	5.786	2.031	2.073	-	2.073	2.110	2.157	2.198	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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 2018	FY 2019	FY 2020
Title: Program Support and Management (GCCS-A)	0.150	-	-
Description: Program management includes overall management of program execution, major events, reporting, funds execution, contract management, and logistical support. Includes participation in program planning meetings and IPTs			
Title: Program Support and Management for Readiness Capabilities (GCCS-A)	0.153	-	-
Description: Provides program management and acquisition oversight functions to enable the Army's readiness capabilities.			
Title: Defense Readiness Reporting System (DRRS-A) - Software Enhancements (Design/Develop)	4.616	1.658	1.037
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.			
FY 2019 Plans: Continue software enhancements for the Army's authoritative readiness reporting system.			
FY 2020 Plans: Will continue support to design, develop, and deploy emerging requirements into the Army's authoritative readiness reporting system to include: Software enhancements to support evolving DoD and Army readiness policies, processes, technical standards			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
and new interface and interoperability requirements needed to share Army authoritative readiness data with Joint and Army data sharing partners. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to cost savings.			
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. FY 2019 Plans: Continue developmental and interoperability testing. FY 2020 Plans: Will continue developmental and interoperability testing. FY 2019 to FY 2020 Increase/Decrease Statement: Increase attributable to inflation	0.867	0.308	1.036
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	0.065	-
Accomplishments/Planned Programs Subtotals	5.786	2.031	2.073

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• BA8250: Army Global Cmd & Control Sys (AGCCS)	2.658	-	0.000	-	0.000	-	-	-	-	0.000	2.658

Remarks

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303150A / <i>WWMCCS/Global Command and Control System</i>	Project (Number/Name) C86 / <i>Army Global C2 System</i>

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 continue to 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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0303150A / WWMCCS/Global Command and Control System				C86 / Army Global C2 System							
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Office Management (GCCS-A)	Various	Various : Various Locations	15.938	0.150		-		-		-		-	0.000	16.088	Continuing
Subtotal			15.938	0.150		-		-		-		-	0.000	16.088	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Defense Readiness Reporting System-Army Software Development	Option/CPFF	Software Engineering Center : APG, MD	10.217	4.603	Sep 2018	1.658	Mar 2019	1.037	Mar 2020	-		1.037	0.000	17.515	Continuing
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			28.062	4.603		1.723		1.037		-		1.037	0.000	35.425	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Contractors (GCSS-A)	C/FP	Various : Various	17.333	0.166		-		-		-		-	0.000	17.499	17.333
Subtotal			17.333	0.166		-		-		-		-	0.000	17.499	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Modernization of Defense Readiness Reporting System - Army																												
DRRS-A Modernization																												
DRRS-A Testing																												
DRRS-A Event 1																												
DRRS-A Event 2																												
DRRS-A Event 3																												
DRRS-A Event 4																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303150A / <i>WWMCCS/Global Command and Control System</i>	Project (Number/Name) C86 / <i>Army Global C2 System</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Modernization of Defense Readiness Reporting System - Army	1	2018	4	2023
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

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0303150A / WWMCCS/Global Command and Control System					Project (Number/Name) EA5 / Strategic and Joint Mission Command		
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EA5: Strategic and Joint Mission Command	-	4.269	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.269
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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 is a software only implementation of strategic applications and interoperability services that leverage the unified software architecture design (core infrastructure and selected common applications being implemented in the CPCE) that 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. Capability Packages enabled by AJaSC2 are providing Force Employment, Joint Force Synchronization, and Total Force Analysis. The operational payoff providing the Joint Force Commander a linkage between Army Mission Command and Unified Action Partners, enabling Unified Action through integration with existing and future applications (including CPCE and MCE) and contributes to achieving Shared Understanding during Unified Land Operations (ULO) facilitating effective Mission Command.

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

	FY 2018	FY 2019	FY 2020
Title: Software Design and Systems Engineering (Pre Milestone B)	1.853	-	-
Description: Software Development and Systems Engineering of Capability Packages (Common Operating Environment (COE) System Engineering)			
Title: Program Support and Management	1.137	-	-
Description: Program management includes overall management of program execution, major events, reporting, funds execution, contract management, and logistical support. Includes participation in program planning meetings and IPTs			
Title: Joint Requirements Validation Process	1.279	-	-
Description: Synchronization and Systems Engineering efforts with COE and Command Post Computing Environment (CPCE) and Joint C2 objective Architecture for CP 3, 4 and 5.			
Accomplishments/Planned Programs Subtotals	4.269	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303150A / WWMCCS/Global Command and Control System	Project (Number/Name) EA5 / Strategic and Joint Mission Command

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	Total Cost
			Base	OCO	Total					Complete	
• BA8250: Army Global Cmd & Control Sys (AGCCS)	2.658	-	0.000	-	0.000	-	-	-	-	0.000	2.658

Remarks

D. Acquisition Strategy

In accordance with the Army Mission Command for Unified Action (AMCUA) CDP approved December of 2014. The AMCUA CDP provides an overarching structure for future Army Mission Command systems. The AMCUA initiative will meet the requirements to enable planning and share situational awareness within an interdependent enterprise services network comprised of Unified Action Partners (UAP) and sister service components to achieve integrated mission operations. The AMCUA CDP defines the Land Component-unique Mission Command (MC) capabilities that the Army will develop to enable unified action through integration with existing and future Joint and Service command and control applications. MC capability contributions will enable Joint Forces Land Component Command (JFLCC) Commanders to gain and maintain Situational Awareness (SA), make decisions, and exercise authority and direction via a flexible, distributive and seamless system.

The acquisition strategy for AJaSC2 consists of the development, testing and fielding of Capability Packages implemented over time and synchronized with Command Post Computing Environment infrastructure. AJaSC2 will utilize the "Information Technology (IT) Box" construct. As such, evolutionary development of the software will continue as defined Capability Packages to meet emerging requirements that fall within the bounds of the approved IT Box. AJaSC2 strategy will consist of agile application development which will utilize and leverage existing and emerging technologies from Programs of Record and Common Operating Environment (COE) infrastructure. The product development under this R-Form will be accomplished in part under a Project Manager, Mission Command engineering services contract approach which will consist of multiple prime contractors competitively bidding on development efforts.

E. Performance Metrics


N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0303150A / WWMCCS/Global Command and Control System				EA5 / Strategic and Joint Mission Command							
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Office Management	Various	APG, MD : APG, MD	0.400	1.137		-		-		-		-	0.000	1.537	-
Subtotal			0.400	1.137		-		-		-		-	0.000	1.537	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Software Development and Systems Engineering	TBD	TBD : TBD	3.177	1.853		-		-		-		-	0.000	5.030	-
Synchronization with COE, CP CE, and Joint C2	TBD	TBD : TBD	0.510	1.279		-		-		-		-	0.000	1.789	-
Subtotal			3.687	3.132		-		-		-		-	0.000	6.819	N/A
Project Cost Totals			4.087	4.269		0.000		-		-		-	0.000	8.356	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303150A / WWMCCS/Global Command and Control System	Project (Number/Name) EA5 / Strategic and Joint Mission Command

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
MDD Program Documentation	[Redacted]																											
MDD Delegation	 MDD Delegation																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0303150A / <i>WWMCCS/Global Command and Control System</i>	Project (Number/Name) EA5 / <i>Strategic and Joint Mission Command</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Validate C-BA	2	2017	4	2017
Design and Systems Engineering	1	2017	3	2017
MDD Program Documentation	4	2017	4	2018
MDD Delegation	3	2018	3	2018

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019	
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0305172A / <i>Combined Advanced Applications</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	1.100	1.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.600
XT9: <i>Combined Advanced Applications</i>	-	1.100	1.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.600

A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)

	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	1.100	1.500	1.500	-	1.500
Current President's Budget	1.100	1.500	0.000	-	0.000
Total Adjustments	0.000	0.000	-1.500	-	-1.500
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-1.500	-	-1.500

Change Summary Explanation

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.450	0.459	-	0.459	0.467	0.500	0.000	0.000	0.000	1.876
EF4: <i>Integrated Broadcast System</i>	-	0.000	0.450	0.459	-	0.459	0.467	0.500	0.000	0.000	0.000	1.876

A. Mission Description and Budget Item Justification

The Joint Program Office (JPO) for Integrated Broadcast Service (IBS) Terminals supports the Joint Services and the Special Operations Command (SOCOM). The IBS transmits worldwide time-sensitive tactical and strategic intelligence and targeting data to all echelons of Joint Service operational users. The JPO is responsible for coordinating modernization and sustainment of IBS terminals compatible with the Ultra High Frequency (UHF) SATCOM IBS broadcasts. The JPO is pursuing a next generation non-developmental item to replace the existing Joint Tactical Terminals (JTT). The transmit/receive-capable JTT systems currently consist of the JTT-Senior and JTT-IBS configurations, and they satisfy the radio communication Key Performance Parameters for the IBS Program. The JTT is the official IBS producer system, and ensures continued IBS interoperability to a variety of tactical producers/consumers across the Joint Services.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	0.450	0.459	-	0.459
Current President's Budget	0.000	0.450	0.459	-	0.459
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>				Project (Number/Name) EF4 / <i>Integrated Broadcast System</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EF4: <i>Integrated Broadcast System</i>	-	0.000	0.450	0.459	-	0.459	0.467	0.500	0.000	0.000	0.000	1.876
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Program Office (JPO) for Integrated Broadcast Service (IBS) Terminals supports the Joint Services and the Special Operations Command (SOCOM). The IBS transmits worldwide time-sensitive tactical and strategic intelligence and targeting data to all echelons of Joint Service operational users. The JPO is responsible for coordinating modernization and sustainment of IBS terminals compatible with the UHF SATCOM IBS broadcasts. The JPO is pursuing a next generation non-developmental item to replace the existing Joint Tactical Terminals (JTT) and performs JTT life cycle program management and technical fixes. The IBS network uses Type-1 encryption, Common Interactive Broadcast (CIB), and Common Message Format (CMF). Funds support acquisition related technical development, requirements, testing and integration of next generation JTT systems and components.

FY 2020 funds in the amount of \$0.459 million will be used for testing and certification for the next generation JTT and engineering services to support the program office.

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

	FY 2018	FY 2019	FY 2020
Title: Support Costs and Management Services	-	0.450	0.459
Description: Engineering Support			
FY 2019 Plans: Initiate system engineering support.			
FY 2020 Plans: Continue system engineering support.			
FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to inflation.			
Accomplishments/Planned Programs Subtotals	-	0.450	0.459

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• V29600: <i>JTT/CIBS-M (MIP)</i>	12.154	9.027	7.686	-	7.686	5.310	5.482	1.807	-	0.000	41.466

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>	Project (Number/Name) EF4 / <i>Integrated Broadcast System</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

Remarks

FY 2020 funds continue support of the next generation JTT acquisition initiated in FY 2019.

D. Acquisition Strategy

The Integrated Broadcast Service (IBS) was designed to consolidate legacy broadcasts into an interoperable set of broadcasts that can carry threat warning and situational data to both users and producers. The requirement for IBS is documented in the Integrated SIGINT Information Mission Needs Statement (MNS) validated by the Joint Requirements Oversight Council (JROC) Memo (JROCM) 115-95 on 15 September 1995. The JTT program is an effort to provide common tactical terminals capable of receiving and transmitting into the IBS UHF broadcasts. The House Permanent Select Committee for Intelligence (HPSCI) requested an IBS Implementation Plan, which was approved by the Assistant Secretary for Defense for Command, Control, Communications and Intelligence (ASD/C3I) (ref (i)) on 24 October 1995. The JTT was included as part of the solution in the Implementation Plan. The JTT program Operational Requirements Document (ORD) was signed on 24 September 1996. Subsequent updates in March 2005 and November 2017 were made to reflect changes in interoperability/Net Readiness certifications and Post Milestone C enhancements respectively. Additional fact of life administrative changes were made and the updated ORD was signed on 25 April 2018. The JTT is integrated into platforms that have a requirement to interact (transmit and/or receive) with the IBS Common Interactive Broadcast (CIB). JTT is a post-Milestone C program. The legacy IBS Terminals will reach sustainment end-of-life in FY2025. The procurement of a post-Milestone C replacement was initiated to replace the end-of-life systems, leverage updated technology, and enable flexible configurations to meet Joint customer operational needs. The procurement for a modernized Non-Developmental Item terminal will access multiple vendors by leveraging competitively awarded contracts.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>	Project (Number/Name) EF4 / <i>Integrated Broadcast System</i>
--	---	--

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
User Support	MIPR	ICOE : Fort Huachuca, AZ	0.046	-		-		-		-		-	0.000	0.046	-
Project Management Support	Allot	PM DCGS-A : APG, MD; Fort Huachuca, AZ	0.075	-		-		-		-		-	0.000	0.075	-
Subtotal			0.121	-		-		-		-		-	0.000	0.121	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Integration and Testing of JTT fleet Modernization	MIPR	JITC : Fort Huachuca, AZ; APG,MD	0.629	-		0.450		0.459		-		0.459	0.000	1.538	-
Subtotal			0.629	-		0.450		0.459		-		0.459	0.000	1.538	N/A

Project Cost Totals	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	0.750	-		0.450		0.459		-		0.459	0.000	1.659	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>		Project (Number/Name) EF4 / <i>Integrated Broadcast System</i>	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Next Generation IBS Terminals Integration and Test																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305179A / <i>Integrated Broadcast Service (IBS)</i>	Project (Number/Name) EF4 / <i>Integrated Broadcast System</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Next Generation IBS Terminals Integration and Test	2	2019	1	2023

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	16.925	6.000	5.097	34.100	39.197	39.079	4.327	4.244	4.099	0.000	113.871
11A: <i>Advanced Payload Develop & Spt (MIP)</i>	-	10.733	1.252	0.143	34.100	34.243	34.246	0.000	0.000	0.000	0.000	80.474
11B: <i>Tsp Development (MIP)</i>	-	1.480	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.480
123: <i>Joint Technology Center System Integration</i>	-	4.712	4.748	4.954	-	4.954	4.833	4.327	4.244	4.099	0.000	31.917

A. Mission Description and Budget Item Justification

Project 11A: The Advanced Payloads Development project line 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.

Small Tactical Radar - Lightweight (STARLite) Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI) is a lightweight, high performance, all weather, multi-functional radar system for the Gray Eagle UAS. The STARLite system provides wide area, near real time Reconnaissance, Surveillance and Target Acquisition (RSTA) capabilities. It operates throughout the UAS flight mission profile in adverse weather and through battlefield obscurants. The Synthetic Aperture Radar (SAR) mode generates quality images for the battlefield commander for detection, classification and location of stationary commercial wheeled vehicle-size targets. The MTI mode detects moving ground targets, to include man-sized detection, and provides location information and performs cross-cue with the Electro-Optic/Infrared (EO/IR) sensors. STARLite is increasing its software capabilities based on Initial Operational Test and Evaluation (IOT&E) results which will increase automation and upgrade to a common Graphical User Interface (GUI) to align with the Common Operating Environment (COE) requirement to enable Sensor Processing and Exploitation (SPE). The SPE software enhancements will improve performance, reduce operator workload and enhance operator effectiveness.

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 technologies that directly support emerging requirements of the Army's Current and Future Force.

Project 11B: The Tactical Signals Intelligence (SIGINT) Payload (TSP) is a SIGINT sensor for the Gray Eagle that detects radio frequency (RF) emitters. The TSP system will provide a SIGINT capability to the tactical commander. The TSP system will be a modular, scalable payload using an architecture that is software reconfigurable to allow for growth and flexibility as technology, and as the adversaries use of technology, changes. This flexible architecture allows for third party

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>
---	--

software applications to be integrated into the TSP system. The TSP system processing, control and data dissemination is integrated into the Distributed Common Ground System - Army (DCGS-A) via the Operational Ground Station. It supports Manned/Unmanned (MUM) teaming with Brigade Combat Team ground SIGINT Terminal Guidance (STG) teams and manned airborne assets. The TSP system improves situational awareness and shortens the targeting cycle by detecting and identifying emitters associated with high value targets (HVTs). The TSP system is capable of processing conventional signals, standard military signals, and modern signals of interest. This includes detection, recognition, identification, direction finding, and high confidence geo-location.

Project 123: 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).

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	16.925	6.000	5.099	-	5.099
Current President's Budget	16.925	6.000	5.097	34.100	39.197
Total Adjustments	0.000	0.000	-0.002	34.100	34.098
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.002	34.100	34.098

Change Summary Explanation

The FY 2020 funding profile changes reflect OCO funding of the Target Location Accuracy (TLA) and Tactical Awareness Improvement (TAI) product improvement efforts for the Common Sensor Payload (CSP), under project 11A.

No FY 2020 budget submission STARLite Program of Record (POR).

No FY 2020 budget submission for TSP POR.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>				Project (Number/Name) 11A / <i>Advanced Payload Develop & Spt (MIP)</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
11A: <i>Advanced Payload Develop & Spt (MIP)</i>	-	10.733	1.252	0.143	34.100	34.243	34.246	0.000	0.000	0.000	0.000	80.474
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.

Small Tactical Radar - Lightweight (STARLite) ACAT III - Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI) is a lightweight, high performance, all weather, multi-functional radar system for the Gray Eagle UAS. The STARLite system provides wide area, near real time RSTA capabilities. It operates throughout the UAS flight mission profile in adverse weather and through battlefield obscurants. The Synthetic Aperture Radar (SAR) mode generates quality images for the battlefield commander for detection, classification and location of stationary commercial wheeled vehicle-size targets. The MTI mode detects moving ground targets, to include man-sized detection, and provides location information and performs cross-cue with the Electro-Optic/Infrared (EO/IR) sensors. STARLite is increasing its software capabilities based on Initial Operational Test and Evaluation (IOT&E) results which will increase automation and upgrade to a common Graphical User Interface (GUI) to align with the Common Operating Environment (COE) requirement to enable Sensor Processing and Exploitation (SPE). The SPE software enhancements will improve performance, reduce operator workload and enhance operator effectiveness.

Common Sensor Payload (CSP) - 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 2020 base dollars in the amount of \$0.143M and OCO dollars in the amount of \$34.1M will fund product improvements to enhance CSP lethality through enhanced Target Location Accuracy (TLA) and usability through Tactical Awareness Improvement (TAI). TLA provides validated, precision geolocation data for real-time targeting by coordinate-seeking weapons, reducing the kill chain timeline from minutes to seconds. TAI provides the warfighter enhanced situational awareness of the battlefield thru full spectrum imaging, aided target recognition, and simultaneous targeting.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: STARLite SPE	1.620	0.626	-	-	-
Description: Software Development to improve STARLite SPE Development, Testing and Integration.					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 11A / <i>Advanced Payload Develop & Spt (MIP)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<i>FY 2019 Plans:</i> STARLite Sensor CE Development					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Program will continue to implement transitional strategy towards full operational sustainment.					
<i>Title:</i> CSP Increased Usability and Lethality <i>Description:</i> Software and Hardware developments to increase lethality and usability of the CSP while reducing cognitive burden on the Warfighter.	9.113	0.626	0.143	34.100	34.243
<i>FY 2019 Plans:</i> Developing Tactical Awareness Improvements for increased operator situational awareness and program office management support.					
<i>FY 2020 Base Plans:</i> Will continue to develop Tactical Awareness Improvement (TAI) for increased operator situational awareness and reduced cognitive burden.					
<i>FY 2020 OCO Plans:</i> Will continue to develop and test Target Location Accuracy (TLA) to improve lethality; Develop TAI; program office management support.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Program focus shift from TAI S&T efforts to TLA and TAI product improvement efforts.					
Accomplishments/Planned Programs Subtotals	10.733	1.252	0.143	34.100	34.243

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• A01003: SAR/MTI (MIP)	19.000	-	0.000	-	0.000	-	-	-	-	0.000	19.000
• A01005: CSP FMV (MIP)	50.010	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing

Remarks
MQ-1 PAYLOAD - UAS - A00020 is a shared Aircraft Procurement, Army (APA) funding line for STARLite (A01003), Tactical Signals Intelligence (SIGINT) Payload (TSP) (A01004), and Common Sensor Payload (CSP) (A01005).

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 (MIP)

D. Acquisition Strategy

STARLite SAR/MTI is a threshold requirement for the Gray Eagle UAS. The acquisition strategy for STARLite program was based on a full and open competition for the Army. Full Rate Production (FRP) was successfully achieved in June 2013. A follow-on production contract was awarded in April 2014 to procure all remaining STARLite Payloads required for the Gray Eagle platform. Based on Initial Operational test and Evaluation (IOT&E) results, STARLite is increasing its software capabilities to increase automation and upgrade to a common Graphical User Interface (GUI) and aligns SPE with the COE requirements. The SPE software enhancements will improve performance, reduce operator workload and enhance operator effectiveness. A competitive Research, Development, Test, and Evaluation (RDTE) funded contract was awarded to Northrop Grumman in October 2013 to perform trade studies and begin the development of the software improvements. Integration onto the Gray Eagle will be done via a sole source cost-plus fixed fee contract with the UAS prime contractor, General Atomics ASI.

Common Sensor Payload (CSP) EO/IR/LD enables the Gray Eagle to meet KPP (Key Performance Parameter) requirements. The acquisition strategy for the CSP program was based on a full and open competition for the Army. A competitive contract was awarded in November 2007 to Raytheon for the build, integration, test and delivery of the CSP. Full Rate Production (FRP) was achieved in June 2013. A three (3) year system support contract was awarded in July 2015 for sustainment and upgrade of the CSP to include retrofitting standard definition sensors with high definition sensors and to perform RDT&E activities. The Enhanced EO/IR Capability Production Document, approved 19 December 2016, defines additional KPP requirements for Full Motion Video (FMV) sensors. The first KPP increases detection, recognition, and identification requirements which can only be met with the High Definition (HD) variation of the CSP. Currently, units are being fielded HD CSPs, with additional HD CSPs in production and retrofit. The second KPP requirement is for the CSP to be a metric sensor providing rapid and enhanced Target Location Accuracy (TLA). A five (5) year follow-on production and system support contract is scheduled for award in June 2019 for integration, test, upgrade, and sustainment of these enhanced capabilities. The FY 2020 acquisition strategy for CSP includes: maturation of hardware and software product improvements, production of qualification assets and initiation of testing necessary to meet identified CSP-TLA requirements, and efforts to improve situational awareness, provide multiple fields of view, and enhance targeting capabilities as CSP-TAI transitions from an S&T effort to development.

The acquisition strategy is to complete STARLite SPE software developmental test and integration onto Gray Eagle.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 11A / <i>Advanced Payload Develop & Spt (MIP)</i>
--	--	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CSP Program Management	MIPR	PM EOIR : Fort Belvoir, VA	0.190	0.632		0.100	Dec 2018	0.000		2.217	Dec 2018	2.217	Continuing	Continuing	Continuing
STARLite Program Mgmt Personnel	Various	PM SAI : Aberdeen, MD	1.150	0.617		0.227		-		-		-	Continuing	Continuing	Continuing
Subtotal			1.340	1.249		0.327		0.000		2.217		2.217	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
CSP Development	C/CPFF	Raytheon : McKinney, TX	84.022	-		-		-		-		-	0.000	84.022	-
STARLite Sensor CE Development	SS/CPFF	General Atomics ASI : Potway, CA	1.295	1.003		0.399		-		-		-	Continuing	Continuing	Continuing
CSP HW/SW Improvements Reduce Cognitive Burden	MIPR	Night Vision Labs : Fort Belvoir, VA	2.819	1.202		0.426	Mar 2019	-		-		-	Continuing	Continuing	Continuing
CSP Target Location Accuracy (TLA)	SS/CPFF	Raytheon : McKinney, TX	-	6.187		-		0.000		8.919		8.919	Continuing	Continuing	Continuing
CSP HW/SW Improvements Reduce Cognitive Burden (TAI)	SS/CPFF	Raytheon : McKinney, TX	-	-		-		0.143		7.475		7.618	Continuing	Continuing	Continuing
CSP TLA Integration	MIPR	Various : Various	-	-		-		0.000		3.755		3.755	Continuing	Continuing	Continuing
CSP TAI Integration	MIPR	Various : Various	-	-		-		0.000		5.786		5.786	Continuing	Continuing	Continuing
Subtotal			88.136	8.392		0.825		0.143		25.935		26.078	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0305204A / Tactical Unmanned Aerial Vehicles				11A / Advanced Payload Develop & Spt (MIP)							
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
CSP TLA Integration (NRE)	SS/CPFF	PM MAE(General Automics) : San Diego, CA	-	0.781		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			-	0.781		-		-		-		-	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
CSP Testing	MIPR	Various : Various	17.086	-		-		-		-		-	0.000	17.086	-
CSP HW/SW Improvements Reduce Cognitive Burden	MIPR	Night Vision Labs : Fort Belvoir, VA	0.200	0.311		0.100	Mar 2019	-		-		-	Continuing	Continuing	Continuing
STARLite YTC Software Development Testing	MIPR	YPG : Yuma Proving Ground	0.910	-		-		-		-		-	Continuing	Continuing	Continuing
STARLite IGE Testing	MIPR	Various : Various	13.441	-		-		-		-		-	0.000	13.441	-
CSP Testing (TLA)	MIPR	Various : Various	-	-		-		0.000		1.732		1.732	Continuing	Continuing	Continuing
CSP Testing (TLA)	SS/CPFF	Raytheon : McKinney, TX	-	-		-		0.000		1.533		1.533	Continuing	Continuing	Continuing
CSP Testing (TAI)	MIPR	Various : Various	-	-		-		0.000		2.049		2.049	0.000	2.049	-
CSP Testing (TAI)	SS/CPFF	Raytheon : McKinney, TX	-	-		-		0.000		0.634		0.634	Continuing	Continuing	Continuing
Subtotal			31.637	0.311		0.100		0.000		5.948		5.948	Continuing	Continuing	N/A
Project Cost Totals			121.113	10.733		1.252		0.143		34.100		34.243	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 7		R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>		Project (Number/Name) 11A / <i>Advanced Payload Develop & Spt (MIP)</i>	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
CSP TAI Retrofit																																				
CSP TLA Retrofit																																				

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 11A / <i>Advanced Payload Develop & Spt (MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
CSP HD (EO/IR/LD) Production	2	2013	2	2020
CSP HD Retrofit	4	2013	4	2020
CSP HW/SW Improvements Reduce Cognitive Burden Development	1	2016	4	2019
CSP HW/SW Improvements Reduce Cognitive Burden Testing / Integration	3	2017	4	2020
STARLite (SAR/MTI) Award	3	2008	3	2008
STARLite (SAR/MTI) Increment 1 Performance Enhancements and Testing	2	2009	2	2011
STARLite (SAR/MTI) Systems Integration for Gray Eagle UAS	3	2008	4	2012
STARLite (SAR/MTI) Testing (IOT&E)	4	2009	4	2012
STARLite (SAR/MTI) Production	3	2008	3	2016
CSP TLA Development	2	2018	4	2020
CSP TLA Testing/Integration	2	2018	1	2021
Improvements to STARLite Sensor Processing and Exploitation	1	2014	3	2016
STARLite SPE SW Developmental Test	2	2016	1	2017
STARLite (401) SW Integration Flight Test	4	2016	1	2018
STARLite (500) SPE SW Integration Flight Test	3	2017	3	2018
Advanced Payloads Development	1	2020	4	2021
STARLite (501) SPE SW Integration Flight Test	3	2018	3	2019
STARLite Sensor CE Development	2	2018	2	2021
CSP TAI Development	1	2020	1	2023
CSP TAI Testing/Integration	1	2020	1	2023
CSP TAI Retrofit	1	2024	4	2027
CSP TLA Retrofit	1	2023	4	2024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 11B / <i>Tsp Development (MIP)</i>
--	--	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
11B: <i>Tsp Development (MIP)</i>	-	1.480	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.480
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Tactical Signals Intelligence (SIGINT) Payload (TSP) is a SIGINT sensor for the Gray Eagle that detects radio frequency (RF) emitters. The TSP system will provide a SIGINT capability to the tactical commander. The TSP system will be a modular, scalable payload using an architecture that is software reconfigured to allow for growth and flexibility as technology, and as the adversaries use of technology, changes. This flexible architecture allows for third party software applications to be integrated into the TSP system. The TSP system processing, control and data dissemination is integrated into the Distributed Common Ground System - Army (DCGS-A) via the Operational Ground Station. It supports Manned/Unmanned (MUM) teaming with Brigade Combat Team ground SIGINT Terminal Guidance (STG) teams and manned airborne assets. The TSP system improves situational awareness and shortens the targeting cycle by detecting and identifying emitters associated with high value targets (HVTs). The TSP system is capable of processing conventional signals, standard military signals, and modern signals of interest. This includes detection, recognition, identification, direction finding, and high confidence geo-location.

No Investment Funding for (FY 2019- beyond) for TSP POR.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: TSP/INSCOM ASSESSMENT	1.480	-	-	-	-
Description: TSP/INSCOM Assessment for acceptance of capability, urgent materiel release, forward operational assessment, for fielding decision. In addition, any activities for TSP for ongoing system improvements.					
Accomplishments/Planned Programs Subtotals	1.480	-	-	-	-

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• A01004: <i>SIGINT (MIP)</i>	1.500	-	0.000	-	0.000	-	-	-	-	0.000	1.500
• 0605766A: <i>National Capabilities Integration (MIP)</i>	9.382	12.340	7.835	-	7.835	7.677	11.682	11.054	11.299	0.000	71.269

Remarks

MQ-1 PAYLOAD - UAS - A00020: Shared Aircraft Procurement, Army (APA) procurement funding line for CSP, STARLite, TSP, and Advanced Payloads.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 11B / <i>Tsp Development (MIP)</i>

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

SIGINT (MIP) - A01004: Procurement funding line for TSP Payloads. Under Parent Line MQ-1 Payloads (MIP) - A01001.

TSP Theater Net-Centric Geolocation (TNG) - PE0605766A, Project DX9: TNG funding included in Tactical Exploitation of National Capabilities (TENCAP) funding line.

D. Acquisition Strategy

TSP is a threshold requirement for the MQ-1C Gray Eagle UAS. The TSP program completed the Engineering and Manufacturing Development (EMD) phase with a Milestone B decision in September 2011. The TSP Program EMD contract award was based on full-and-open competition with a period of performance that was completed in October 2015, and focused on integration and test onto the Gray Eagle platform, and integration and test of TSP software into the Operational Ground Station. The TSP EMD program is a derivative of systems that were fielded as a Quick Reaction Capability on the MQ-1C UAS and a variety of other manned platforms. The demonstrated scalability of these fielded materiel solutions allows the TSP EMD program to leverage effort that directly supports the TSP EMD program.

The TSP program entered the Low Rate Initial Production (LRIP) phase with a Milestone C decision that was approved on 2 May 2014. The TSP Program LRIP contract award was based on sole source selection with a period of performance that was completed on June 2016, and primarily focused on the obsolescence of the EMD phase assets via the required Engineering Change Proposals, and the first initial production of 30 TSP Payloads in support of the Gray Eagle Platform. The TSP Program ICLS contract award was a result of previous sole selection with a period of performance of 12-months with a 5 year option for total completion into August 2021. The primary focus supports fielding of system, continuous contractual support through operational and sustainment transition, engineering corrective actions, support of the MQ-1C (ER), and the conversion of the 30 LRIP TSP systems.

The TSP Block 1 is the current Program of Record capability. TSP Beyond Block 1 will address objectives and remaining deferred Block 1 threshold requirements as reflected in the approved Capability Production Document (CPD).

Improved Gray Eagle (IGE)- Program Manager Unmanned Aircraft Systems(PM UAS)received a Congressional plus up of \$49M President's Budget 2015 to procure Extended Range UAS which increases the CPD objective endurance requirements for the current GE configuration to an Improved Gray Eagle (IGE).

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0305204A / Tactical Unmanned Aerial Vehicles				11B / Tsp Development (MIP)							
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management-Gov	RO	PM SAI : APG	8.556	-		-		-		-		-	0.000	8.556	-
Program Management Support	MIPR	Various : APG	4.575	-		-		-		-		-	0.000	4.575	Continuing
FFRDC Support	SS/CR	MITRE : APG	2.548	0.350		-		-		-		-	0.000	2.898	-
Subtotal			15.679	0.350		-		-		-		-	0.000	16.029	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
TSP EMD	C/CPIF	BAE Systems, : Nashua, NH	20.206	-		-		-		-		-	0.000	20.206	-
TSP Engineering Changes	SS/CPFF	BAE Systems : Nashua, NH	8.295	0.477		-		-		-		-	0.000	8.772	-
MQ-1C (ER) and OGS Integration	SS/CPFF	Various : Various	6.575	-		-		-		-		-	0.000	6.575	-
TSP System Support (Logistics, Training, & Test)	MIPR	Various : Various	11.843	-		-		-		-		-	0.000	11.843	-
Block 2	C/CPIF	To Be Determined : To Be Determined	-	0.478		-		-		-		-	0.000	0.478	-
Subtotal			46.919	0.955		-		-		-		-	0.000	47.874	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	MIPR	Various : Various	6.158	0.175		-		-		-		-	0.000	6.333	-
Subtotal			6.158	0.175		-		-		-		-	0.000	6.333	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 11B / <i>Tsp Development (MIP)</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024											
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4								
TSP DT/LUT 6U	TSP DT/LUT 6U				TSP/INSCOM ASSESSMENT				FOA				PROGRAM DECISION																							
TSP/INSCOM ASSESSMENT																																				
PROGRAM DECISION																																				
FORWARD OPERATIONAL ASSESSEMENT																																				

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 11B / <i>Tsp Development (MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
TSP DT/LUT 6U	2	2017	1	2018
TSP/INSCOM ASSESSMENT	1	2019	1	2019
PROGRAM DECISION	3	2019	3	2019
FORWARD OPERATIONAL ASSESSEMENT	4	2019	4	2019

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>				Project (Number/Name) 123 / <i>Joint Technology Center System Integration</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
123: <i>Joint Technology Center System Integration</i>	-	4.712	4.748	4.954	-	4.954	4.833	4.327	4.244	4.099	0.000	31.917
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Unmanned Aircraft System (UAS) Joint Technology Center/System 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 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).

Continued integration of Night Vision Image Generator (NVIG) into the Modeling & Simulation domain as it pertains to UAS simulation. Terrain, and model development for NVIG and Virtual Reality Scene Generator (VRSG) to increase fidelity. Support of theater level Exercises, Ulchi Freedom Guardian (UFG), Yama Sakura (YS) and Key Resolve (KR). Improvement of mapping capability for mission planning. Redesign of Windows Entity Server (WES) and NetLink to improve network routing, thus lessening bandwidth consumption. Incorporation of Common Image Generator Interface to provide an Image Generator (IG) agnostic solution thereby allowing for other IGs to be supported that are currently not supported. Continued implementation of tactical protocols into the simulation domain to enhance interoperability. Development of a Heads Up Display (HUD) designer application that will allow for the creation and modification of HUDs without having to touch the software baseline thereby reducing costs and increasing fidelity and speed of solution in theater. Redesign of generic 6 Degree of Freedom (DoF) application that will allow for creation of new platforms without touching code; again a reduction in costs and increased solution delivery speed.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	4.212	4.248	4.354	-	4.354
Description: Funding is provided for the following efforts.					
FY 2019 Plans: Continue movement towards standards based solutions, e.g. Common Image Generator Interface (CIGI), which will facilitate optimal interoperability and an IG agnostic framework with which to integrate with various IGs. Continue specific integration of Night Vision Image Generator (NVIG) and Virtual Reality Scene Generator					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 123 / <i>Joint Technology Center System Integration</i>

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>(VRSG) into the Modeling & Simulation domain as it pertains to UAS simulation, terrain and model development. Continue support of annual/bi-annual theater level Exercises (Ulchi Freedom Guardian (UFG), Yama Sakura (YS) and Key Resolve (KR), Talisman Saber (TS), Pacific Sentry -2 & -3, as well as 5 other Exercises coming online, Integration Events (IEs) and Validation Events (VEs). Continue improvement of mapping capability for mission planning. Continue redesign of Windows Entity Server (WES) and NetLink to improve network routing and large PDU data feeds (i.e. ? 7 million+), thus lessening bandwidth consumption. Continue development of a Heads Up Display (HUD) designer application that will allow for the creation and modification of HUDs without having to touch the software baseline thereby reducing costs and increasing fidelity and speed of solution in theater. Continue implementation of generic 6 Degree of Freedom (DoF) application that will allow for creation of new platforms without modifying code; again a reduction in costs and increased solution delivery velocity. Continue architecture optimization, to facilitate extensibility and scalability, to maintain readiness for growth of M&S requirements coming from the Services.</p> <p>FY 2020 Base Plans: Will continue movement towards standards based solutions, e.g. Common Image Generator Interface (CIGI), which will facilitate optimal interoperability and an IG agnostic framework with which to integrate with various IGs. Will continue specific integration of Night Vision Image Generator (NVIG) and Virtual Reality Scene Generator (VRSG) into the Modeling & Simulation domain as it pertains to UAS simulation, terrain and model development. Will continue support of annual/bi-annual theater level Exercises (Ulchi Freedom Guardian (UFG), Yama Sakura (YS) and Key Resolve (KR), Talisman Saber (TS), Pacific Sentry -2 & -3, as well as 5 other Exercises coming online, Integration Events (IEs) and Validation Events (VEs). Will continue improvement of mapping capability for mission planning. Will continue redesign of Windows Entity Server (WES) and NetLink to improve network routing and large PDU data feeds (i.e. ? 7 million+), thus lessening bandwidth consumption. Will continue development of a Heads Up Display (HUD) designer application that will allow for the creation and modification of HUDs without having to touch the software baseline thereby reducing costs and increasing fidelity and speed of solution in theater. Will continue implementation of generic 6 Degree of Freedom (DoF) application that will allow for creation of new platforms without modifying code; again a reduction in costs and increased solution delivery velocity. Will continue architecture optimization, to facilitate extensibility and scalability, to maintain readiness for growth of M&S requirements coming from the Services.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: \$106K increase for contract MUSE development support.</p>					
Title: Management Services	0.500	0.500	0.600	-	0.600

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 123 / <i>Joint Technology Center System Integration</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Funding is provided for the following efforts.					
FY 2019 Plans: Continue coordination and oversight of MUSE product development.					
FY 2020 Base Plans: Will continue coordination and oversight of MUSE product development.					
FY 2019 to FY 2020 Increase/Decrease Statement: \$100k increase for contract MUSE development support.					
Accomplishments/Planned Programs Subtotals	4.712	4.748	4.954	-	4.954

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• PE 0305206F Air Force: <i>PE 0305206F Air Force</i>	3.429	3.480	3.548	-	3.548	3.607	3.680	3.746	-	Continuing	Continuing

Remarks
The JTC/SIL and the MUSE receive funding from the Air Force, 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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 0305204A / Tactical Unmanned Aerial Vehicles				123 / Joint Technology Center System Integration							
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	AMC, AMCOM, AMRDEC, SED : Redstone Arsenal, AL	3.019	0.500		0.520		0.600		-		0.600	Continuing	Continuing	Continuing
Subtotal			3.019	0.500		0.520		0.600		-		0.600	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
MUSE Development	MIPR	AMC, AMCOM, AMRDEC, SED : Redstone Arsenal, AL	17.059	4.212		4.228		4.354		-		4.354	Continuing	Continuing	Continuing
Subtotal			17.059	4.212		4.228		4.354		-		4.354	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Interoperability Support	MIPR	AMC, RDECOM, AMRDEC : Redstone Arsenal, AL	9.460	-		-		-		-		-	0.000	9.460	-
Subtotal			9.460	-		-		-		-		-	0.000	9.460	N/A
Project Cost Totals			29.538	4.712		4.748		4.954		-		4.954	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 123 / <i>Joint Technology Center System Integration</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Risk Management Framework: MUSE/AFFERS SW Dev. Kit	█				█				█				█															
Vignette Planning and Rehearsal SW Refactoring(Service Orient	█				█				█				█															
Generic 6 Degrees of Freedom	█				█				█				█															
Web Based MUSE/AFSERS	█				█				█				█															
Integration of Night Vision Image Generator (NVIG)	█				█				█				█															
User Interface Redesign	█				█				█				█				█											
Key Resolve Exercises	█				█				█				█				█											
Ulchi Freedom Guardian Exercises	█				█				█				█				█											
Yama Sakura Exercises	█				█				█				█				█											
MUSE/AFSERS Releases	█				█				█				█				█											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305204A / <i>Tactical Unmanned Aerial Vehicles</i>	Project (Number/Name) 123 / <i>Joint Technology Center System Integration</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Windows Entity Server and NetLink Redesign	1	2015	3	2016
Risk Management Framework: MUSE/AFFERS SW Dev. Kit	3	2015	4	2021
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
Key Resolve Exercises	1	2015	1	2023
Ulchi Freedom Guardian Exercises	3	2015	3	2022
Yama Sakura Exercises	4	2015	4	2022
MUSE/AFSERS Releases	3	2015	3	2022

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305206A / <i>Airborne Reconnaissance Systems</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	20.080	26.416	11.177	14.000	25.177	13.296	17.483	18.707	21.348	0.000	142.507
EH2: <i>EMARSS ADV DEV (MIP)</i>	-	0.000	3.205	3.218	-	3.218	2.000	2.011	2.051	5.735	0.000	18.220
EH3: <i>EMARSS Payloads ADV DEV (MIP)</i>	-	2.111	6.531	5.959	-	5.959	6.296	6.493	6.622	6.942	0.000	40.954
EH5: <i>ARL Payloads ADV DEV (MIP)</i>	-	17.969	15.980	0.000	14.000	14.000	1.000	4.579	5.784	7.171	0.000	66.483
EH7: <i>Guardrail Common Sensor (GRCS) Payloads (MIP)</i>	-	0.000	0.700	2.000	-	2.000	4.000	4.400	4.250	1.500	0.000	16.850

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 U.S. Army Intelligence and Security Command (INSCOM) Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance support to combatant commanders. EMARSS is also assigned to the United States Army Training and Doctrine Command (TRADOC) in support of training at the US Army Intelligence Center of Excellence (USAICoE). The Army Acquisition Objective for EMARSS is 36 systems, with an Army Procurement Objective of 24, to include the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT). Budget Item Justification is addressed in each Project.

Airborne Reconnaissance Low - Enhanced (ARL-E) is a worldwide self-deployable airborne Intelligence Surveillance Reconnaissance (ISR) system designed for timely, accurate, assured support to tactical forces over the full spectrum of operations. This system is a De Havilland DHC-8 aircraft replacing the DHC-7 in accordance with the Aerial ISR (AISR) 2020 Strategy. ARL-E will enhance the ARL-M sensor capability sets through the procurement of new and refurbished sensors to meet the ARL-E Capabilities Production Document (CPD) requirements. It provides a persistent capability to include: Broad-Area Surveillance and/or Focused Stare on Target Areas of Interest (Point or Objective Targets), Electro-Optical/Infrared (EO/IR)/Full-Motion Video (FMV) , Multi-Mode Radar, Robust Communications Intelligence (COMINT), on-Board Collection, Analysis, Sensor Cross Cue and dissemination through Distributed Common Ground System-Army (DCGS-A) Enabled workstations. ARL-E will be assigned to the U.S. Army Intelligence and Security Command's Aerial ISR Brigade providing AISR support to combatant commanders. For the overall system, the Army Acquisition Objective and the Army Procurement Objective, is nine (9). The Mission Equipment Package (MEP) objective is eight (8). Budget Item Justification is addressed in each Project.

The RC-12X Guardrail Common Sensor (GRCS) is a fixed-wing, airborne Communications Intelligence (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 Intelligence and Security Command (INSCOM) Aerial Exploitation Battalions providing Aerial Intelligence,

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305206A / <i>Airborne Reconnaissance Systems</i>
---	--

Surveillance and Reconnaissance (AISR) support to combatant commanders. The 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.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	20.080	26.416	19.177	-	19.177
Current President's Budget	20.080	26.416	11.177	14.000	25.177
Total Adjustments	0.000	0.000	-8.000	14.000	6.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-8.000	14.000	6.000

Change Summary Explanation

FY 2020 Base funds decrease on EH3 funding for EMARSS sensor enhancements.

FY 2020 Base funds zeroed on EH5 OCO funding to support New Signal Development.

FY 2020 Base funds increase on EH7 for Guardrail Common Sensor (GRCS) SIGINT sensor upgrades.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH2 / EMARSS ADV DEV (MIP)
--	---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EH2: EMARSS ADV DEV (MIP)	-	0.000	3.205	3.218	-	3.218	2.000	2.011	2.051	5.735	0.000	18.220
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 U.S. Army INSCOM Aerial Exploitation Battalions, providing Aerial Intelligence, Surveillance and Reconnaissance support to combatant commanders. EMARSS is also assigned to the United States Army Training and Doctrine Command (TRADOC) in support of training at the US Army Intelligence Center of Excellence (USAICoE). The Army Acquisition Objective for EMARSS is 36 systems, with an Army Procurement Objective of 24, to include the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT).

This funding line supports non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems and engineering analysis/structural modifications to substantially increase EMARSS (King Air B300) payload capacity and time on station. Funding provides for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft communications, navigations and surveillance (CNS); aircraft survivability equipment (ASE) and the integration of the AISR mission equipment package (MEP) as well as obsolescence issues and commonality with EMARSS Program of Record (POR) aircraft.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Non-Recurring Engineering	-	3.205	3.218	-	3.218
Description: This funding line supports non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems and engineering analysis/studies/structural modifications to substantially increase EMARSS (King Air B300) payload capacity and time on station. Funding provides for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft communications, navigations and surveillance (CNS); aircraft survivability equipment (ASE) and the integration of the AISR mission equipment package (MEP) as well as obsolescence issues and commonality with the EMARSS Program of Record (POR) aircraft.					
FY 2019 Plans:					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH2 / EMARSS ADV DEV (MIP)

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
This funding line supports NRE, development of TC, testing and integration of Army AISR systems. Funding provides for the integration of DoD mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft CNS, ASE and the integration of the AISR MEP as well as obsolescence issues involved with the transition from QRC to POR in regards to the Navy AAR-47 changing to Army AAR-57, BFT to BFT-2 and APX-123 Transponder to APX-119 Transponder.					
<i>FY 2020 Base Plans:</i> This funding line will support non-recurring engineering (NRE), development of type certificates (TC), testing, integration of Modifications in Service of Army Aerial, Intelligence, Surveillance and Reconnaissance (AISR) systems and engineering analysis/studies/structural modifications to substantially increase EMARSS (King Air B300) payload capacity and time on station. Funding provides for the integration of Department of Defense (DoD) mandated safety equipment to meet current and evolving International Standards. It also enhances aircraft communications, navigations and surveillance (CNS), aircraft survivability equipment (ASE), future development for modifications in service, and the integration of the AISR mission equipment package (MEP) as well as obsolescence issues and commonality with the EMARSS Program of Record (POR) aircraft.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> \$.013 million increase from FY 2019 to FY 2020 is due to inflation					
Accomplishments/Planned Programs Subtotals	-	3.205	3.218	-	3.218

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

Line Item	FY 2018	FY 2019	FY 2020			FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• A02112: EMARSS SEMA Mods (MIP)	51.279	60.248	3.859	22.180	26.039	24.812	1.903	1.940	2.374	Continuing	Continuing
• AZ2054: EMARSS Payloads (MIP)	12.467	18.809	2.146	10.000	12.146	12.176	7.765	7.919	10.521	0.000	81.803
• EH3: EMARSS Payloads ADV DEV (MIP)	2.111	6.531	5.959	-	5.959	6.296	6.493	6.622	6.942	0.000	40.954

Remarks

The EMARSS RDTE efforts are found in the following two project lines; 0305206AEH2 EMARSS ADV DEV (MIP) (Fixed Wing Project Office) and 0305206AEH3 EMARSS Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting Aircraft Procurement Army (APA lines are A02112 (P-1 Line #26) for Fixed Wing and AZ2054 (P-1 Line #21) for Aerial Intelligence. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH2 / EMARSS ADV DEV (MIP)

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
memorandum, to assign overall acquisition lead for manned airborne intelligence systems to Program Executive Officer for Aviation; and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.											

D. Acquisition Strategy

The acquisition strategy, supported by the EMARSS CPD, is to design, test and field 24 systems as well as provide enhancements to the following sensor capabilities in order to maintain relevancy to the Warfighter: Electro-optical/Infrared (EO/IR)/Full Motion Video (FMV); Communications Intelligence (COMINT); Wide Area Aerial Surveillance (WAAS); Light Imaging Detection and Ranging (LiDAR) and improved Synthetic Aperture Radar / Moving Target Indicator (SAR/MTI) radar; line-of-site (LOS) and beyond line-of-site (BLOS) communications; and Processing Exploitation and Dissemination (PED) supporting two Distributed Common Ground System - Army (DCGS-A) enabled operator workstations. The EMARSS fleet of 24 systems will consist of the following variants: eight (8) EMARSS-G (Geo-INT); four (4) EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight (8) EMARSS-M (Multi-INT); and four (4) EMARSS-S (SIGINT).

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH2 / EMARSS ADV DEV (MIP)
--	---	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMO	RO	FW PO/ PM SAI : Huntsville, AL/ Aberdeen, MD	0.104	-		0.272	Jan 2019	0.273	Jan 2020	-		0.273	0.000	0.649	-
Subtotal			0.104	-		0.272		0.273		-		0.273	0.000	0.649	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Non-Recurring Engineering (OEM Design)/FAA Testing and Certification	SS/CPFF	Textron : Wichita, KS	-	-		2.933	May 2019	2.945	May 2020	-		2.945	0.000	5.878	-
Subtotal			-	-		2.933		2.945		-		2.945	0.000	5.878	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Testing	MIPR	AFTD RTC : Eglin, AFB, FL	1.636	-		-		-		-		-	0.000	1.636	-
Subtotal			1.636	-		-		-		-		-	0.000	1.636	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		1.740	-	3.205	3.218	-	3.218	0.000	8.163	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH2 / EMARSS ADV DEV (MIP)	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Non-Recurring Engineering (OEM Design)																												
FAA Testing and Certification																												
Army Testing																												
Developmental Initiatives for Performance Enhancements																												

Note
 FY18 \$0.00 FY19 \$3.205 FY20 \$3.218 FY21 \$2.000 FY22 \$2.011 FY23 \$2.051 FY24 \$5.735
 Funding Delta between PB19 and PB20: FY21- \$2.00 million added FY24- \$5.735 million added

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / <i>Airborne Reconnaissance Systems</i>	Project (Number/Name) EH2 / <i>EMARSS ADV DEV (MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Non-Recurring Engineering (OEM Design)	3	2019	2	2020
FAA Testing and Certification	3	2020	2	2021
Army Testing	3	2021	2	2022
Developmental Initiatives for Performance Enhancements	3	2022	4	2024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems				Project (Number/Name) EH3 / EMARSS Payloads ADV DEV (MIP)			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EH3: EMARSS Payloads ADV DEV (MIP)	-	2.111	6.531	5.959	-	5.959	6.296	6.493	6.622	6.942	0.000	40.954
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The EMARSS RDTE efforts are found in the following two (2) project lines; 0305206AEH2 EMARSS ADV DEV (MIP) (Fixed Wing Project Office) and 0305206AEH3 EMARSS Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting procurement lines are A02112 and AZ2054. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum, to assign overall acquisition lead for manned airborne intelligence systems to Program Executive Officer for Aviation; and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.

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 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 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 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); 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) 2020 funding in the amount of \$5.959 million continues the development of sensor enhancements and provides PED sensor engineering support. The EMARSS sensor enhancements will replace the existing SIGINT and LiDAR capabilities with an improved sensor system which provides greater standoff range and significantly improved area coverage rate for the EMARSS platform. This enhancement addresses the approved EMARSS Capability Production Document (CPD) performance requirements.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: EMARSS - Sensor Enhancement	1.893	5.577	5.577	-	5.577

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH3 / EMARSS Payloads ADV DEV (MIP)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Research, Development, Test, and Evaluation (RDTE) funded LiDAR, SIGINT and Airborne Wide Area Persistent Surveillance System (AWAPSS) sensor enhancement.</p> <p>FY 2019 Plans: Funded Advanced LiDAR Preliminary Design.</p> <p>FY 2020 Base Plans: Complete preliminary design of Advanced LiDAR. Initiate sensor enhancements to upgrade existing EMARSS sensors.</p>					
<p>Title: EMARSS - Sensor Engineering Support</p> <p>Description: Matrix Government and Matrix Contractor engineering support for sensor enhancements.</p> <p>FY 2019 Plans: Funded matrix government engineering support for sensor enhancements.</p> <p>FY 2020 Base Plans: Continue matrix government engineering support for sensor enhancements.</p>	0.126	0.301	0.301	-	0.301
<p>Title: Program Management Support</p> <p>Description: Program Management Office (PMO) support and travel, as well as Systems Engineering and Technical Assistance (SETA) support.</p> <p>FY 2019 Plans: Funded Program Management Office government support and travel as well as Systems Engineering and Technical Assistance (SETA) support.</p> <p>FY 2020 Base Plans: Continue Program Management Office government support and travel as well as Systems Engineering and Technical Assistance (SETA) support.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: \$0.572 million decrease from FY 2019 to FY 2020 is due to completed Advanced LiDAR preliminary design.</p>	0.092	0.653	0.081	-	0.081
Accomplishments/Planned Programs Subtotals	2.111	6.531	5.959	-	5.959

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH3 / EMARSS Payloads ADV DEV (MIP)

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

Line Item	FY 2018	FY 2019	FY 2020			FY 2021	FY 2022	FY 2023	FY 2024	Cost To	
			Base	OCO	Total					Complete	Total Cost
• A02112: EMARSS SEMA Mods (MIP)	51.279	60.248	3.859	22.180	26.039	24.812	1.903	1.940	2.374	Continuing	Continuing
• AZ2054: EMARSS Payloads (MIP)	12.467	18.809	2.146	10.000	12.146	12.176	7.765	7.919	10.521	0.000	81.803
• EH2: EMARSS ADV DEV (MIP)	-	3.205	3.218	-	3.218	2.000	2.011	2.051	5.735	0.000	18.220

Remarks

The EMARSS RDTE efforts are found in the following two (2) project lines; 0305206AEH2 EMARSS ADV DEV (MIP) (Fixed Wing Project Office) and 0305206AEH3 EMARSS Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting procurement lines are A02112 and AZ2054. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum to assign overall acquisition lead for manned airborne intelligence systems to Program Executive Officer for Aviation and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.

D. Acquisition Strategy

The acquisition strategy, supported by the EMARSS CPD, is to provide enhancements to the following sensor capabilities in order to maintain relevancy to the Warfighter: EO/IR FMV; COMINT; WAAS; LiDAR and improved SAR/MTI radar; LOS and BLOS communications; and PED supporting two DCGS-A enabled operator workstations. The EMARSS fleet of 24 systems consists of the following variants: eight EMARSS-G (Geo-INT); four EMARSS-V (Vehicle and Dismount Exploitation Radar, VaDER); eight EMARSS-M (Multi-INT); and four EMARSS-S (SIGINT).

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH3 / EMARSS Payloads ADV DEV (MIP)
--	---	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PMO	C/CR	PEO IEW&S, PM SAI : APG, MD	0.298	0.092	Mar 2018	0.653	Dec 2018	0.081	Nov 2019	-		0.081	Continuing	Continuing	-
Subtotal			0.298	0.092		0.653		0.081		-		0.081	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
LiDAR sensor enhancement	SS/CPFF	JHU APL : Laurel, MD	1.500	-		-		-		-		-	0.000	1.500	-
AWAPSS sensor enhancement	C/CPIF	BAE : Nashua, CT	0.200	-		-		-		-		-	0.000	0.200	-
SIGINT sensor enhancement	C/CPFF	CACI/Boeing : APG, MD	0.114	-		-		-		-		-	0.000	0.114	-
SIGINT sensor enhancement	C/CPFF	Lockheed Martin Integrated Systems : Marlton, NJ	0.948	-		-		-		-		-	0.000	0.948	-
Advanced LiDAR Development	SS/CPFF	Johns Hopkins University Applied Physics Laboratory, LLC : Laurel, Md	-	1.893	Jun 2018	5.577	Jan 2019	0.895	Dec 2019	-		0.895	Continuing	Continuing	-
SIGINT sensor enhancement	C/CPFF	TBD : TBD	-	-		-		4.682	Feb 2020	-		4.682	Continuing	Continuing	-
Subtotal			2.762	1.893		5.577		5.577		-		5.577	Continuing	Continuing	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Matrix Government Engineering Support	MIPR	USACERDEC, I2WD : APG, MD	0.390	-		-		0.301	Nov 2019	-		0.301	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH3 / EMARSS Payloads ADV DEV (MIP)

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
QRC to EMARSS POR Modification and Conversion																												
EMARSS Fielding																												
Advanced LiDAR Development																												
Sensor Upgrades/Enhancements																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH3 / EMARSS Payloads ADV DEV (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
QRC to EMARSS POR Modification and Conversion	2	2015	4	2019
EMARSS Fielding	3	2017	4	2019
Advanced LiDAR Development	2	2018	4	2021
Sensor Upgrades/Enhancements	2	2020	4	2024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems				Project (Number/Name) EH5 / ARL Payloads ADV DEV (MIP)			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EH5: ARL Payloads ADV DEV (MIP)	-	17.969	15.980	0.000	14.000	14.000	1.000	4.579	5.784	7.171	0.000	66.483
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Airborne Reconnaissance Low - Enhanced (ARL-E) is a worldwide self-deployable airborne Intelligence Surveillance Reconnaissance (ISR) system designed for timely, accurate, assured support to tactical forces over the full spectrum of operations. This system is a De Havilland DHC-8 aircraft replacing the DHC-7 IAW the Aerial ISR (AISR) 2020 Strategy. ARL-E will enhance the ARL-M sensor capability sets through the procurement of new and refurbished sensors to meet the ARL-E Capabilities Production Document (CPD) requirements. It provides a persistent capability to include: Broad-Area Surveillance and/or Focused Stare on Target Areas of Interest (Point or Objective Targets), Electro-Optical/Infrared (EO/IR)/Full-Motion Video (FMV) , Multi-Mode Radar, Robust Communications Intelligence (COMINT), on-Board Collection, Analysis, Sensor Cross Cue and dissemination through Distributed Common System-Army (DCGS-A) Enabled workstations. ARL-E will be assigned to the 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) 2020 OCO funding of \$14.000 million continues the new signal enhancement development effort to develop software to enhance the COMINT collection capabilities and the lab and flight test for Signal 3 and 4 software to see if it meets the requirements in the ARL-E CPD. This funding line supports continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: New Signals (COMINT/Software Upgrades)	17.969	15.980	0.000	14.000	14.000
Description: To develop software for Signals 1, 2, 3 and 4					
FY 2019 Plans: Fiscal Year (FY) 2019 Base funding of \$1.980 million continues the lab and flight test for Signal 3 and 4 software to see if it meets the requirements in the ARL-E CPD.					
FY 2020 Base Plans: Base funding for FY 2020 zeroed.					
FY 2020 OCO Plans: Fiscal Year (FY) 2020 OCO funding of \$14.000 million continues the new signal enhancement development effort to develop software to enhance the COMINT collection capabilities and the lab and flight test for Signal 3 and 4 software to see if it meets the requirements in the ARL-E CPD. This funding line supports continued					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH5 / ARL Payloads ADV DEV (MIP)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY20 decrease due to cost adjustments.					
Accomplishments/Planned Programs Subtotals	17.969	15.980	0.000	14.000	14.000

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• AZ2050: ARL PAYLOADS (MIP)	59.938	80.119	32.895	45.000	77.895	78.588	49.071	45.103	18.342	0.000	409.056
• DX9: National Integration To Tactical Systems(MIP)	5.320	9.060	4.490	-	4.490	4.223	5.183	4.425	4.537	0.000	37.238
• A02109: A02109	-	12.103	12.294	-	12.294	9.796	-	-	-	0.000	34.193
• A02110: ARL SEMA Mods (MIP)	11.650	7.522	6.566	-	6.566	9.786	10.532	5.773	6.409	Continuing	Continuing

Remarks
The Airborne Reconnaissance Low- Enhanced (ARL-E) RDTE efforts are found in the following two (2) project lines; 0305206AEH4 ARL ADV DEV (MIP) (Fixed Wing Project Office) and 0305206AEH5 ARL Payloads ADV DEV (Project Manager Sensors - Aerial Intelligence). The supporting procurement lines are A02110 and AZ2050. Separate funding lines support the Army Acquisition Executive's directive, codified in the October 28, 2011 memorandum, to assign overall acquisition lead for manned airborne Intelligence systems to Program Executive Officer for Aviation; and overall sensor, processing, exploitation, and dissemination responsibilities to Program Executive Officer for Intelligence, Electronic Warfare, and Sensors.

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.

E. Performance Metrics
N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH5 / ARL Payloads ADV DEV (MIP)
--	---	--

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
New Signals (COMINT/ Software Upgrades)	C/CPFF	Boeing Argon : Mountain View, CA	11.969	14.969	Nov 2017	14.000		0.000		12.000	Nov 2019	12.000	0.000	52.938	-
Subtotal			11.969	14.969		14.000		0.000		12.000		12.000	0.000	52.938	N/A

Remarks
New Signals Contract: W56KGY-16-D-0001/ 0006. Fiscal Year (FY) 2020 Base funding of \$14.000 million continues the new signal enhancement development effort for Signal 3 and 4 to develop software to enhance the COMINT collection capabilities. This funding line supports continued software development to enhance COMINT collection capabilities to effectively prosecute high priority and emerging modern signal emitters.

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
New Signals (COMINT/ Software Upgrades)	C/CPFF	Boeing Argon : Mountain View, CA	4.000	3.000	Nov 2017	1.980	Mar 2019	0.000		2.000	Nov 2019	2.000	0.000	10.980	-
Subtotal			4.000	3.000		1.980		0.000		2.000		2.000	0.000	10.980	N/A

Remarks
New Signals Contract: W56KGY-16-D-0001/ 0006. Fiscal Year (FY) 2020 Base funding of \$1.495 million continues the lab and flight test for Signal 3 and 4 software to see if it meets the requirements in the ARL-E CPD.

Project Cost Totals	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	15.969	17.969	15.980	0.000	14.000	14.000	0.000	63.918	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH5 / ARL Payloads ADV DEV (MIP)

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
ARL-E MEP Integration	[Redacted]				[Redacted]																							
ARL-E System FOT&E	[Redacted]				[Redacted]																							
ARL-E New Signals Development and Test	[Redacted]				[Redacted]																							
ARL-E Signals 3 and 4 Development and Test	[Redacted]				[Redacted]																							
ARL-E Continued Signal 1 and 2 Development and Test	[Redacted]				[Redacted]																							

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305206A / Airborne Reconnaissance Systems	Project (Number/Name) EH5 / ARL Payloads ADV DEV (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ARL-E MEP Integration	1	2016	4	2018
ARL-E System FOT&E	4	2019	4	2019
ARL-E New Signals Development and Test	2	2016	2	2022
ARL-E Signals 3 and 4 Development and Test	2	2016	2	2022
ARL-E Continued Signal 1 and 2 Development and Test	4	2017	2	2022

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 (MIP)				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EH7: Guardrail Common Sensor (GRCS) Payloads (MIP)	-	0.000	0.700	2.000	-	2.000	4.000	4.400	4.250	1.500	0.000	16.850
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) 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 FY 2020 RDT&E dollars in the amount of \$2.000 million supports GRCS advanced signal enhancement efforts, development and testing of the signal enhancement infrastructure for GRCS updated SIGINT sensor capabilities.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: USFK ONS Development/JICD 4.2 Compliance Description: Development and Testing for Signal Enhancement efforts. FY 2019 Plans: Development and Testing for JICD 4.2 Compliance FY 2019 to FY 2020 Increase/Decrease Statement: Decrease from \$.700 million in FY 2019 to \$0 in FY 2020 due to completion of effort.	-	0.700	-	-	-
Title: GRCS SIGINT Sensor Upgrades Description: Funding line supports GRCS advanced signal enhancement efforts and software development and testing of signal enhancement infrastructure for GRCS updated SIGINT sensor development. FY 2020 Base Plans:	-	-	2.000	-	2.000

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

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 (MIP)
--	---	---

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
This funding line supports GRCS advanced signal enhancement efforts and software development and testing of signal enhancement infrastructure for GRCS updated SIGINT sensor development.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Increase from \$0 to \$2.000 million due to advanced signal enhancement efforts and software development and testing of signal enhancement infrastructure for GRCS updated SIGINT sensor development.					
Accomplishments/Planned Programs Subtotals	-	0.700	2.000	-	2.000

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• AZ2052: Guardrail Payloads (MIP)	34.370	18.346	0.148	25.260	25.408	25.389	18.998	37.447	16.446	0.000	176.404

Remarks

D. Acquisition Strategy

The acquisition strategy is to provide technical refresh to the GRCS SIGINT Sensors. Pending competitive contract award.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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 (MIP)

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
USFK ONS Development/JICD 4.2 Compliance																												
GRCS SIGINT Tech Refresh Development & Testing																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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 (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
USFK ONS Development/JICD 4.2 Compliance	1	2019	2	2019
GRCS SIGINT Tech Refresh Development & Testing	2	2020	4	2024

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	24.700	27.109	38.121	-	38.121	57.250	40.225	35.389	36.160	0.000	258.954
D07: <i>DCGS-A Common Modules (MIP)</i>	-	24.700	27.109	38.121	-	38.121	57.250	40.225	35.389	36.160	0.000	258.954

Note

The Distributed Common Ground Systems - Army (DCGS-A) was formerly designated a Major Automation Information System (MAIS) program.

A. Mission Description and Budget Item Justification

Distributed Common Ground System - Army (DCGS-A) is the Intelligence, Surveillance and Reconnaissance (ISR) System of Systems (SoS) for Joint, Interagency, Allied, Coalition, and National data analysis, sharing and collaboration. The core functions of DCGS-A are: the vertical and horizontal synchronization of ISR Processing, Exploitation and Dissemination (PED) efforts; operations in a networked environment at multiple security levels; the control of select Army and joint sensor systems; the fusion of all acquired data and information, and distribution of relevant red (threat), gray (non-aligned), and environmental (weather and terrain) information; and providing the Warfighters' early warning, targeting, and sensor ground station capabilities. DCGS-A provides a single integrated ISR ground processing system composed of common components that are interoperable with sensors, other information sources, all Warfighting Functions, compliant with standards providing the Defense Information & Intelligence Enterprise (DI2E) and Intelligence Community Information Technology Enterprise (IC ITE). DCGS-A is fielded in Fixed, Mobile, and embedded configurations emphasizing the use of reach and split based operations by improving accessibility of data in order to reduce forward deployed footprint. As enhanced commercial capabilities are integrated and tested, a continuing series of software capability drop releases will be provided into Army Common/commodity hardware and fielded to units IAW the Army Resourcing Priority List (ARPL) process.

DCGS-A is designated as a Program of Record (PoR) within the Command Post Computing Environment (CP CE) of the Common Operating Environment (COE). DCGS-A provides the Single and Shareable Geospatial Foundation (SSGF) Cross Cutting Capability (CCC), and is defining the DCGS-A architecture to fit within the COE as described by the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)) COE Implementation Plan. This is in accordance with the G-3/5/7 priority to align all Army networks, procurements and enhancements under one COE and one vision leveraging intelligence community investments. PM DCGS-A continues to work with PM Mission Command (PM MC) to converge on CP CE Tactical Server Infrastructure (TSI).

DCGS-A provides technologically advanced Processing, Exploitation, and Dissemination (PED) capabilities through iterative software releases delivered in tailored and scalable mobile, fixed, and embedded configurations in all maneuver and maneuver support units from Company Intelligence Support Team to Army Service Component Command, and in select maneuver sustainment units battalion and above.

FY 2020 Base funding in the amount of \$38.121 million for D07, DCGS-A, will be used for modification, testing and integration of commercially available technologies to support multi-source intelligence processing at the tactical levels, as directed in the FY 2017 National Defense Authorization Act (NDAA), Section 113 and Section 220 that will increase the Processing, Exploitation, and Dissemination capability our Army requires. DCGS-A will continue critical updates to the Army's ISR PED and multi-intelligence planning, analysis, and production capabilities through the exploitation of Cloud Computing and advanced analytics capabilities. This approach will achieve

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>
---	--

Information Technology efficiencies through alignment with the Intelligence Community Information Technology Environment (IC ITE), while providing iterative software updates required to remain current. DCGS-A will focus on Capability Drop (CD) CD 2. CD 2 will replace DCGS-A data management capabilities hosted at Echelons Above Corps, and adds advanced analytics and Artificial Intelligence/Machine Learning capabilities. CDs 3-7 will provide enhanced Army Intelligence capabilities to the majority of Army Intelligence formations. CD 3 will provide a modernized Data Management Architecture, leveraging open standards based on the DI2E that will allow additional capabilities (CDs 4-7) to be added in a plug and play fashion. CD 3 will deliver improved interoperability aligned with the Army's Common Operating Environment (COE) and the concepts of converged Operations and Intelligence associated with the Command Post Computing Environment. CD-3 will also provide automated "Level 2 Fusion" capabilities and a consistent user visualization framework. CD 4 will provide targeting and collection management tools, Natural Language Processing, Text Analytics, and Open Source Analytics capabilities. CD 5 will provide improved Counter Intelligence and Human Intelligence Reporting capabilities. CD 6 will focus on Signals Intelligence analysis and Intelligence Support to Cyber Operations. CD 7 will support Geospatial capabilities for the Army's combat engineers and the Imagery Analyst. As with CD's 1 and 2, CDs 3-7 will complete Market Research with the goal of identifying the best and most innovative commercial/NDI solutions, as directed by FY 2017 and FY 2018 NDAA language.

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>
Previous President's Budget	24.700	38.667	57.481	-	57.481
Current President's Budget	24.700	27.109	38.121	-	38.121
Total Adjustments	0.000	-11.558	-19.360	-	-19.360
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-11.558			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-19.360	-	-19.360

Change Summary Explanation

FY 2019 decrease of \$11.558 million is related to prior year under execution.

FY 2020 decrease of \$19.360 million is related to realignment of funds.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>				Project (Number/Name) D07 / <i>DCGS-A Common Modules (MIP)</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
D07: <i>DCGS-A Common Modules (MIP)</i>	-	24.700	27.109	38.121	-	38.121	57.250	40.225	35.389	36.160	0.000	258.954
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The Distributed Common Ground System - Army was formerly designated a Major Automation Information System (MAIS) program.

A. Mission Description and Budget Item Justification

Distributed Common Ground System - Army (DCGS-A) is the Intelligence, Surveillance and Reconnaissance (ISR) System of Systems (SoS) for Joint, Interagency, Allied, Coalition, and National data analysis, sharing and collaboration. The core functions of DCGS-A are: the vertical and horizontal synchronization of ISR Processing, Exploitation and Dissemination (PED) efforts; operations in a networked environment at multiple security levels; the control of select Army and joint sensor systems; the fusion of all acquired data and information, and distribution of relevant red (threat), gray (non-aligned), and environmental (weather and terrain) information; and providing the Warfighters' early warning, targeting, and sensor ground station capabilities. DCGS-A provides a single integrated ISR ground processing system composed of common components that are interoperable with sensors, other information sources, all Warfighting Functions, compliant with standards providing the Defense Information & Intelligence Enterprise (DI2E) and Intelligence Community Information Technology Enterprise (IC ITE). DCGS-A is fielded in Fixed, Mobile, and embedded configurations emphasizing the use of reach and split based operations by improving accessibility of data in order to reduce forward deployed footprint. As enhanced commercial capabilities are integrated and tested, a continuing series of software capability drop releases will be provided into Army Common/commodity hardware and fielded to units IAW the Army Resourcing Priority List (ARPL) process.

DCGS-A is designated as a Program of Record (PoR) within the Command Post Computing Environment (CP CE) of the Common Operating Environment (COE). DCGS-A provides the Single and Shareable Geospatial Foundation (SSGF) Cross Cutting Capability (CCC), and is defining the DCGS-A architecture to fit within the COE as described by the Assistant Secretary of the Army (Acquisition, Logistics, and Technology) (ASA(ALT)) COE Implementation Plan. This is in accordance with the G-3/5/7 priority to align all Army networks, procurements and enhancements under one COE and one vision leveraging intelligence community investments. PM DCGS-A continues to work with PM Mission Command (PM MC) to converge on CP CE Tactical Server Infrastructure (TSI).

DCGS-A provides technologically advanced Processing, Exploitation, and Dissemination (PED) capabilities through iterative software releases delivered in tailored and scalable mobile, fixed, and embedded configurations in all maneuver and maneuver support units from Company Intelligence Support Team to Army Service Component Command, and in select maneuver sustainment units battalion and above.

FY 2020 Base funding in the amount of \$38.121 million for D07, DCGS-A, will be used for modification, testing and integration of commercially available technologies to support multi-source intelligence processing at the tactical levels, as directed in the FY 2017 National Defense Authorization Act (NDAA), Section 113 and Section 220 that will increase the Processing, Exploitation, and Dissemination capability our Army requires. DCGS-A will continue critical updates to the Army's ISR PED and multi-intelligence planning, analysis, and production capabilities through the exploitation of Cloud Computing and advanced analytics capabilities. This approach will achieve

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	Project (Number/Name) D07 / <i>DCGS-A Common Modules (MIP)</i>
--	--	--

Information Technology efficiencies through alignment with the Intelligence Community Information Technology Environment (IC ITE), while providing iterative software updates required to remain current. DCGS-A will focus on Capability Drop (CD) CD 2. CD 2 will replace DCGS-A data management capabilities hosted at Echelons Above Corps, and adds advanced analytics and Artificial Intelligence/Machine Learning capabilities. CDs 3-7 will provide enhanced Army Intelligence capabilities to the majority of Army Intelligence formations. CD 3 will provide a modernized Data Management Architecture, leveraging open standards based on the DI2E that will allow additional capabilities (CDs 4-7) to be added in a plug and play fashion. CD 3 will deliver improved interoperability aligned with the Army's Common Operating Environment (COE) and the concepts of converged Operations and Intelligence associated with the Command Post Computing Environment. CD-3 will also provide automated "Level 2 Fusion" capabilities and a consistent user visualization framework. CD 4 will provide targeting and collection management tools, Natural Language Processing, Text Analytics, and Open Source Analytics capabilities. CD 5 will provide improved Counter Intelligence and Human Intelligence Reporting capabilities. CD 6 will focus on Signals Intelligence analysis and Intelligence Support to Cyber Operations. CD 7 will support Geospatial capabilities for the Army's combat engineers and the Imagery Analyst. As with CD's 1 and 2, CDs 3-7 will complete Market Research with the goal of identifying the best and most innovative commercial/NDI solutions, as directed by FY 2017 and FY 2018 NDAA language.

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

	FY 2018	FY 2019	FY 2020
<p>Title: Integrate and Test DCGS-A Software</p> <p>Description: The Army will maximize Full and Open competition for Capability Drop (CD 2) and will issue commercial contracts to vendors on multiple-award contract/s. Initial contract awards will be followed by brief test-fix-test periods, incorporating maximum Soldier participation and feedback to inform procurement and fielding decisions. Each test-fix-test period will result in minor modifications to adapt commercial capabilities for military use through customization, cyber accreditation, and integration with other Army systems.</p> <p>FY 2019 Plans: Continue to integrate and test DCGS-A Software.</p> <p>FY 2020 Plans: CD 2 is planned to replace DCGS-A data management capabilities hosted at Echelons Above Corps, and adds advanced analytics and Artificial Intelligence/Machine Learning capabilities. Complete integration and testing of CD 2 and start CDs 3-7.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increase of \$10.705 million supports the completion of CD 2 testing activities and the start of five new capability drops (CD 3-7).</p>	13.010	12.568	15.831
<p>Title: Matrix Support Government for Software Integration</p> <p>Description: Matrix Support Government for software integration to the target platforms.</p> <p>FY 2019 Plans:</p>	3.899	3.787	5.130

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	Project (Number/Name) D07 / <i>DCGS-A Common Modules (MIP)</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Continue Government Matrix Support for software integration to the target platforms. FY 2020 Plans: Will continue Government Matrix Support for software integration to the target platforms. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increase of \$1.343 million supports the completion of CD 2 and the start of five new capability drops (CD 3-7).				
Title: Project Management Description: Project Management support to manage the cost, schedule, and performance metrics for the program. FY 2019 Plans: Continue acquisition document preparation and support for multiple capability drops. FY 2020 Plans: Will continue acquisition document preparation and support for multiple capability drops. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increase of \$1.024 million supports the completion of CD 2 and the start of five new capability drops (CD 3-7).		2.118	1.997	3.021
Title: Army and Joint Interoperability Testing/Developmental Testing/Operational Testing Description: Testing of DCGS-A FY 2019 Plans: Continue to support testing requirements for DCGS software. FY 2020 Plans: Will continue to support testing requirements for DCGS software. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increase of \$2.842 million supports the completion of CD 2 and the start of five new capability drops (CD 3-7).		2.090	5.568	8.410
Title: Training Support Description: Training support - embedded computer based training (CBT) for the DCGS-A software. FY 2019 Plans: Continue training support - embedded computer based training (CBT) for the DCGS-A software. FY 2020 Plans:		3.203	2.851	4.230

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	Project (Number/Name) D07 / <i>DCGS-A Common Modules (MIP)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Will continue training support - embedded computer based training (CBT) for the DCGS-A software.			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2020 increase of \$1.379 million supports the completion of CD 2 and the start of five new capability drops (CD 3-7).			
<i>Title:</i> Logistics Documentation	0.380	0.338	1.499
<i>Description:</i> Logistics activities including maintenance task analysis, level of repair analysis, user manual, training support package, and MANPRINT activities.			
<i>FY 2019 Plans:</i> Continue logistics activities including task maintenance task analysis, level of repair analysis, user manual, training support package, and MANPRINT activities.			
<i>FY 2020 Plans:</i> Will continue logistics activities including task maintenance task analysis, level of repair analysis, user manual, training support package, and MANPRINT activities.			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2020 increase of \$1.161 million supports the completion of CD 2 and the start of five new capability drops (CD 3-7).			
Accomplishments/Planned Programs Subtotals	24.700	27.109	38.121

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• B01001: <i>DCGS-A (MIP)</i>	-	-	67.615	-	67.615	301.252	276.387	294.885	-	Continuing	Continuing

Remarks
The Distributed Common Ground System - Army is designated a Major Automation Information System (MAIS) program.

D. Acquisition Strategy
DCGS-A is a former ACAT IAM, Major Automated Information System (MAIS) program. 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.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	Project (Number/Name) D07 / <i>DCGS-A Common Modules (MIP)</i>
--	--	--

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 times. As Capability Drop 3-7 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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019				
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 (MIP)								
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Project Management	Allot	DCGS-A : APG, MD	3.831	2.118	Oct 2017	1.997	Oct 2018	3.021	Oct 2019	-		3.021	Continuing	Continuing	-	
Milestone preparation; Activities; Trade Space Analysis (TSA)	MIPR	Various : Various	3.318	-		-		-		-		-	0.000	3.318	-	
Subtotal			7.149	2.118		1.997		3.021		-		3.021	Continuing	Continuing	N/A	
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Integrate & Test software	C/FP	Various : Various	39.712	13.010	Dec 2017	12.568	Dec 2018	15.831	Dec 2019	-		15.831	Continuing	Continuing	Continuing	
System reconfiguration	C/FP	Various : Various	4.020	-		-		-		-		-	Continuing	Continuing	-	
Subtotal			43.732	13.010		12.568		15.831		-		15.831	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Matrix Support	MIPR	Various : Various	4.936	3.899	Oct 2017	3.787	Oct 2018	5.130	Oct 2019	-		5.130	Continuing	Continuing	-	
Training Development	MIPR	Various : Various	1.316	3.203	Jan 2018	2.851	Oct 2018	4.230	Oct 2019	-		4.230	Continuing	Continuing	-	
Logistics Documentation	MIPR	Various : Various	0.405	0.380	Jan 2018	0.338	Jan 2019	1.499	Jan 2020	-		1.499	Continuing	Continuing	-	
Subtotal			6.657	7.482		6.976		10.859		-		10.859	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Government Test & Integration Lab	MIPR	Various : Various	1.000	2.090	Mar 2018	5.568	Mar 2019	8.410	Mar 2020	-		8.410	Continuing	Continuing	-	
Subtotal			1.000	2.090		5.568		8.410		-		8.410	Continuing	Continuing	N/A	

UNCLASSIFIED




Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army							Date: March 2019				
Appropriation/Budget Activity 2040 / 7			R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>				Project (Number/Name) D07 / <i>DCGS-A Common Modules (MIP)</i>				

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	58.538	24.700	27.109	38.121	-	38.121	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	Project (Number/Name) D07 / <i>DCGS-A Common Modules (MIP)</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Capability Drop 1	[Redacted]				[Redacted]																							
Capability Drop 1 IOC	[Redacted]				 CD1 IOC																							
Capability Drop 2	[Redacted]				[Redacted]				[Redacted]																			
Capability Drop 2 IOC	[Redacted]				[Redacted]				 CD2 IOC																			
Capability Drop 3-7	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
Capability Drop 3-7 IOC	[Redacted]				[Redacted]				[Redacted]				 CD3-7 IOC															

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305208A / <i>Distributed Common Ground/Surface Systems</i>	Project (Number/Name) D07 / <i>DCGS-A Common Modules (MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Capability Drop 1	4	2017	2	2019
Capability Drop 1 IOC	2	2019	2	2019
Capability Drop 2	1	2018	4	2020
Capability Drop 2 IOC	4	2020	4	2020
Capability Drop 3-7	1	2020	3	2021
Capability Drop 3-7 IOC	3	2021	3	2021

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	10.531	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.531
MQ1: MQ-1 Gray Eagle - Army UAV (MIP)	-	10.531	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.531

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.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	9.574	0.000	0.000	-	0.000
Current President's Budget	10.531	0.000	0.000	-	0.000
Total Adjustments	0.957	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.957	-			
• SBIR/STTR Transfer	-	-			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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 (MIP)
--	---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
MQ1: MQ-1 Gray Eagle - Army UAV (MIP)	-	10.531	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.531
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The MQ-1C Gray Eagle provides the Army with an Extended Range, Multi-Purpose (ERMP) Unmanned Aircraft System (UAS); capable of executing reconnaissance, security, attack, and intelligence data 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.

The Fiscal Year (FY) 2018 MQ-1 Gray Eagle funding of \$10.531 million supports the Test and Evaluation efforts associated with the MQ-1C Gray Eagle Extended Range Engineering Change Proposal (ECP). The test effort evaluates overall system level performance to ensure it meets developmental and operational requirements. The types of effort required include Environmental Testing, Electromagnetic Environmental Effects (E3) testing, transportability/mobility testing, logistics demonstration, and Follow-On Operational Test and Evaluation (FOTE II).

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: MQ-1C Gray Eagle Extended Range - Testing	10.531	-	-	-	-
Description: MQ-1C ER Testing					
Accomplishments/Planned Programs Subtotals	10.531	-	-	-	-

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• A00005: MQ-1 UAV	224.506	163.326	0.000	54.000	54.000	54.000	-	-	-	0.000	495.832
• AA6601: Gray Eagle Mods2	74.291	129.781	14.699	-	14.699	14.089	1.662	1.548	1.495	Continuing	Continuing
• EB6: MQ-1C Gray Eagle MODS	34.228	17.684	16.486	-	16.486	13.904	11.307	9.187	7.188	Continuing	Continuing

Remarks

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019

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 (MIP)
--	---	--

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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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 (MIP)
--	---	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management	MIPR	PM UAS : Redstone Arsenal, AL	9.066	-		-		-		-		-	0.000	9.066	-
Subtotal			9.066	-		-		-		-		-	0.000	9.066	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Development Engineering	C/CPIF	General Atomics / ASI : San Diego, CA	165.070	-		-		-		-		-	0.000	165.070	-
Prototype Manufacturing	Various	General Atomics / ASI : San Diego, CA	213.776	-		-		-		-		-	0.000	213.776	-
Ground Support Equipment	C/CPIF	Various : Various	9.075	-		-		-		-		-	0.000	9.075	-
Ground Base Sense & Avoid (GBSAA)	SS/CPFF	Various : Various	16.445	-		-		-		-		-	0.000	16.445	-
Software / Hardware Development	SS/CPIF	General Atomics : San Diego, CA	95.179	-		-		-		-		-	0.000	95.179	-
Common System Integration (CSI) Obsolescence	SS/CPFF	General Dynamics Mission Systems/ Various : Various	19.985	-		-		-		-		-	0.000	19.985	-
MQ-1C Gray Eagle Extended Range - Longbow Integration	SS/CPFF	GA-ASI : Poway, CA	2.300	-		-		-		-		-	0.000	2.300	-
Subtotal			521.830	-		-		-		-		-	0.000	521.830	N/A

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contractor Engineering Support	MIPR	Ft. Huachuca : Ft. Huachuca	24.501	-		-		-		-		-	0.000	24.501	-

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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 (MIP)

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Operational Test Readiness Review I			▲ 1 OTRR1																									
Electromagnetic Environmental Effects (E3) Qual Test II								■ DT																				
Environmental Qual Testing				■ DT																								
First Article Test	■ DT																											
Operational Test Readiness Review III			▲ 2 OTRR3																									
Logistics Demonstration		■ DT																										
Follow-on Operational Test and Evaluation II				■ FOT&E II																								
Transport / Mobility Qual Test			■ DT																									

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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 (MIP)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Engineering and Manufacturing Development	3	2005	4	2013
Critical Design Review	2	2006	2	2006
Operational Assessment	3	2009	3	2010
Milestone C	2	2011	2	2011
Initial Operational Test and Evaluation (IOT&E)	4	2012	4	2012
Engineering Software / Hardware Development	1	2013	1	2014
Electromagnetic Environmental Effects (E3) Qual Test	3	2017	3	2017
Operational Test Readiness Review I	3	2018	3	2018
Electromagnetic Environmental Effects (E3) Qual Test II	3	2019	3	2019
Environmental Qual Testing	4	2018	4	2018
First Article Test	4	2017	1	2018
Operational Test Readiness Review III	4	2018	4	2018
Logistics Demonstration	2	2018	2	2018
Follow-on Operational Test and Evaluation II	4	2018	4	2018
Transport / Mobility Qual Test	3	2018	3	2019

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	12.691	6.180	3.218	-	3.218	3.879	3.486	3.983	4.849	Continuing	Continuing
RA7: RQ-11 Raven (MIP)	-	12.691	6.180	3.218	-	3.218	3.879	3.486	3.983	4.849	Continuing	Continuing

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.

A FoSUAS includes three hand-launched aircraft that do not require an improved launch/recovery location. 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). The equipment is fully transportable in or on rucksack type packs that are organic to the unit. FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with Short Range Reconnaissance (SRR) and Long Range Reconnaissance and Surveillance (LRRS) options under development.

Justification: Fiscal Year (FY) 2020 Research, Development, Test, and Evaluation (RDTE) Base funding of \$3.218 million for Program Management Engineering support and to meet Capabilities Production Document (CPD) Increment II Block II related requirements. Specifically, to continue the research and development required to identify and baseline the SRR prototype solution and the LRRS prototype solution for the FoSUAS effort.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	2.191	6.180	3.222	-	3.222
Current President's Budget	12.691	6.180	3.218	-	3.218
Total Adjustments	10.500	0.000	-0.004	-	-0.004
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	10.500	-	-0.004	-	-0.004

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305232A / RQ-11 UAV	
<u>Change Summary Explanation</u> Funding will be primarily used for Developmental Engineering, Systems Engineering and Program Management, and Test and Evaluation for the Short Range Reconnaissance (SRR) and Long Range Reconnaissance and Surveillance (LRRS).		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0305232A / RQ-11 UAV				Project (Number/Name) RA7 / RQ-11 Raven (MIP)			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
RA7: RQ-11 Raven (MIP)	-	12.691	6.180	3.218	-	3.218	3.879	3.486	3.983	4.849	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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.

A FoSUAS includes three hand-launched aircraft that do not require an improved launch/recovery location. 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). The equipment is fully transportable in or on rucksack type packs that are organic to the unit. FoSUAS will utilize existing RQ-11 in a system of systems fielding concept, with Short Range Reconnaissance (SRR) and Long Range Reconnaissance and Surveillance (LRRS) options under development.

Justification: Fiscal Year (FY) 2020 Research, Development, Test, and Evaluation (RDTE) Base funding of \$3.218 million for Program Management Engineering support and to meet CPD Increment II Block II related requirements. Specifically, to continue the research and development required to identify and baseline the SRR prototype solution and the LRRS prototype solution for the FoSUAS effort.

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

	FY 2018	FY 2019	FY 2020
Title: Systems Engineering/Program Management (SEPM)	1.015	0.380	0.244
Description: Systems Engineering and Program Management Support during SRR engineering, integration and preparation of documentation for FRP decision.			
FY 2019 Plans: Continue Program Management Support for Short Range Reconnaissance vendor down select and testing activities.			
FY 2020 Plans: Will continue Program Management Support for Short Range Reconnaissance Testing activities			
FY 2019 to FY 2020 Increase/Decrease Statement: The decrease in SEPM funding is due to the Short Range Reconnaissance program moving to procurement funding.			
Title: SRR Developmental Engineering	7.850	4.050	0.974

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305232A / RQ-11 UAV	Project (Number/Name) RA7 / RQ-11 Raven (MIP)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: SRR Developmental Engineering and integration with Handheld Ground Control Station (H-GCS)</p> <p>FY 2019 Plans: Continue Short Range Reconnaissance (SRR) vendor down select</p> <p>FY 2020 Plans: Will continue Short Range Reconnaissance (SRR) formerly Short Range Micro (SRM) product validation and integration with the Handheld Ground Control Station in preparation for FRP decision.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funds will complete integration efforts and preparation of documentation for FRP decision.</p>			
<p>Title: LRRS Requirements Decomposition/Systems Engineering/Component Level Projects/Market Research</p> <p>Description: Funding provided to initiate the Long Range Reconnaissance and Surveillance (LRRS) prototype materiel baseline</p> <p>FY 2019 Plans: Continuing the Long Range Reconnaissance and Surveillance (LRRS) prototype materiel baseline.</p> <p>FY 2020 Plans: Will continue the Long Range Reconnaissance and Surveillance (LRRS) prototype materiel baseline.</p>	3.000	0.750	0.750
<p>Title: SRR Test and Evaluation</p> <p>Description: Test and Evaluation of the Short Range Reconnaissance (SRR).</p> <p>FY 2019 Plans: Continue the development testing of the SRR and Limited User Test (LUT)</p> <p>FY 2020 Plans: Will continue the Development Testing of the Short Range Reconnaissance (SRR)</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funding will complete finish up integration testing for SRR and H-GCS and document preparation for FRP decision.</p>	0.826	1.000	1.250
Accomplishments/Planned Programs Subtotals	12.691	6.180	3.218

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• A00010: RQ-11 (RAVEN)	-	46.416	23.510	-	23.510	30.948	33.831	10.041	16.988	Continuing	Continuing

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
--	-------------------------

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305232A / RQ-11 UAV	Project (Number/Name) RA7 / RQ-11 Raven (MIP)
--	---	---

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
------------------	----------------	----------------	-------------------------------	------------------------------	--------------------------------	----------------	----------------	----------------	----------------	-----------------------------------	-------------------

Remarks
 FY 2019 funding procures 200 RQ-11B Raven Systems for Security Force Assistance Brigade, FY 2020 - 2023 procures 1985 SRR air vehicles. FY 2024 procures 345 SRR and 170 LRRS air vehicles.

D. Acquisition Strategy

The Tactical Unmanned Product Office (TUAS) 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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305232A / RQ-11 UAV	Project (Number/Name) RA7 / RQ-11 Raven (MIP)
--	---	---

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering/ Program Management (SEPM)	RO	PM-TUAS/ AMRDEC : Redstone Arsenal, AL	1.690	1.015		0.380		0.244		-		0.244	Continuing	Continuing	-
Subtotal			1.690	1.015		0.380		0.244		-		0.244	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Engineering 1	C/IDIQ	Various : Various	9.824	-		-		-		-		-	0.000	9.824	-
Developmental Engineering 2	C/IDIQ	AMRDEC : Redstone Arsenal, AL	1.935	-		-		-		-		-	0.000	1.935	-
SRR Developmental Engineering	TBD	Various : Various	-	7.850		4.050		0.974		-		0.974	Continuing	Continuing	-
LRRS Requirements Decomposition/Systems Engineering/Component Level Projects/Market Research	TBD	Various : Various	-	3.000		0.750		0.750		-		0.750	Continuing	Continuing	-
Subtotal			11.759	10.850		4.800		1.724		-		1.724	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Test and Evaluation 1	MIPR	Various : Various	1.046	-		-		-		-		-	0.000	1.046	-
Test and Evaluation 2	MIPR	Various : Various	0.300	-		-		-		-		-	0.000	0.300	-
SRR Test and Evaluation	TBD	Various : Various	-	0.826		1.000		1.250		-		1.250	Continuing	Continuing	-
Subtotal			1.346	0.826		1.000		1.250		-		1.250	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0305232A / RQ-11 UAV				Project (Number/Name) RA7 / RQ-11 Raven (MIP)					
	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	14.795	12.691		6.180		3.218		-		3.218	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305232A / RQ-11 UAV	Project (Number/Name) RA7 / RQ-11 Raven (MIP)
--	---	---

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Systems EngineeringProgram Management (SEPM)																												
SRR OTA Award																												
SRR Prototyping																												
Test and Evaluation																												
SRR/HGCS Integration																												
SRR End User Assessment																												
SRR Full Rate Production (FRP) Decision																												
SRR Full Rate Production (For Information)																												
LRRS OTA Award																												
LRRS Prototyping																												
LRRS/HGCS Integration																												
LRRS End User Assessment																												
LRRS Full Rate Production (FRP) Decision																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305232A / RQ-11 UAV	Project (Number/Name) RA7 / RQ-11 Raven (MIP)
--	---	---

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Tactical Open Government Architecture Test Event 2	3	2015	3	2015
Systems Engineering Program Management (SEPM)	2	2018	4	2024
SRR OTA Award	3	2018	3	2018
SRR Prototyping	3	2018	4	2019
Test and Evaluation	4	2018	4	2024
SRR/HGCS Integration	2	2018	4	2020
SRR End User Assessment	2	2020	2	2020
SRR Full Rate Production (FRP) Decision	3	2020	3	2020
SRR Full Rate Production (For Information)	3	2020	4	2024
LRRS OTA Award	3	2021	3	2021
LRRS Prototyping	3	2021	4	2022
LRRS/HGCS Integration	3	2021	2	2024
LRRS End User Assessment	3	2023	3	2023
LRRS Full Rate Production (FRP) Decision	4	2023	4	2023

Note

N/A

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	12.773	17.863	7.817	-	7.817	0.000	2.344	0.000	0.000	0.000	40.797
RQ7: RQ-7 Shadow UAV	-	12.773	17.863	7.817	-	7.817	0.000	2.344	0.000	0.000	0.000	40.797

A. Mission Description and Budget Item Justification

The RQ-7Bv2 Shadow Tactical Unmanned Aircraft System (TUAS) provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA), and Force Protection. In line with the Army's Aviation Restructure Initiative (ARI) three Shadow Platoons are being integrated into the 11 Combat Aviation Brigade (CAB) Apache Reconnaissance Battalions. This will provide Aviation Brigades with Manned-Unmanned-Teaming (MUM-T) and enhanced Aerial Scout capabilities. The RQ-7B Shadow has logged approximately 1,180,000 flight hours, most of which were flown in support of Overseas Contingency Operations (OCO).

The full Shadow system consists of four air vehicles with payload, two Universal Ground Control stations, two Universal Ground Data Terminals, one Portable Ground Control Station with Portable Ground Data Terminal, Ground Support Equipment, two launchers, ten High Mobility Multipurpose Wheeled Vehicles (HMMWVs) with trailer(s), and a Light Medium Tactical Vehicle. Each system is equipped with one Maintenance Section Multifunctional (MSM) and is supported at the division level by a Mobile Maintenance Facility (MMF). The baseline fielded payload was the electro-optic infrared (EO/IR), but half of those have been replaced with a Laser Designator (LD) payload. An Improved Payload for Shadow, selected by Product Manager Electro-Optic/Infrared (PdM EO/IR), will be integrated and qualified in FY 2019-2020. 110 of 115 Shadow systems required by the Army Acquisition Objective (AAO) have been resourced.

Justification: Fiscal Year (FY) 2020 RQ-7Bv2 TUAS Base funding of \$7.817 million will be utilized for the following: 1) \$4.757M will be used for test and evaluation of the RQ-7Bv2 TUAS, 2) \$3.060M provides interoperability and enhancements for the One System Remote Video Terminal (OSRVT).

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	12.773	12.863	10.817	-	10.817
Current President's Budget	12.773	17.863	7.817	-	7.817
Total Adjustments	0.000	5.000	-3.000	-	-3.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-3.000	-	-3.000

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV	
<u>Change Summary Explanation</u> +\$5M increase for RQ-7B digital enhancements		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
RQ7: RQ-7 Shadow UAV	-	12.773	17.863	7.817	-	7.817	0.000	2.344	0.000	0.000	0.000	40.797
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The RQ-7Bv2 Shadow Tactical Unmanned Aircraft System (TUAS) provides the Army Brigade Commander with dedicated Reconnaissance, Surveillance and Target Acquisition (RSTA), Intelligence, Battle Damage Assessment (BDA), and Force Protection. In line with the Army's Aviation Restructure Initiative (ARI) three Shadow Platoons are being integrated into the 11 Combat Aviation Brigade (CAB) Apache Reconnaissance Battalions. This will provide Aviation Brigades with Manned-Unmanned-Teaming (MUM-T) and enhanced Aerial Scout capabilities. The RQ-7B Shadow has logged approximately 1,180,000 flight hours, most of which were flown in support of Overseas Contingency Operations (OCO).

The full Shadow system consists of four air vehicles with payload, two Universal Ground Control stations, two Universal Ground Data Terminals, one Portable Ground Control Station with Portable Ground Data Terminal, Ground Support Equipment, two launchers, ten High Mobility Multipurpose Wheeled Vehicles (HMMWVs) with trailer(s), and a Light Medium Tactical Vehicle. Each system is equipped with one Maintenance Section Multifunctional (MSM) and is supported at the division level by a Mobile Maintenance Facility (MMF). The baseline fielded payload was the electro-optic infrared (EO/IR), but half of those have been replaced with a Laser Designator (LD) payload. An Improved Payload for Shadow, selected by Product Manager Electro-Optic/Infrared (PdM EO/IR), will be integrated and qualified in FY2019-2020. 110 of 115 Shadow systems required by the Army Acquisition Objective (AAO) have been resourced.

Justification: Fiscal Year (FY) 2020 RQ-7Bv2 TUAS Base funding of \$7.817 million will be utilized for the following: 1) \$4.757M will be used for test and evaluation of the RQ-7Bv2 TUAS, 2) \$3.060M provides interoperability and enhancements for the One System Remote Video Terminal (OSRVT).

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

	FY 2018	FY 2019	FY 2020
Title: Air Vehicle Improvements	5.543	3.768	-
Description: Air Vehicle Improvements			
FY 2019 Plans: Complete developmental testing of the ability to operate in a GPS denied environment; Interoperability software modifications that support Manned Unmanned Teaming with the AH-64 Apache Helicopter.			
FY 2019 to FY 2020 Increase/Decrease Statement: Assured Positioning, Navigation, and Timing development should be completed in FY 2019.			
Title: Ground Equipment Improvements	2.933	7.218	-
Description: Ground Equipment Improvements			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
<p>FY 2019 Plans: Continue to fund Ground Equipment Improvements and will continue development of interoperability capabilities through use of Universal Ground Data Terminals and Universal Ground Control Stations. Network Security and System Vulnerability.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Assured Positioning, Navigation, and Timing development should be completed in FY 2019.</p>			
<p>Title: Test and Evaluation</p> <p>Description: Test and Evaluation</p> <p>FY 2019 Plans: Continue Funds Operational Test for the Shadow V2 Block III upgrade and continues to fund test and evaluation of Air Vehicle and Ground Equipment.</p> <p>FY 2020 Plans: Will continue Funds Test and Evaluation for the Shadow V2 Block III upgrade</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funds will increase for Shadow due to improvements.</p>	0.900	3.542	3.427
<p>Title: System Engineering/Program Management</p> <p>Description: System Engineering/Program Management</p> <p>FY 2019 Plans: Continue to fund System Engineering/Program management</p> <p>FY 2020 Plans: Will continue to fund System Engineering/Program management</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Price increase due to inflation.</p>	1.278	1.868	1.330
<p>Title: One System Remote Video Terminal (OSRVT)</p> <p>Description: OSRVT</p> <p>FY 2019 Plans: Continue to fund interoperability and performance improvements for OSRVT.</p> <p>FY 2020 Plans:</p>	2.119	1.467	3.060

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
Will Continue to fund interoperability and performance improvements for OSRVT.			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Price increase of OSRVT due to interoperability and performance improvements.			
Accomplishments/Planned Programs Subtotals	12.773	17.863	7.817

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

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• A00018: RQ-7 UAV MODS	193.160	154.114	8.983	-	8.983	-	16.366	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

A System Capability Demonstration (SCD) was conducted with four contractors. The results from the SCD in conjunction with proposal evaluations resulted in the competitive down select of a Best Value TUAS. A successful Milestone II Army Systems Acquisition Review Council (ASARC) was conducted 21 December 1999 and a Milestone III Decision was reached on 25 September 2002. The full rate production contract was awarded 27 December 2002 and in FY 2009 the last of the authorized 104 systems was placed on contract. Continued development of the selected Tactical Unmanned Aircraft Vehicle (TUAV) system will be accomplished through a series of modifications and retrofits such as Shadow v2, Communications Relay, Laser Designator, Block III engine, and reliability upgrades. Development/integration of these improved capabilities will be through individual efforts on a competitive technical services contract with Shadow contractors. Development of the Block III engine was accomplished through a competitive process. Management responsibilities of the TUAV RQ-7B variant EO/IR/LD payload was transferred from Program Executive Office (PEO) Aviation to PEO Intelligence, Electronic Warfare and Sensors (IEW&S) on 14 February 2017. This was done in accordance with (IAW) ASA(ALT) memorandum titled: Transfer of Army Office of Primary Responsibility and Program Management Responsibility for RQ-7B Shadow EO/IR/LD. An Improved Payload for Shadow, competitively selected by PEO IEW&S - Product Manager Electro-Optic/Infrared (PdM EO/IR), will be integrated and qualified in FY 2019-2020.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Base: Program Management	RO	PM UAS : Redstone Arsenal, AL	3.662	0.426		0.705		-		-		-	Continuing	Continuing	Continuing
Subtotal			3.662	0.426		0.705		-		-		-	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
OIF Improvements / Block Upgrades / Capability Improvements	SS/CPFF	AAI Corporation : Hunt Valley, MD	4.605	-		1.869		-		-		-	0.000	6.474	-
System Engineering / Reliability Solutions	SS/CPFF	AAI Corporation : Hunt Valley, MD	2.025	-		6.116		-		-		-	Continuing	Continuing	-
Ground Equipment Improvements	C/CPFF	TBD: Competitive in FY18 : TBD: Competitive in FY18	19.298	2.933	Dec 2017	-		-		-		-	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	16.643	0.375		0.246		-		-		-	Continuing	Continuing	Continuing
Assured, Positioning, Navigation, and Timing (APNT)	C/CPFF	TBD: Competitive in FY18 : TBD: Competitive in FY18	3.587	5.168	Dec 2017	2.755		-		-		-	Continuing	Continuing	-
Payload Improvements	SS/CPFF	Various : Various	4.750	-		-		-		-		-	0.000	4.750	-
One System Remote Video Terminal (OSRVT)	SS/CPFF	AAI Corporation, MD : AAI Corporation, MD	14.406	2.119		1.467		3.060		-		3.060	Continuing	Continuing	Continuing
Subtotal			96.039	10.595		12.453		3.060		-		3.060	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Contractor Engineering Support	Various	Various : Various	2.928	0.284		0.262		0.685		-		0.685	Continuing	Continuing	Continuing
Base: Government Engineering and Logistic Support	MIPR	Various : Various	1.463	0.568		0.901		0.645		-		0.645	Continuing	Continuing	Continuing
Subtotal			4.391	0.852		1.163		1.330		-		1.330	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
RQ-7 Developmental Testing of Product Development	Various	Various : Various	6.088	0.800		1.443		-		-		-	Continuing	Continuing	Continuing
RQ-7 Operational Testing of Product Developments	MIPR	Various : Various	0.500	0.100		2.099		3.427		-		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			8.721	0.900		3.542		3.427		-		3.427	Continuing	Continuing	N/A

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	112.813	12.773	17.863	7.817	-	7.817	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0305233A / RQ-7 UAV	Project (Number/Name) RQ7 / RQ-7 Shadow UAV
--	--	---

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Assured Positioning, Navigation, and Timing (APNT)	APNT				APNT																							
OSRVT Increment II Interoperability Improvements	OSRVT				OSRVT				OSRVT																			
Improved Payload Integration	OSRVT				OSRVT				OSRVT				OSRVT															
Test and Evaluation	OSRVT				OSRVT				OSRVT				OSRVT															

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

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

Events	Start		End	
	Quarter	Year	Quarter	Year
Block III Engine Development	1	2015	3	2016
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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	8.573	6.524	2.000	2.214	4.214	2.236	2.259	2.259	2.304	0.000	28.369
BI7: <i>Biometrics Enabled Intelligence - MIP</i>	-	8.573	6.524	0.000	2.214	2.214	2.236	2.259	2.259	2.304	0.000	26.369
FL5: <i>Next Gen Biometric Collection Capability (MIP)</i>	-	0.000	0.000	2.000	-	2.000	0.000	0.000	0.000	0.000	0.000	2.000

A. Mission Description and Budget Item Justification

The Next Generation Biometrics Collection Capability (NXGBCC) is the replacement system for the Biometrics Automated Toolset-Army (BAT-A). The BAT-A is the current Army Program of Record for tactical biometrics collection capability. The BAT-A was originally developed as a Quick Reaction Capability. These devices have been deployed in a combat zone for over 19 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC will be an integrated system of Commercial-Off-The-Shelf (COTS) hardware and software, comprising a kit, data base, and transport architecture. NXGBCC will be capable of operating on multiple communications networks and achieve near real-time identity matching and data synchronization. NXGBCC will add to the number of biometric modalities collected, provide matches to the Warfighter in less than 3 minutes, increase the data sharing capability, and reduce weight, power, and cost. NXGBCC will use a Local Trusted Source composed of a distributed database capable of being used worldwide, data management software, forward biometric matching software, and an analysis portal. Also, the NXGBCC collection kit(s) will be composed of 1 or more collection devices, a credential/badge device, and document scanning device. Beginning with FY 2020, funding for NXGBCC previously reflected in project BI7 has been moved to project FL5.

Identity Intelligence 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 Biometric Identity Intelligence Resource (BI2R) functionality as well as elasticity, encryption, and open source software for enduring interoperability with DoD, IC, and external partners.

Justification:

Beginning with FY 2020, funding for NXGBCC previously reflected in project BI7 has been moved to project FL5. The \$2.000 million of FY 2020 Base Funding in FL5 will complete the prototype selection process via the Other Transaction Agreement (OTA) started in FY 2018. Also, the program office will begin Operational and Interoperability Testing along with New Equipment Training development.

The FY 2020 OCO of \$2.214 million in BI7 will continue to support the development of new software code & associated testing to deliver the Identity Intelligence Analytic Resource (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.

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>
---	--

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	8.573	6.524	4.800	-	4.800
Current President's Budget	8.573	6.524	2.000	2.214	4.214
Total Adjustments	0.000	0.000	-2.800	2.214	-0.586
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-2.800	2.214	-0.586

Change Summary Explanation

The FY 2020 Base funding request in FL5 for NXGBCC was reduced by \$2.800 million to support other Army requirements.

I2AR received FY 2020 OCO funding in BI7 for continued support of the development of new software code and associated testing.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>				Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
B17: <i>Biometrics Enabled Intelligence - MIP</i>	-	8.573	6.524	0.000	2.214	2.214	2.236	2.259	2.259	2.304	0.000	26.369
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Next Generation Biometrics Collection Capability (NXGBCC) is the replacement system for the Biometrics Automated Toolset-Army (BAT-A). The BAT-A is the current Army Program of Record for tactical biometrics collection capability. The BAT-A was originally developed as a Quick Reaction Capability. These devices have been deployed in a combat zone for over 19 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC will be an integrated system of Commercial-Off-The-Shelf (COTS) hardware and software, comprising a kit, data base, and transport architecture. NXGBCC will be capable of operating on multiple communications networks and achieve near real-time identity matching and data synchronization. NXGBCC will add to the number of biometric modalities collected, provide matches to the Warfighter in less than 3 minutes, increase the data sharing capability, and reduce weight, power, and cost. NXGBCC will use a Local Trusted Source composed of a distributed database capable of being used worldwide, data management software, forward biometric matching software, and an analysis portal. Also, the NXGBCC collection kit(s) will be composed of 1 or more collection devices, a credential/badge device, and document scanning device. Beginning with FY 2020, funding for NXGBCC previously reflected in project B17 has been moved to project FL5.

Identity Intelligence 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 Biometric 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 2020 OCO of \$2.214 million in B17 will continue to support the development of new software code & associated testing to deliver the Identity Intelligence Analytic Resource (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.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Army G2 Projects - B17	6.036	2.214	0.000	2.214	2.214
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).					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><i>FY 2019 Plans:</i> No RDT&E Base associated efforts are planned for FY 2019.</p> <p>The FY 2019 OCO of \$2.214 million will continue to support the development of new software code & associated testing to deliver the Identity Intelligence Analytic Resource (I2AR) a replacement for the Biometrics Identity Intelligence Repository (BI2R -the unique software-based analytic production system used by NGIC specifically to create the Biometric Enabled Watchlist for OFS and other worldwide missions) on the Intelligence Community Information Technology Environment (IC ITE) C2S cloud.</p> <p><i>FY 2020 Base Plans:</i> No dollars identified.</p> <p><i>FY 2020 OCO Plans:</i> The FY 2020 OCO of \$2.214 million in BI7 will continue to support the development of new software code & associated testing to deliver the Identity Intelligence Analytic Resource (I2AR) a replacement for the Biometrics Identity Intelligence Repository.</p>					
<p><i>Title:</i> Next Generation Biometrics Collection Capability (NXGBCC) transitions to FL5 in FY20</p> <p><i>Description:</i> The Next Generation Biometrics Collection Capability (NXGBCC) will replace the BAT-A Program of Record. The BAT-A capability was originally developed as a Quick Reaction Capability and has been deployed in a combat zone for over 19 years. The current BAT-A technology is old and obsolete. NXGBCC will use a Local Trusted Source composed of a distributed database capable of being used worldwide, data management software, forward biometric matching software, and an analysis portal. Also, the NXGBCC collection kit(s) will be composed of 1 or more collection devices, a credential/badge device, and document scanning device.</p> <p><i>FY 2019 Plans:</i> The \$4.310 million of FY 2019 Base Funding in BI7 will expand on the transition phase established in FY 2018 for Next Generation Biometrics Collection Capability (NXGBCC) the replacement for the BAT-A. The program will continue the Other Transaction Agreement (OTA) process to down-select prototypes from commercial vendors. Also, the program will begin NXGBCC infrastructure assessment, functionality and modality evaluation.</p> <p><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i></p>	2.537	4.310	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Beginning with FY 2020, funding for NXGBCC previously reflected in project BI7 has been moved to project FL5.					
Accomplishments/Planned Programs Subtotals	8.573	6.524	0.000	2.214	2.214

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

N/A

Remarks

D. Acquisition Strategy

The \$2.214 million of FY 2020 OCO funding in BI7 will continue the development of new software code & associated testing necessary to deliver the Identity Intelligence Analytic Resource (I2AR). The acquisition strategy will be to exercise a contract option which enables for continuation of a contractor to develop activities for the Army Requirements Oversight Council (AROC) approved Quick Reaction Capability (QRC).

The NXGBCC acquisition strategy is to procure a limited development integrated solution that meets the NXGBCC collect/store/match/share requirements and interfaces with the Biometric Family of Systems. The strategy will maximize mature technologies (integrated commercial off the shelf products) and reward industry for providing a solution that can be fielded in FY 2021. The program office will use an Other Transaction Agreement (OTA) to down-select prototypes from commercial vendors. Upon OTA completion, the Initial Operating Test, procurement, fielding and sustainment of NXGBCC will begin.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>
--	--	--

Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PM Management Services	C/Various	TBD : TBD	12.921	-		-		-		-		-	0.000	12.921	-
Subtotal			12.921	-		-		-		-		-	0.000	12.921	N/A

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Base Products Development	C/IDIQ	Various : TBD	49.787	5.247	Mar 2018	2.214		0.000		2.214		2.214	0.000	59.462	-
Product Development	TBD	TBD : TBD	-	2.537	Sep 2018	4.310		-		-		-	0.000	6.847	-
Subtotal			49.787	7.784		6.524		0.000		2.214		2.214	0.000	66.309	N/A

Remarks
Contract will use an Other Transaction Agreement (OTA) for product selection.

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
PM Civilian Personnel and Other Support Costs	Various	Various : Various	20.102	-		-		-		-		-	0.000	20.102	-
Subtotal			20.102	-		-		-		-		-	0.000	20.102	N/A

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
IA, T&E, Threat Assessment, Interoperability Certifications	Various	Various : TBD	4.277	0.789	Feb 2018	-		-		-		-	0.000	5.066	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>
--	--	--

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			4.277	0.789		-		-		-		-	0.000	5.066	N/A
Project Cost Totals			87.087	8.573		6.524		0.000		2.214		2.214	0.000	104.398	N/A

Remarks
 Prior years are mostly associated with the termination of the Joint Personnel Identification Version 2 (JPIv2) project.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Army G2 Projects																												
Product Development																												
Operational Test & Evaluation																												
FY18 Product Development																												
FY18 Operational Test & Evaluation																												
FY20 Product Development																												
FY20 Systems Test & Evaluation																												
FY20 Operational Test & Evaluation																												
FY22 Product Development																												
FY22 Systems Test & Development																												
FY22 Operational Test & Evaluation																												
FY24 Product Development																												
FY24 Systems Test & Development																												

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	
FY24 Operational Test & Development																													FY24
Next Generation Biometrics Collection Capability (NXGBCC)																													
NXGBCC Program Planning																													
AoA Report	[Redacted]																												
AoA	[Redacted]																												
AROC CDD Signed	[Redacted]		[Redacted]																										
CDD	[Redacted]		[Redacted]																										
Other Transaction Agreement - Phase 1	[Redacted]		[Redacted]																										
OTA - 1	[Redacted]		[Redacted]																										
Other Transaction Agreement - Phase 2	[Redacted]		[Redacted]		[Redacted]																								
OTA - 2	[Redacted]		[Redacted]		[Redacted]																								
Other Transaction Agreement - Phase 3	[Redacted]		[Redacted]		[Redacted]		[Redacted]																						
OTA - 3	[Redacted]		[Redacted]		[Redacted]		[Redacted]																						
Initial Operational Test	[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		
IOT	[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		
Milestone-C	[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		
MS-C	[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		
New Equipment Training & Fielding	[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		
NET	[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		
Initial Operational Capability	[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		
IOC	[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		[Redacted]		

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
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 Biometrics Collection Capability (NXGBCC)	1	2018	1	2032
NXGBCC Program Planning	1	2018	4	2019

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) B17 / <i>Biometrics Enabled Intelligence - MIP</i>
--	--	--

Events	Start		End	
	Quarter	Year	Quarter	Year
AoA Report	1	2018	3	2018
AROC CDD Signed	3	2018	2	2019
Other Transaction Agreement - Phase 1	4	2018	1	2019
Other Transaction Agreement - Phase 2	2	2019	1	2020
Other Transaction Agreement - Phase 3	2	2020	4	2020
Initial Operational Test	4	2020	1	2021
Milestone-C	1	2021	1	2021
New Equipment Training & Fielding	1	2022	2	2025
Initial Operational Capability	3	2022	3	2022

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>				Project (Number/Name) FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FL5: <i>Next Gen Biometric Collection Capability (MIP)</i>	-	0.000	0.000	2.000	-	2.000	0.000	0.000	0.000	0.000	0.000	2.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project FL5 was previously funded in Project BI7.

A. Mission Description and Budget Item Justification

The Next Generation Biometrics Collection Capability (NXGBCC) is the replacement system for the Biometrics Automated Toolset-Army (BAT-A). The BAT-A is the current Army Program of Record for tactical biometrics collection capability. The BAT-A was originally developed as a Quick Reaction Capability. These devices have been deployed in a combat zone for over 19 years, well beyond the standard 3 to 6 years of useful electronic equipment life. NXGBCC will be an integrated system of Commercial-Off-The-Shelf (COTS) hardware and software, comprising a kit, data base, and transport architecture. NXGBCC will be capable of operating on multiple communications networks and achieve near real-time identity matching and data synchronization. NXGBCC will add to the number of biometric modalities collected, provide matches to the Warfighter in less than 3 minutes, increase the data sharing capability, and reduce weight, power, and cost. NXGBCC will use a Local Trusted Source composed of a distributed database capable of being used worldwide, data management software, forward biometric matching software, and an analysis portal. Also, the NXGBCC collection kit(s) will be composed of 1 or more collection devices, a credential/badge device, and document scanning device.

Justification:

Beginning with FY2020, funding for NXGBCC previously reflected in project BI7 has been moved to project FL5. The \$2.000 million of FY20 Base Funding will complete the prototype selection process via the Other Transaction Agreement (OTA) started in FY18. Also, the program office will begin Operational and Interoperability Testing along with New Equipment Training development.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Next Generation Biometrics Collection Capability	-	-	2.000	-	2.000
Description: The Next Generation Biometrics Collection Capability (NXGBCC) will replace the BAT-A Program of Record. The BAT-A capability was originally developed as a Quick Reaction Capability and has been deployed in a combat zone for over 19 years. The current BAT-A technology is old and obsolete. NXGBCC will use a Local Trusted Source composed of a distributed database capable of being used worldwide, data management software, forward biometric matching software, and an analysis portal. Also, the NXGBCC collection kit(s) will be composed of 1 or more collection devices, a credential/badge device, and document scanning device.					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p><i>FY 2020 Base Plans:</i> The \$2.0 million of FY 2020 Base Funding completes the Other Transaction Agreement (OTA) process to down-select the prototypes from commercial vendors to the best system that meets Army requirements. Also, the program will begin NXGBCC testing and New Equipment Training development.</p> <p><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Beginning with FY 2020, funding for NXGBCC previously reflected in project BI7 has been moved to project FL5.</p>					
Accomplishments/Planned Programs Subtotals	-	-	2.000	-	2.000

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

N/A

Remarks

D. Acquisition Strategy

The NXGBCC acquisition strategy is to procure a limited development integrated solution that meets the NXGBCC collect/store/match/share requirements and interfaces with the Biometric Family of Systems. The strategy will maximize mature technologies (integrated commercial off the shelf products) and reward industry for providing a solution that can be fielded in FY 2021. The program office will use an Other Transaction Agreement (OTA) to down-select prototypes from commercial vendors. Upon OTA completion, the procurement, fielding and sustainment of NXGBCC will begin.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>
--	--	---

Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Field Prototype Development	TBD	ACC / Picatinny : New Jersey	-	-		-		1.880		-		1.880	0.000	1.880	-
Subtotal			-	-		-		1.880		-		1.880	0.000	1.880	N/A

Remarks
Funding will complete the Other Transaction Agreement started in FY18.

Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
New Equipment Development Training	TBD	TBD : TBD	-	-		-		0.090	Feb 2020	-		0.090	0.000	0.090	-
Subtotal			-	-		-		0.090		-		0.090	0.000	0.090	N/A

Remarks
Dollars will begin new equipment training requirement for NXGBCC.

Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Operational and Interoperability Testing	TBD	TBD : TBD	-	-		-		0.030	Mar 2020	-		0.030	0.000	0.030	-
Subtotal			-	-		-		0.030		-		0.030	0.000	0.030	N/A

Remarks
Dollars will begin Interoperability Testing for NXGBCC.

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals		-	-	0.000	2.000	-	2.000	0.000	2.000	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army							Date: March 2019			
Appropriation/Budget Activity 2040 / 7			R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>			Project (Number/Name) FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>				
	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	

Remarks
 Funding will complete the Other Transaction Agreement started in FY18.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024							
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
Next Generation Biometrics Collection Capability (NXGBCC)																																
NXGBCC Program Planning																																
AoA Report																																
AOA																																
AROC CDD Signed																																
CDD																																
Other Transaction Agreement - Phase 1																																
OTA -1																																
Other Transaction Agreement - Phase 2																																
OTA -2																																
Other Transaction Agreement - Phase 3																																
OTA -3																																
Initial Operational Test																																
IGT																																
Milestone-C																																
MS-C																																
New Equipment Training & Fielding																																
NET																																
Initial Operational Capability																																
IOC																																

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0307665A / <i>Biometrics Enabled Intelligence</i>	Project (Number/Name) FL5 / <i>Next Gen Biometric Collection Capability (MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Next Generation Biometrics Collection Capability (NXGBCC)	1	2018	1	2032
NXGBCC Program Planning	1	2018	1	2021
AoA Report	1	2018	3	2018
AROC CDD Signed	3	2018	2	2019
Other Transaction Agreement - Phase 1	4	2018	1	2019
Other Transaction Agreement - Phase 2	2	2019	1	2020
Other Transaction Agreement - Phase 3	2	2020	4	2020
Initial Operational Test	4	2020	1	2021
Milestone-C	1	2021	1	2021
New Equipment Training & Fielding	1	2022	2	2025
Initial Operational Capability	3	2022	3	2022

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	118.410	108.696	59.848	-	59.848	61.071	62.543	63.749	64.386	0.000	538.703
E25: Mfg Science & Tech	-	58.610	53.896	59.848	-	59.848	61.071	62.543	63.749	64.386	0.000	424.103
EA2: MANTECH INITIATIVES (CA)	-	59.800	54.800	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	114.600

A. Mission Description and Budget Item Justification

This Program Element (PE) develops, demonstrates, and transitions manufacturing processes that enable improvements in producibility and affordability of emerging and enabling components and subsystems of Army ground and air platforms, Soldier systems, weapons systems, air & missile defense systems, and sensors and electronics. Initiatives within the PE result in cost savings and reduced risk of transitioning military-unique manufacturing processes into production. Project E25 fosters the transfer of new/improved manufacturing technologies to the industrial base, including manufacturing efforts that have potential for high payoff across the spectrum of Army systems.

The cited work is consistent with the Under Secretary of Defense, Research and Engineering science and technology focus areas and the Army Modernization Strategy.

Work in this PE is performed by: the U.S. Army Futures Command; The U.S. Army Medical Research and Materiel Command (MRMC), Ft. Detrick, MD; and the Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT), Huntsville, AL.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	60.877	53.958	59.848	-	59.848
Current President's Budget	118.410	108.696	59.848	-	59.848
Total Adjustments	57.533	54.738	0.000	-	0.000
• Congressional General Reductions	-0.046	-0.062			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	59.800	54.800			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.221	-			

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

Project: EA2: MANTECH INITIATIVES (CA)

Congressional Add: Additive Manufacturing Technology Insertion

FY 2018	FY 2019
10.000	10.000

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0708045A / <i>End Item Industrial Preparedness Activities</i>
---	--

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

	FY 2018	FY 2019
Congressional Add: <i>Additive Manufacturing Supply Chain</i>	10.000	-
Congressional Add: <i>Inventory Management and Demand Planning Software</i>	9.800	-
Congressional Add: <i>Nanoscale Materials</i>	15.000	20.000
Congressional Add: <i>Advanced Development of Asset Protection Technologies</i>	10.000	-
Congressional Add: <i>Lightweight Transparent Armor</i>	5.000	10.000
Congressional Add: <i>Engineering Data Synchronization</i>	-	9.800
Congressional Add: <i>Power Take-Off Hybridization</i>	-	5.000
Congressional Add Subtotals for Project: EA2	59.800	54.800
Congressional Add Totals for all Projects	59.800	54.800

Change Summary Explanation

FY 2018 congressional add of \$59.8M for Additive manufacturing technology insertion and supply chain, Army inventory management and demand planning software, nanoscale materials, advanced development of asset protection technologies, and manufacturing for novel lightweight transparent armor.
 FY 2019 congressional add of \$54,800 for additive manufacturing technology insertion, nanoscale materials, lightweight transparent armor, engineering data synchronization, and power take-off hybridization.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
E25: Mfg Science & Tech	-	58.610	53.896	59.848	-	59.848	61.071	62.543	63.749	64.386	0.000	424.103
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project develops and demonstrates manufacturing processes that enable improvements in producibility and affordability of emerging and enabling components and subsystems of Army ground and air platforms, Soldier systems, weapons systems, air & missile defense systems, and sensors and electronics. Focus is on components and subsystems such as advanced armor, lightweight structural components, sensors, propellants, and gun tubes. Additionally, work is performed to advance the state of the art in manufacturing processing and fabrication techniques for coatings, multifunctional materials, and structural elements for Army specific applications.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

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

	FY 2018	FY 2019	FY 2020
<p>Title: Long Range Precision Fires</p> <p>Description: The effort funds manufacturing improvements to support areas such as Advanced Weapon Systems, Fire Control, and Advanced Energetics and Warheads. Work focuses on addressing challenges in areas such as enhanced missile seekers; fuses and initiators for munitions; and boring, honing, and rifling cannon and mortar barrels.</p> <p>FY 2019 Plans: Complete development of manufacturing processes for battery free initiators for scatterable munitions; and development of manufacturing technologies for complex missile seekers. Develop safer and more cost effective methods for mixing and packing of propellants; enhanced processes to fabricate large-caliber cannon and mortar tubes with longer range and higher durability than existing systems.</p> <p>FY 2020 Plans: Will demonstrate advanced materials, processing techniques, and tools to fabricate, bore, and rifle large caliber mortar and cannon tubes that enable long range fires; demonstrate more efficient propellant mixing and packing processes for rocket motors.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The Manufacturing Technology selection process supports planned completions in FY19 and planned new start efforts in FY20 to support the Army's modernization priority of Army Long Range Precision Fires.</p>	-	9.956	6.235
<p>Title: Next Generation Combat Vehicle</p>	15.454	18.529	25.211

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	Project (Number/Name) E25 / <i>Mfg Science & Tech</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: This effort funds manufacturing technology advances needed for more affordable components and subsystems for tactical and combat vehicles and weapons systems. Work focuses on addressing challenges in areas such as advanced armor, lighter weight components, insensitive propellants, precision munitions, and vehicle power devices.</p> <p>FY 2019 Plans: Develop manufacturing technology to reduce the cost and improve the performance of weight sensitive armor protection systems against future threats; demonstrate manufacturing technologies to reduce cost and improve performance when joining dissimilar materials for ground platform structural components; develop manufacturing techniques for ground vehicle powertrain components with improved efficiency and power density.</p> <p>FY 2020 Plans: Will mature processing of weight sensitive armor and protection systems that meet size, weight and power requirements; demonstrate manufacturing processes and non-destructive evaluation techniques to enable advanced welding for vehicle structures; develop manufacturing technologies that address unit cost and enable lower life cycle costs as compared to currently available modern combat powertrain components; develop manufacturing processes required to produce composite rubber track systems applicable to heavy ground combat systems.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The Manufacturing Technology selection process supports planned completions in FY19 and planned new start efforts in FY20 to support the Army's modernization priority of Next Generation Combat Vehicle.</p>			
<p>Title: Future Vertical Lift</p> <p>Description: This effort funds manufacturing technology advances needed for more affordable manned and unmanned aircraft components and subsystems. Work focuses on addressing challenges in areas such as engine performance and life, reliable component integration/attachment, structural durability at low weight, sensors for aircraft protection and pilotage, and reduced corrosion.</p> <p>FY 2019 Plans: Investigate novel manufacturing methods for fabrication of composite material air platform components with reduced weight and improved fatigue resistance.</p> <p>FY 2020 Plans: Will develop novel automated manufacturing methods for composite air platform components which are lighter weight and more maintainable; develop manufacturing of targeting sensors for airborne applications.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>	3.932	1.170	5.058

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	Project (Number/Name) E25 / <i>Mfg Science & Tech</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
The Manufacturing Technology selection process supports planned completions in FY19 and planned new start efforts in FY20 to support the Army's modernization priority of Future Vertical Lift.				
<p>Title: Networks and Command, Control, Communications and Intelligence</p> <p>Description: This effort funds manufacturing technology advances needed for more affordable components and subsystems for intelligence, surveillance, reconnaissance and targeting systems, mission command systems, electronic warfare and improved explosive device detect/defeat systems. Work focuses on addressing challenges in areas such as large format multi-color focal plane arrays, flexible displays, night vision sensors, target detectors, advanced antennas and sensors.</p> <p>FY 2019 Plans: Complete optimization of manufacturing process to produce ultra-thin, wide-band, conformal antennas for Army platforms; investigate process improvements for digital imagers and sensors for aviation protection and pilotage.</p> <p>FY 2020 Plans: Will improve process maturation and material growth and yield of dual band digital imagers for aviation protection and pilotage; demonstrate optics coating deposition techniques for 3rd generation sensor platforms; develop Micro Electro Mechanical Systems (MEMS)-based navigation-grade inertial measurement units.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The Manufacturing Technology selection process supports planned completions in FY19 and planned new start efforts in FY20 to support the Army's modernization priority of Networks and Command, Control, Communications and Intelligence.</p>		8.452	7.819	12.363
<p>Title: Air & Missile Defense</p> <p>Description: This effort funds manufacturing improvements to support areas such as High Energy Laser system components (e.g. diodes, optics), interceptor components, and armament systems for counter-unmanned aerial systems and counter-rocket, artillery, and mortar systems.</p> <p>FY 2019 Plans: Develop processes to improve manufacturing yield for high energy laser diodes.</p> <p>FY 2020 Plans: Will develop prototype tooling, test, and evaluation processes to improve manufacturing yield for high energy laser diodes; optimize manufacturing techniques for High Energy Laser (HEL) optics through manufacturing improvements to reduce lead time; develop improvements to the manufacturing process for electromagnetic mitigation devices to eliminate co-site, jamming,</p>		-	0.588	3.734

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
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 2018	FY 2019	FY 2020
and other threats to radar and other communication systems; design and develop a manufacturing process for critical gyroscope components. FY 2019 to FY 2020 Increase/Decrease Statement: Efforts for AMD were realigned from Lethality beginning in FY19 with continued progression in FY20. This effort builds in FY20 for developing an automated means of manufacturing fiber-coupled Pump Diode Processes for High Energy Lasers resulting in reduced production costs. Such efforts will benefit future Army rotary-wing hard-kill aircraft survivability equipment development and other service fiber laser system development.				
Title: Soldier Lethality Description: This effort funds manufacturing technology advances needed for more affordable components and subsystems in areas such as aerial delivery of supplies, expeditionary basing, Soldier-borne sensors, clothing, and protective equipment. Work focuses on addressing challenges in areas such as multifunctional fabrics for shelters, uniforms and portage equipment; lightweight materials for body armor; and medical technologies such as biotechnology and vaccine production. FY 2019 Plans: Develop manufacturing techniques for low cost freeform prism eyepieces and components for Infantry sighting systems; develop manufacturing process improvement techniques for optical coatings and optical components to reduce cost and improve performance. FY 2020 Plans: Will develop manufacturing scale up for advanced metal organic materials to enable better integrated warfighter protection systems; advance manufacturing processes low light level imagers for night time situational awareness for Soldiers. FY 2019 to FY 2020 Increase/Decrease Statement: Decreases in program results from planned transitions and/or completions of programmable initiators for scatterable munitions, freeform prism eyepieces, and power and energy for medium caliber liquid reserve batteries.		16.830	9.174	5.319
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. FY 2019 Plans:		5.042	4.811	1.928

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	Project (Number/Name) E25 / <i>Mfg Science & Tech</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Demonstrate advanced additive manufacturing capabilities for the build, remanufacture, and life extension of critical weapon systems components to improve performance, allow fabrication of structures not possible thorough subtractive methods, and/or improve component affordability; demonstrate an integrated augmented reality solution for advanced machining.</p> <p>FY 2020 Plans: Will demonstrate advanced machining solutions for large caliber weapons.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The Manufacturing Technology selection process supports planned completions in FY19 and continued efforts in FY20 for Cross Cutting technologies.</p>				
<p>Title: Lethality</p> <p>Description: The effort funds manufacturing improvements to support areas such as Advanced Weapon Systems, Fire Control, Logistics, Emerging Technologies, and Advanced Energetics and Warheads. Work focuses on addressing challenges in areas such as enhanced missile seekers; fuses and initiators for munitions; and boring, honing, and rifling cannon and mortar barrels.</p>		8.400	-	-
<p>Title: Medical</p> <p>Description: This effort funds manufacturing technology advances needed for more affordable process methods in areas such as manufacturing of lighter weight multi-functional materials, biotechnology, vaccines, medical equipment power sources, and component ruggedization that directly address Soldier rehabilitation.</p>		0.500	-	-
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>Description: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 Plans: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer</p>		-	1.849	-
Accomplishments/Planned Programs Subtotals		58.610	53.896	59.848
C. Other Program Funding Summary (\$ in Millions)				
N/A				

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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

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

Remarks

Not applicable for this item.

D. Acquisition Strategy

Not applicable for this item.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
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	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
N/A	N/A				N/A																							

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	Project (Number/Name) E25 / <i>Mfg Science & Tech</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2016	4	2019

Note

N/A

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EA2: MANTECH INITIATIVES (CA)	-	59.800	54.800	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	114.600
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 2018	FY 2019
Congressional Add: Additive Manufacturing Technology Insertion	10.000	10.000
FY 2018 Accomplishments: Additive Manufacturing Technology Insertion		
FY 2019 Plans: Additive Manufacturing Technology Insertion		
Congressional Add: Additive Manufacturing Supply Chain	10.000	-
FY 2018 Accomplishments: Additive Manufacturing Supply Chain		
Congressional Add: Inventory Management and Demand Planning Software	9.800	-
FY 2018 Accomplishments: Inventory Management and Demand Planning Software		
Congressional Add: Nanoscale Materials	15.000	20.000
FY 2018 Accomplishments: Nanoscale Materials		
FY 2019 Plans: Nanoscale Materials		
Congressional Add: Advanced Development of Asset Protection Technologies	10.000	-
FY 2018 Accomplishments: Advanced Development of Asset Protection Technologies		
Congressional Add: Lightweight Transparent Armor	5.000	10.000

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	Project (Number/Name) EA2 / <i>MANTECH INITIATIVES (CA)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019
FY 2018 Accomplishments: Lightweight Transparent Armor		
FY 2019 Plans: Lightweight Transparent Armor		
Congressional Add: Engineering Data Synchronization	-	9.800
FY 2019 Plans: Engineering Data Synchronization		
Congressional Add: Power Take-Off Hybridization	-	5.000
FY 2019 Plans: Power Take-Off Hybridization		
Congressional Adds Subtotals	59.800	54.800

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

N/A

Remarks

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	Project (Number/Name) EA2 / <i>MANTECH INITIATIVES (CA)</i>

	FY 2011				FY 2012				FY 2013				FY 2014				FY 2015				FY 2016				FY 2017			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
N/A	[REDACTED]																											

	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
N/A	[REDACTED]																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0708045A / <i>End Item Industrial Preparedness Activities</i>	Project (Number/Name) EA2 / <i>MANTECH INITIATIVES (CA)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
N/A	1	2016	4	2016

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1203142A / <i>SATCOM Ground Environment (SPACE)</i>
---	--

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	9.945	12.105	34.169	-	34.169	18.702	21.728	16.983	22.885	Continuing	Continuing
FE1: <i>Dscs-Dcs (Phase II)</i>	-	6.530	4.229	4.260	-	4.260	4.376	4.499	4.560	13.158	Continuing	Continuing
FE2: <i>MILSATCOM System Engineering</i>	-	2.455	4.387	4.357	-	4.357	4.364	4.379	4.914	3.703	Continuing	Continuing
FE4: <i>Enroute Mission Command</i>	-	0.960	3.489	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.449
FI8: <i>Protected Anti-JAM Tactical SATCOM</i>	-	0.000	0.000	25.552	-	25.552	9.962	12.850	7.509	6.024	Continuing	Continuing

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.

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.

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

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1203142A / <i>SATCOM Ground Environment (SPACE)</i>
---	--

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.

F18: Protected Anti-JAM Tactical SATCOM (Protected SATCOM) provides for a critical protected communications gap in anti-jam SATCOM capability across the Army with the denigration of the current protected terminal. It provides the ability for the tactical Army to be resilient in a contested environment and protect against potentially catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the Tactical Army protection against interference that is either intentional or unintentional. The effort includes development of a critical Protected Tactical Waveform (PTW) modem which will be integrated into Army tactical SATCOM terminals to provide higher throughputs, protection (anti-jam) against Electronic Warfare (EW), and resiliency in a contested environment; development of a dual small form factor modem that can run the PTW and the current Network Centric Waveform (NCW) to Army Expeditionary Signal Battalions (ESBs) and eventually Army Corps, Division, and Brigade Combat Teams; and development, testing and certification of prototype Advanced Extremely High Frequency (AEHF) protected SATCOM terminals which will augment existing AEHF terminals. The PTW efforts are linked to the Air Force and DoD's plans for PTW on Wideband Global SATCOM (WGS) and its follow-on satellite constellation.

In FY2020, a new start development of Advanced Extremely High Frequency (AEHF) protected SATCOM terminal prototype. The new terminal will augment the existing capability of the Secure, Mobile, Anti-Jam, Reliable, Tactical Terminal (SMART-T) AEHF terminal, with the intent to backfill decreasing SMART-T numbers post FY2025. This ensures the Army's ability to meet increasing EW threat requirements. It will provide AEHF protected SATCOM capability in a modular, more transportable, vehicle agnostic form factor, providing greater flexibility on the battlefield. The terminal will be built with the intent to migrate from the AEHF constellation to the PTS constellation.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	11.959	12.119	8.644	-	8.644
Current President's Budget	9.945	12.105	34.169	-	34.169
Total Adjustments	-2.014	-0.014	25.525	-	25.525
• Congressional General Reductions	-0.009	-0.014			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.600	-			
• SBIR/STTR Transfer	-0.405	-			
• Adjustments to Budget Years	-	-	25.525	-	25.525

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1203142A / <i>SATCOM Ground Environment (SPACE)</i>	
<u>Change Summary Explanation</u> Increase in Project FI8 for Protected Anti-Jam Tactical SATCOM.		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FE1: Dscs-Dcs (Phase II)	-	6.530	4.229	4.260	-	4.260	4.376	4.499	4.560	13.158	Continuing	Continuing
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.

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 2018	FY 2019	FY 2020
Title: SATCOM Terminal Digital Intermediate Frequency (IF) Implementation Analysis	3.605	2.854	2.614
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 2019 Plans: Assess various vendor implementations for compliance with Digital IF standard. Perform multi-vendor interoperability analysis to ensure maximum vendor participation in future Digital IF technology and foster competition.			
FY 2020 Plans: Demonstrate SATCOM Gateway resiliency through path diversity; use SATCOM terminals at different geographical locations to support any SATCOM mission.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Decrease is due to delay in requirement for air time for demonstration purposes.			
<p>Title: Electromagnetic Interference Mitigation Analysis</p> <p>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.</p> <p>FY 2019 Plans: Mature Interference Mitigation / Cancellation technology to software/firmware that can be incorporated in SATCOM modem/terminal. Integrate solutions into DoD gateway satellite communications architecture.</p> <p>FY 2020 Plans: Transition performance specifications to be implemented into next generation SATCOM modem. Mature and demonstrate gateway resiliency by using satellite links and terrestrial connectivity simultaneously to support SATCOM missions.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funds is due to exploring diversity through terrestrial and SATCOM networks simultaneously.</p>	2.925	1.220	1.646
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>Description: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 Plans: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer</p>	-	0.155	-
Accomplishments/Planned Programs Subtotals	6.530	4.229	4.260

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• BB8500: Defense Enterprise Wideband Satcom Systems	155.551	97.633	101.189	-	101.189	99.102	108.642	112.177	112.505	Continuing	Continuing
Remarks											

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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)

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.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 7				PE 1203142A / SATCOM Ground Environment (SPACE)				FE1 / Dscs-Dcs (Phase II)							
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
SATCOM Terminal Digital IF Implementation Analysis	MIPR	TBD : APG, MD	-	2.709		2.023	Jan 2019	1.504		-		1.504	Continuing	Continuing	Continuing
Electromagnetic Interference Mitigation Analysis	MIPR	TBD : APG, MD	-	2.167		1.035	Jan 2019	1.625		-		1.625	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.155		-		-		-	0.000	0.155	-
Subtotal			-	4.876		3.213		3.129		-		3.129	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
In-house Support	Allot	PdM WESS : Ft. Belvoir, VA	-	1.121		0.689		0.671		-		0.671	Continuing	Continuing	Continuing
Contractor Support	C/CPFF	ACC, MD : APG, MD	-	0.533	Dec 2018	0.327	Jan 2019	0.460	Jan 2020	-		0.460	Continuing	Continuing	Continuing
Subtotal			-	1.654		1.016		1.131		-		1.131	Continuing	Continuing	N/A
Project Cost Totals			-	6.530		4.229		4.260		-		4.260	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
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)	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
SATCOM Terminal Digital IF Implementation Analysis																												
Electromagnetic Interference Mitigation Analysis																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

Events	Start		End	
	Quarter	Year	Quarter	Year
SATCOM Terminal Digital IF Implementation Analysis	1	2019	4	2024
Electromagnetic Interference Mitigation Analysis	1	2019	4	2024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FE2: MILSATCOM System Engineering	-	2.455	4.387	4.357	-	4.357	4.364	4.379	4.914	3.703	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project FE2, MILSATCOM System Engineering supports the Army's Network Modernization Line of Effort (LOE) #1, Unified Network.

FE2: Military Satellite Communications (MILSATCOM) System Engineering (SE) assures that tactical Army Satellite Communications (SATCOM) and SATCOM On-The-Move (SOTM) systems are engineered to legally and efficiently operate worldwide. MILSATCOM SE shapes Joint SATCOM systems' design efforts, standards development and planning processes. MILSATCOM SE represents the Army's tactical interests within DoD, Commercial & International forums to ensure affordable and scalable future SATCOM capabilities for maneuver forces. These efforts ensure that the Army continues to evaluate evolving technologies for the planning and designing of SATCOM solutions that reduce technical and programmatic impacts.

FY 2020 funds the systems engineering required to support technology maturation, systems analysis, and planning associated with joint SATCOM development efforts including complying with the outcome of 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 2020 funding covers the Narrowband Mobile User Objective System (MUOS) Analysis of Alternatives (AoA), 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.

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

	FY 2018	FY 2019	FY 2020
Title: Protected Communications System Engineering and WGS Communications	0.662	1.140	1.176
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 outcome of the Protected SATCOM Communications Systems (PSCS) Analysis of Alternatives (AoA).			
FY 2019 Plans: Will continue systems engineering and analysis for the Protected Communications and WGS Communications as well as development and technology maturation on the NCW Tool.			
FY 2020 Plans:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
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 2018	FY 2019	FY 2020
Will continue systems engineering and analysis for the Protected Communications and WGS Communications as well as development and technology maturation on the NCW Tool. FY 2019 to FY 2020 Increase/Decrease Statement: Program funds increased \$36K from \$1.14M in FY 2019 to \$1.176M in FY 2020 to support increased systems engineering support of product development and planning.				
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 Analysis of Alternatives, that have impact on tactical Army use of military and commercial satellite constellations. These efforts have a direct impact in reducing technical and programmatic risk for the acquisition efforts for tactical Army SATCOM systems using the WGS and Protected constellations. FY 2019 Plans: Will continue in house Engineering Support, Contractor Support and System Architecture & Analysis FY 2020 Plans: Will continue in house Engineering Support, Contractor Support and System Architecture & Analysis. FY 2019 to FY 2020 Increase/Decrease Statement: Program funds increased \$79K from \$2.544M in FY 2019 to \$2.623M in FY 2020 to support increased systems engineering support of related to the joint Protected programs and on-going Analysis of Alternatives.		1.478	2.544	2.623
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. FY 2019 Plans: Will continue testing and certification of critical SATCOM and SOTM communication and network technologies. FY 2020 Plans: Will continue testing and certification of critical SATCOM and SOTM communication and network technologies. FY 2019 to FY 2020 Increase/Decrease Statement: Program funds increased \$0.016M from \$0.542M in FY 2019 to \$0.558M in FY 2020 to support increased testing and certification of critical SATCOM and SOTM communication and network technologies.		0.315	0.542	0.558
Title: FY 2019 SBIR / STTR Transfer		-	0.161	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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 2018	FY 2019	FY 2020
Description: FY 2019 SBIR / STTR Transfer			
FY 2019 Plans: FY 2019 SBIR / STTR Transfer			
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer			
Accomplishments/Planned Programs Subtotals	2.455	4.387	4.357

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

N/A

Remarks

FY 2017 and prior funding was aligned to 0303142A/456.

D. Acquisition Strategy

This project funds advanced systems engineering, research, development, test and evaluation of new and emerging technologies to optimize terminal performance and communications control. Once the technologies are mature and deemed feasible, funding and management responsibility for implementation of the technology will transition to PM Tactical Network and related programs of record.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Protected Communications and WGS Communications SE	TBD	Various : APG, MD	-	0.662	Sep 2018	1.140	Feb 2019	1.176	Jan 2020	-		1.176	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.161		-		-		-	0.000	0.161	-
Subtotal			-	0.662		1.301		1.176		-		1.176	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering (In House)	MIPR	PM WIN-T : APG, MD	-	0.679	Sep 2018	1.168	Sep 2019	1.204	Sep 2020	-		1.204	Continuing	Continuing	-
Engineering Contractors Support	C/CPFF	PM WIN-T : APG, MD	-	0.671	Mar 2018	1.155	Sep 2019	1.190	Mar 2020	-		1.190	Continuing	Continuing	-
System Architecture & Analysis	Various	CERDEC : APG, MD	-	0.128	Apr 2018	0.221	Apr 2019	0.228	Apr 2020	-		0.228	Continuing	Continuing	-
Subtotal			-	1.478		2.544		2.622		-		2.622	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Terminal Testing and Evaluation System Engineering	FFRDC	PEO C3T : TBD	-	0.112	Sep 2018	0.192	Jan 2019	0.198	Dec 2019	-		0.198	0.000	0.502	-
Test Support	MIPR	Matrix : APG, MD	-	0.091	Apr 2018	0.157	Apr 2019	0.162	Apr 2020	-		0.162	0.000	0.410	-
Testing, Certification	MIPR	TBD : APG, MD	-	0.112	Jul 2018	0.193	Jul 2019	0.199	Jul 2020	-		0.199	0.000	0.504	-
Subtotal			-	0.315		0.542		0.559		-		0.559	0.000	1.416	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019			
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 2018	FY 2019		FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals	-	2.455	4.387		4.357	-	4.357	Continuing	Continuing	N/A	

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) FE2 / MILSATCOM System Engineering

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Wideband AoA	[Redacted]				[Redacted]																							
Protected Tactical Service Field Demo Modem Testing	[Redacted]				[Redacted]				[Redacted]																			
Narrowband (MUOS) AoA	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
Protected Tactical Service Field Demo	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
NCW Tool Development and Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
SATCOM Systems Architecture & Analysis	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
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

Events	Start		End	
	Quarter	Year	Quarter	Year
Wideband AoA	4	2016	2	2018
Protected Tactical Service Field Demo Modem Testing	1	2018	4	2020
Narrowband (MUOS) AoA	3	2019	4	2021
Protected Tactical Service Field Demo	4	2015	2	2021
NCW Tool Development and Testing	1	2015	4	2024
SATCOM Systems Architecture & Analysis	1	2018	4	2024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) FE4 / Enroute Mission Command
--	---	---

COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FE4: <i>Enroute Mission Command</i>	-	0.960	3.489	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.449
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Enroute Mission Command supports the Army's Network Modernization Strategy Line Of Effort (LOE) 1 - Unified Network.

Enroute Mission Command (EMC) supports the Global Response Force (GRF) and other Army units with the requirement to conduct Airborne forced entry operations with the ability to conduct mission command, to include mission planning and rehearsal, while enroute on board US Air Force Air Mobility Command (AMC) aircraft. EMC provides a modernization to enroute communications to enable broadband reach-back data capability utilizing military or commercial networks with adequate bandwidth support required by Mission Command and Intelligence applications. EMC will provide commanders with the ability to obtain and share near real-time information regarding intelligence, situational awareness and command and control information while enroute to their objective. The ability to adjust plans and strategize utilizing the latest Intel data will give the GRF the information dominance needed to execute their mission once they arrive at their objective.

Ku FOC was achieved in September 2017 as directed by MDA due to rephasing of FY 2017 OPA funding into FY 2018/2019 and program was restructure in Dec 2015. A Modification Work Order (MWO), adding Ka Fixed Installed Satellite Antenna (FISA) capability began in FY18.

FY 2019 funding supports the Post Deployment Assessment (PDA) requirement which will validate the EMC capability for warfighters to conduct mission command utilizing the Key Leader Enroute Node (KEN), Dependent Airborne Node (DAN) and Command and Staff Palletized Airborne Node (CASPAN) on the C17 aircraft.

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

	FY 2018	FY 2019	FY 2020
Title: EMC Testing Description: Post Deployment Assessment (PDA) FY 2019 Plans: Post Deployment Assessment (PDA) FY 2019 to FY 2020 Increase/Decrease Statement: No FY20 RDTE required	0.960	3.377	-
Title: FY 2019 SBIR / STTR Transfer Description: FY 2019 SBIR / STTR Transfer FY 2019 Plans:	-	0.112	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army **Date:** March 2019

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) FE4 / Enroute Mission Command
--	---	---

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
FY 2019 SBIR / STTR Transfer			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2019 SBIR / STTR Transfer			
Accomplishments/Planned Programs Subtotals	0.960	3.489	-

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• B00015: <i>Enroute Mission Command (EMC)</i>	21.067	37.401	8.609	-	8.609	-	-	-	-	0.000	67.077

Remarks
B08400: OPA funding line for EMC

D. Acquisition Strategy
The continued procurement of the EMC full operational capability follows DoDI 5000.02, 7 Jan 2015, Enclosure 13, Rapid Fielding of Capabilities. The Milestone Decision Authority (MDA) and project manager will tailor and streamline program strategy based on the required timelines to meet urgent need capability requirements. The Army Executive Agent signed an Acquisition Decision Memorandum (ADM) on 27 April 2015 delegating MDA to PEO C3T. The MDA signed an ADM on 11 May 2015 selecting the KuKa Antenna and Radome for the Full Operational Capability (FOC). An ADM was signed on 20 May 2015 granting approval to enter into production and deployment phase.

Ku FOC was achieved in September 2017 as directed by MDA due to rephasing of FY 2017 OPA funding into FY 2018/2019 and program was restructured in Dec 2015. A Modification Work Order (MWO), adding Ka Fixed Installed Satellite Antenna (FISA) capability began in FY18.


FY 2019 funding (173142 FE4) supports the Post Deployment Assessment (PDA) requirement which will validate the EMC capability for warfighters to conduct mission command utilizing the Key Leader Enroute Node (KEN), Dependent Airborne Node (DAN) and Command and Staff Palletized Airborne Node (CASPAN) on the C17 aircraft.

Initial Operational Capability met in May 2015 with modification of five C-17s with satellite antennae and installation kits, and roll-on/roll-off, battalion level, Key Leader Node (KEN). FOC is 35 C-17s, eight Key Leader Enroute Node (KEN), and 24 company level Dependent Airborne Nodes (DAN), and a Command and Staff Palletized Airborne Node (CASPAN).

E. Performance Metrics
N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) FE4 / Enroute Mission Command

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Post Deployment Assessment	[Redacted]				[Redacted]																							
NRE for Baseband Redesign	[Redacted]				[Redacted]																							
Post Deployment Assessment (PDA)	[Redacted]				[Redacted]																							
Disposition Decision	[Redacted]				[Redacted]								 Disposition Decision															

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) FE4 / Enroute Mission Command

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
EMI/EMC Test	4	2016	1	2017
Triband Radome Certification Flight Test	1	2017	2	2017
CASPAN Safe to Fly Test	4	2017	4	2017
Post Deployment Assessment	1	2018	1	2018
NRE for Baseband Redesign	3	2018	1	2019
Post Deployment Assessment (PDA)	3	2019	4	2019
Disposition Decision	1	2021	1	2021

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)				Project (Number/Name) F18 / Protected Anti-JAM Tactical SATCOM			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
F18: Protected Anti-JAM Tactical SATCOM	-	0.000	0.000	25.552	-	25.552	9.962	12.850	7.509	6.024	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Protected Anti-Jam Tactical SATCOM (1203142A/F18) is a continuation of efforts previously funded by the Army under PE 1203142A- SATCOM Ground Environment (SPACE) - MILSATCOM Systems Engineering (FE2). The Protected SATCOM (1203142A/F18) funding also includes a new start effort to test commercial Advanced Extremely High Frequency (AEHF) protected SATCOM terminal prototype to meet recently identified critical capability gaps for anti-jam SATCOM.

A. Mission Description and Budget Item Justification

Project F18, Protected Anti-JAM Tactical SATCOM supports the Army's Network Modernization Strategy Line of Effort #1, Unified Network.

F18: Protected Anti-JAM Tactical SATCOM (Protected SATCOM) provides for a critical protected communications gap in anti-jam SATCOM capability across the Army. It provides the ability for the tactical Army to be resilient in a contested environment and protect against potentially catastrophic loss of situational awareness and command and control during critical battle movement. It will offer the Tactical Army protection against interference that is either intentional or unintentional. The effort includes development of a critical Protected Tactical Waveform (PTW) modem which will be integrated into Army tactical SATCOM terminals to provide higher throughputs, protection (anti-jam) against Electronic Warfare (EW), and resiliency in a contested environment; development of a dual small form factor modem that can run the PTW and the current Network Centric Waveform (NCW) to Army Expeditionary Signal Battalions (ESBs) and eventually Army Corps, Division, and Brigade Combat Teams; and development, testing and certification of prototype Advanced Extremely High Frequency (AEHF) protected SATCOM terminals which will augment existing AEHF terminals. The PTW efforts are linked to the Air Force and DoD's plans for PTW on Wideband Global SATCOM (WGS) and its follow-on satellite constellation.

FY2020 funds will continue collaborative development, testing and certification with the US Air Force and Navy of a PTW modem and a Protected Tactical Satellite (PTS). The prototype of a protected modem and protected satellite were previously funded under the FE2 MILSATCOM Systems Engineering during the Protected Tactical Service Field Demo (PTSFD). The PTW modem and the accompanying satellite constellation continue the spiral development of critical protected communications capabilities. The funding on F18 Protected SATCOM incorporates the Army specific requirements to be included in these efforts.

FY2020 funds will start efforts to test commercial Advanced Extremely High Frequency (AEHF) protected SATCOM terminal prototypes to meet recently identified critical capability gaps for anti-jam SATCOM. The new terminal will augment the existing capability of the Secure, Mobile, Anti-Jam, Reliable, Tactical Terminal (SMART-T) AEHF terminal, with the intent to backfill decreasing SMART-T numbers due to obsolescence. This ensures the Army's ability to meet increasing EW threat requirements.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) F18 / Protected Anti-JAM Tactical SATCOM		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Title: Protected Tactical Waveform Modem Development</p> <p>Description: Development of Protected Tactical Waveform modem incorporating tactical Army specific requirements.</p> <p>FY 2020 Plans: Development and engineering of Army specific requirements for the Protected Tactical Waveform Modem that will be utilized for protected communications.</p> <p>Activities are part of joint effort with the US Air Force and Navy.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in FY20 establishes a separate funding line for continuation of efforts previously funded under MILSATCOM Systems Engineering (FE2).</p>		-	-	11.000
<p>Title: Protected Tactical Satellite Development</p> <p>Description: Tactical Army requirement inserted during development of future Protected Tactical SATCOM satellite.</p> <p>Activities are part of joint effort with Air Force and Navy.</p> <p>FY 2020 Plans: Research, development and engineering for the Protected Tactical Satellite incorporating Army specific requirements to be included on the satellite.</p> <p>Activities are part of joint effort led by the Air Force, to include Army and Navy.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in FY20 establishes a separate funding line for continuation of efforts previously funded under MILSATCOM Systems Engineering (FE2).</p>		-	-	3.952
<p>Title: AEHF Protected SATCOM Terminal Prototype Development</p> <p>Description: Research, development and testing of prototype AEHF Protected SATCOM terminals.</p> <p>FY 2020 Plans: Initial research, development and testing of prototype AEHF Protected SATCOM terminals.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>		-	-	10.600

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) F18 / Protected Anti-JAM Tactical SATCOM		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Increase in FY20 establishes funding to support new prototype development for a protected terminal to mitigate critical capability gap.				
Accomplishments/Planned Programs Subtotals		-	-	25.552
C. Other Program Funding Summary (\$ in Millions) N/A				
Remarks				
D. Acquisition Strategy This project funds advanced systems engineering, research, development, test and evaluation of emerging protected Satellite Communications technologies to provide resilience and anti-jam protection against Electronic Warfare (EW). The program will leverage contracts established by the Air Force for the development of Protected Tactical Waveform (PTW) modems, including development of a dual small form factor modem capable of running the PTW and Network Centric Waveform - Resilient (NCW-R), beginning in FY2020. Production and Fielding of the PTW modems will begin in FY2023 under the Protected Anti-JAM Tactical SATCOM procurement line (B34002). This project also funds the research, development and testing of an Advanced Extremely High Frequency (AEHF) protected SATCOM terminal prototype to aid in filling the identified critical protected communications. This terminal is a direct follow-on effort to the Secure, Mobile, Anti-Jam, Reliable, Tactical Terminal (SMART-T). The Program Office is working closely with the US Air Force on scheduling insertion of the terminal into the satellite Mission Planner as well as working with NSA to develop a timely path to certification. The terminal research and development effort will be awarded in FY2020; a developmental test combined with a robust Military utility user assessment will inform an FY2022 decision point on the path forward for the terminal.				
E. Performance Metrics N/A				

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)					Project (Number/Name) F18 / Protected Anti-JAM Tactical SATCOM						
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Protected Tactical Waveform Modem Development	TBD	To Be Determined : To Be Determined	-	-		-		11.000	Jan 2020	-		11.000	0.000	11.000	Continuing
Protected Tactical Satellite Development	TBD	To Be Determined : To Be Determined	-	-		-		3.952	Jan 2020	-		3.952	0.000	3.952	Continuing
AEHF Protected SATCOM Terminal Prototype Development	TBD	To Be Determined : To Be Determined	-	-		-		10.600	Apr 2020	-		10.600	0.000	10.600	Continuing
Subtotal			-	-		-		25.552		-		25.552	0.000	25.552	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	-		0.000		25.552		-		25.552	0.000	25.552	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) F18 / Protected Anti-JAM Tactical SATCOM

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024															
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4												
Protected Tactical Waveform (PTW) Development																																								
Protected Tactical Waveform (PTW) Modem Testing																																								
Army Dual Waveform Development																																								
Protected Tactical Satellite (PTS) Development																																								
AEHF Protected SATCOM Terminal Prototype Development																																								
Decision Point: AEHF Protected SATCOM Terminal Production																																								

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1203142A / SATCOM Ground Environment (SPACE)	Project (Number/Name) F18 / Protected Anti-JAM Tactical SATCOM

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Protected Tactical Waveform (PTW) Development	2	2020	4	2022
Protected Tactical Waveform (PTW) Modem Testing	1	2023	4	2025
Army Dual Waveform Development	1	2024	4	2025
Protected Tactical Satellite (PTS) Development	2	2020	4	2025
AEHF Protected SATCOM Terminal Prototype Development	2	2020	4	2022
Decision Point: AEHF Protected SATCOM Terminal Production	4	2022	4	2022

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019	
Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 1208053A / <i>Joint Tactical Ground System</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	10.228	7.400	10.275	-	10.275	9.519	9.674	7.079	12.097	0.000	66.272
FE7: <i>Joint Tact Grd Station-P3I(MIP)</i>	-	10.228	7.400	10.275	-	10.275	9.519	9.674	7.079	12.097	0.000	66.272

A. Mission Description and Budget Item Justification

The Joint Tactical Ground Station (JTAGS) is a post-production, ACAT III program and is designated as a DoD Space 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.

The JTAGS Program Element (PE) supports development and test to meet JTAGS Operational Requirement(s) Document (ORD) thresholds using improved sensors and algorithms as Pre-Planned Product Improvements (P3I). P3I Improvements upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improves warning tactical parameters and timeliness. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 1 is complete. JTAGS Block II Phase 2 activities are broken into three spirals to expedite delivering critical capabilities sooner. Phase 2, Spiral 1 delivers increased sensor capabilities to include, but not limited to processing SBIRS GEO satellite Staring sensor data and additional Highly Elliptical Orbit data. Spiral 2 delivers increased sensor access, communication upgrades, and enhanced training/exercise capabilities (FY2018-19). Spiral 3 delivers software tuning and testing in accordance with the Operational Requirements Document (ORD) (FY2018-21). JROC-Memos 197-12 and 113-13 supports the need to develop and field JTAGS Block II capabilities as soon as possible. Operational Need Statement (ONS) 18-22681 resulted in an Urgent Materiel Release (UMR) approval (13 Apr 18) for the fielding of JTAGS Block II systems, replacing the legacy JTAGS Block I systems. Fielding of the JTAGS Block II Phase 1 systems began in 2018 and is ongoing. Space and Missile Defense Command (SMDC)/Army Strategic Command (ARSTRAT) are developing Capabilities Production Documents (CPDs) to address emerging threats that are already known and future requirements. JTAGS must stay concurrent with any future overhead persistent infrared sensor capabilities to remain relevant and retain resiliency of Teater Event System (TES).

FY 2020 requested funding of \$10.275 million will allow for the continued Spiral 3 software tuning efforts to fully exploit sensor data, evolving cyber hardening advances, emerging threats, and initial planning for 2021 Follow-On Test and Evaluation (FOTE).

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
---	-------------------------

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 1208053A / <i>Joint Tactical Ground System</i>
---	---

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	10.228	7.400	9.282	-	9.282
Current President's Budget	10.228	7.400	10.275	-	10.275
Total Adjustments	0.000	0.000	0.993	-	0.993
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	0.993	-	0.993

Change Summary Explanation

In FY 2020, \$0.993 million was added to address evolving cyber hardening efforts.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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(MIP)			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FE7: Joint Tact Grd Station-P3I(MIP)	-	10.228	7.400	10.275	-	10.275	9.519	9.674	7.079	12.097	0.000	66.272
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 and is designated as a DoD Space 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.

The JTAGS Program Element (PE) supports development and test to meet JTAGS Operational Requirement(s) Document (ORD) thresholds using improved sensors and algorithms as Pre-Planned Product Improvements (P3I). P3I Improvements upgrade JTAGS to a new Block II configuration for operation with the next generation of Space Based Infrared System (SBIRS) satellites, and improves warning tactical parameters and timeliness. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 1 is complete. JTAGS Block II Phase 2 activities are broken into three spirals to expedite delivering critical capabilities sooner. Phase 2, Spiral 1 delivers increased sensor capabilities to include, but not limited to processing SBIRS GEO satellite Staring sensor data and additional Highly Elliptical Orbit data. Spiral 2 delivers increased sensor access, communication upgrades, and enhanced training/exercise capabilities (FY2018-19). Spiral 3 delivers software tuning and testing in accordance with the Operational Requirements Document (ORD) (FY2018-21). JROC-Memos 197-12 and 113-13 supports the need to develop and field JTAGS Block II capabilities as soon as possible. Operational Need Statement (ONS) 18-22681 resulted in an Urgent Materiel Release (UMR) approval (13 Apr 18) for the fielding of JTAGS Block II systems, replacing the legacy JTAGS Block I systems. Fielding of the JTAGS Block II Phase 1 systems began in 2018 and is ongoing. Space and Missile Defense Command (SMDC)/Army Strategic Command (ARSTRAT) are developing Capabilities Production Documents (CPDs) to address emerging threats that are already known and future requirements. JTAGS must stay concurrent with any future overhead persistent infrared sensor capabilities to remain relevant and retain resiliency of the Theater Event System (TES).

FY 2020 requested funding of \$10.275 million will allow for the continued Spiral 3 software tuning efforts to fully exploit sensor data, evolving cyber hardening advances, emerging threats, and initial planning for 2021 Follow-On Test and Evaluation (FOTE).

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

	FY 2018	FY 2019	FY 2020
Title: JTAGS Test and Evaluation Support	1.616	1.083	1.024

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1208053A / <i>Joint Tactical Ground System</i>	Project (Number/Name) FE7 / <i>Joint Tact Grd Station-P3I(MIP)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: Test and evaluation support for the JTAGS P3I Block II program</p> <p>FY 2019 Plans: Will complete testing support of the JTAGS P3I Block II Phase 2 Spiral 2 development program</p> <p>FY 2020 Plans: Post Limited User Test (LUT) analysis and reporting. Supporting developmental testing for JTAGS Block II Phase 2 Spiral 3 tuning efforts. Begin planning JTAGS FOTE planned for FY21</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Projected FY19 to FY20 funding of the JTAGS Test and Evaluation program will decrease slightly. FY19 effort will finish a Limited User Test (LUT), while FY20 efforts will be post-LUT analysis/reporting and beginning to plan for FOT&E support projected to take place in FY21.</p>			
<p>Title: JTAGS Block II Phase 2</p> <p>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 "Walkers" data and Missile Defense System Exerciser (MDSE) capabilities (FY2018-19). Spiral 3 delivers software tuning and testing to the Operational Requirements Document (ORD) (FY2018-21). JROC-Memos 197-12 and 113-13 supports the need to develop and field JTAGS Block II capabilities as soon as possible. Also includes Government management/oversight of the JTAGS Block II program.</p> <p>FY 2019 Plans: Will continue development efforts of the JTAGS Block II Phase 2 Spiral 2 program. Also covers some Government management/oversight.</p> <p>FY 2020 Plans: Will continue development efforts of the JTAGS Block II Phase 2 Spiral 3 program which focuses on software tuning efforts to fully optimize sensor data, and evolving cyber hardening advances. Also covers some Government management/oversight.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Program was increased to address evolving cyber hardening efforts.</p>	8.612	6.317	9.251
Accomplishments/Planned Programs Subtotals	10.228	7.400	10.275

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1208053A / <i>Joint Tactical Ground System</i>	Project (Number/Name) FE7 / <i>Joint Tact Grd Station-P3I(MIP)</i>

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

Line Item	FY 2018	FY 2019	FY 2020	FY 2020	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	Cost To	Total Cost
			Base	OCO	Total					Complete	
• BZ8420: <i>JOINT TACTICAL GROUND STATION MODS (JTAGS)</i>	-	5.434	0.000	-	0.000	-	-	6.393	-	0.000	11.827

Remarks

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. JTAGS Block II is on contract for a two-Phase development effort. JTAGS Block II Phase 2 is further divided into three spirals to provide critical capabilities to fielded units faster. Spiral 1 delivers stereo SBIRS Geosynchronous staring sensor capabilities and SBIRS Highly Elliptical Orbit (HEO) Pseudo-Link 4 (P/L 4) data. Spiral 2 delivers Cobra Brass and "Walkers" data, and Missile Defense System Exerciser (MDSE) capabilities (FY2018-19). Spiral 3 delivers software tuning and testing in accordance with the Operational Requirements Document (ORD) (FY2018-21). JTAGS Block II Phase 2 is a Cost Plus Incentive Fee (CPIF) option on the JTAGS Block II (P3I) contract (W9113M-12-C-0055). The option was definitized 4Q17. JROC-Memos 197-12 and 113-13 direct fielding of JTAGS Block II capabilities as soon as possible.

E. Performance Metrics

N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)					Project (Number/Name)						
2040 / 7				PE 1208053A / Joint Tactical Ground System					FE7 / Joint Tact Grd Station-P3I(MIP)						
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Allot	Various : Redstone Arsenal AL	-	2.689	Oct 2017	1.190	Oct 2018	1.161	Oct 2019	-		1.161	Continuing	Continuing	-
Subtotal			-	2.689		1.190		1.161		-		1.161	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
JTAGS P3I Block II Phase 2 Development	Option/CPIF	Northrop Grumman : Colorado Springs Co	-	4.590	Dec 2017	3.749	Dec 2018	6.713	Dec 2019	-		6.713	Continuing	Continuing	-
Subtotal			-	4.590		3.749		6.713		-		6.713	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	C/CPIF	TBD : Huntsville AL	-	1.333	Dec 2017	1.378	Nov 2018	1.377	Feb 2020	-		1.377	Continuing	Continuing	-
Subtotal			-	1.333		1.378		1.377		-		1.377	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Support (ATEC/AIC/JITC)	Various	Various : Various	-	1.616	Dec 2017	1.083	Dec 2018	1.024	Dec 2019	-		1.024	Continuing	Continuing	-
Subtotal			-	1.616		1.083		1.024		-		1.024	Continuing	Continuing	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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(MIP)

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
JTAGS P3I Block II Phase 2	[Redacted]																											
JTAGS P3I Block II Phase 2 Spiral 1 (Starer, P/L4)	[Redacted]																											
JTAGS P3I Block II Phase 2 Spiral 2 (Cobra Brass and Slow Wal)	[Redacted]																											
JTAGS P3I Block II Phase 2 Spiral 3 (tuning and testing to ORD)	[Redacted]																											
Future Sensor Integration and Technology Refresh	[Redacted]																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 1208053A / <i>Joint Tactical Ground System</i>	Project (Number/Name) FE7 / <i>Joint Tact Grd Station-P3I(MIP)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
JTAGS P3I Block II Phase 2	4	2015	4	2021
JTAGS P3I Block II Phase 2 Spiral 1 (Starer, P/L4)	4	2015	4	2019
JTAGS P3I Block II Phase 2 Spiral 2 (Cobra Brass and Slow Walkers)	4	2017	4	2019
JTAGS P3I Block II Phase 2 Spiral 3 (tuning and testing to ORD)	3	2018	3	2021
Future Sensor Integration and Technology Refresh	1	2022	4	2024