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

March 2019



Army

Justification Book of

Research, Development, Test & Evaluation, Army

RDT&E – Volume II, Budget Activity 5B

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Army • Budget Estimates FY 2020 • RDT&E Program

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RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY
APPROPRIATION LANGUAGE

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, \$12,396,895,000.00 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.

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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.

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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

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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

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<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

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Summary Recap of Budget Activities	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)
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
Summary Recap of FYDP Programs					
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

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<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

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	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

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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

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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

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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

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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

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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

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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

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Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	Se
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

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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

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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

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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

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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

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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

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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

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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

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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

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116	0604622A	Family of Heavy Tactical Vehicles	05	16,745			16,745	16,745	U
117	0604633A	Air Traffic Control	05	6,989			6,989	6,989	U
118	0604642A	Light Tactical Wheeled Vehicles	05	10,465			10,465	10,465	U
119	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	310,152			310,152	310,152	U
120	0604710A	Night Vision Systems - Eng Dev	05	181,732			181,732	181,732	U
121	0604713A	Combat Feeding, Clothing, and Equipment	05	2,393			2,393	2,393	U
122	0604715A	Non-System Training Devices - Eng Dev	05	27,412			27,412	27,412	U
123	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	43,502			43,502	43,502	U
124	0604742A	Constructive Simulation Systems Development	05	11,636			11,636	11,636	U
125	0604746A	Automatic Test Equipment Development	05	10,915			10,915	10,915	U
126	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	7,801			7,801	7,801	U
127	0604768A	Brilliant Anti-Armor Submunition (BAT)	05	25,000			25,000	25,000	U
128	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	9,241			9,241	9,241	U
129	0604798A	Brigade Analysis, Integration and Evaluation	05	42,634			42,634	42,634	U
130	0604802A	Weapons and Munitions - Eng Dev	05	181,023			181,023	181,023	U

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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

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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

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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

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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

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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

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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

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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

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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	

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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

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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

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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

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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

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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

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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

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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	

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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	

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131	05	0604804A	Logistics and Engineer Equipment - Eng Dev.....	208
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133	05	0604807A	Medical Materiel/Medical Biological Defense Equipment - Eng Dev.....	340
134	05	0604808A	Landmine Warfare/Barrier - Eng Dev.....	365
135	05	0604818A	Army Tactical Command & Control Hardware & Software.....	403
136	05	0604820A	Radar Development.....	522
137	05	0604822A	General Fund Enterprise Business System (GFEBS).....	535
138	05	0604823A	Firefinder.....	550
139	05	0604827A	Soldier Systems - Warrior Dem/Val.....	572

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Command, Control, Communications Systems - Eng Dev	0604805A	132	05.....	329
Firefinder	0604823A	138	05.....	550
General Fund Enterprise Business System (GFEBS)	0604822A	137	05.....	535
Landmine Warfare/Barrier - Eng Dev	0604808A	134	05.....	365
Logistics and Engineer Equipment - Eng Dev	0604804A	131	05.....	208
Medical Materiel/Medical Biological Defense Equipment - Eng Dev	0604807A	133	05.....	340
Radar Development	0604820A	136	05.....	522
Soldier Systems - Warrior Dem/Val	0604827A	139	05.....	572
Weapons and Munitions - Eng Dev	0604802A	130	05.....	71

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>
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COST (\$ in Millions)	Prior Years	FY 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	-	139.386	49.250	42.634	-	42.634	42.990	43.288	42.786	42.436	0.000	402.770
DY3: <i>NIE Test & Evaluation</i>	-	49.220	22.660	16.851	-	16.851	17.326	17.356	16.522	16.851	0.000	156.786
DY5: <i>Production/Field Coordination for Capability Sets</i>	-	4.161	4.239	2.157	-	2.157	2.224	2.213	2.185	2.304	0.000	19.483
DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	-	19.683	15.600	17.807	-	17.807	17.534	17.659	17.870	17.043	0.000	123.196
DZ6: <i>Army Integration Management & Coordination</i>	-	8.315	6.751	5.819	-	5.819	5.906	6.060	6.209	6.238	0.000	45.298
FG7: <i>Emerging Technology Initiatives</i>	-	58.007	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	58.007

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

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

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

A. Mission Description and Budget Item Justification

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

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

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>
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Project DY5: Production/Fielding Coordination for Capability Sets, provides for the development of a synchronized Brigade/Division level plan for the Production equipment delivery and Fielding (hand-off logistics and new equipment training) of Capability Set (CS) components (both hardware/software in A and/or B Kits) upon completion of Network Integration Evaluation (NIE), Army Interoperability Certification (AIC) and Army CS fielding decision.

Project DY7: Army System Engineering, Architecture & Analysis, provides the Army's leadership and materiel developers with the necessary modernization planning, System of Systems (SoS) engineering, technical analysis, architectural products, critical path analysis, and risk analysis and mitigation planning to influence the Army's materiel portfolio. This project also explicitly funds Cyber Security engineering, architecture and development tasks necessary to create effective, affordable and secure network capabilities that address critical gaps, meet Mission Command Network (MCN) 2020 objectives and/or Force 2025 and Beyond (F2025B) initiatives. Integration of Army defensive/offensive cyber and Position, Navigation, and Timing (PNT) capabilities into the overall CS design, Multinational/Mission Partner Environments architecture development at both the tactical and enterprise levels, network modernization risks/gaps for Corps level units and below, and Army spectrum strategy.

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

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

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	145.360	49.288	59.097	-	59.097
Current President's Budget	139.386	49.250	42.634	-	42.634
Total Adjustments	-5.974	-0.038	-16.463	-	-16.463
• Congressional General Reductions	-0.103	-0.038			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.900	-			
• SBIR/STTR Transfer	-4.971	-			
• Adjustments to Budget Years	-	-	-16.463	-	-16.463

Change Summary Explanation

FY 2020 funding change is in support of the Army's modernization priorities in support of the National Defense Strategy.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>				Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>			
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
DY3: <i>NIE Test & Evaluation</i>	-	49.220	22.660	16.851	-	16.851	17.326	17.356	16.522	16.851	0.000	156.786
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project DY3:

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

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

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

	FY 2018	FY 2019	FY 2020
Title: Integrated Evaluations	46.759	20.822	16.144
Description: These funds enable assessments of capabilities in laboratory and operational environments across the Army battlespace to assess the systems, SoS, and inform system development and fielding decisions. These funds support event planning, preparation, execution, and close-out.			
FY 2019 Plans:			
Overview: DY3 JWA			
These funds provide for Close out of NIE 18.2; Planning, Preparation, Execution, and Close-out for JWA 19; and initial planning for JWA 20. Planning and Preparation are expected to occur at Ft Bliss, TX, while, Execution and Close-out are expected to occur at various locations such as the unit's home station or a Combined Arms Training Center.			
Planning:			
These funds support the development and implementation of horse blanket architecture, conducting design activities for integration of capability onto unit vehicles, exercise planning and coordination, to include:			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

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

	FY 2018	FY 2019	FY 2020
<p>Developing a Validation Exercise (VALEX) plan that configures and checks out the system of systems prior to the exercise; assigning unit locations within the VALEX location; identifying and resolving security issues associated with running classified and/or coalition network operations; validating all Information Assurance Accreditations for networked C4ISR systems, and developing of technical mission threads used to validate the capabilities.</p> <p>These funds also support defining the network system configurations and routing schemes for each event.</p> <p>Preparation:</p> <p>These funds support efforts leading up to the execution of the assessment exercise, to include LBRR, vehicle integration design and build, safety release, and conducting of VALEX.</p> <p>The LBRR risk reduction efforts are conducted in controlled laboratory environments to identify and resolve integration, configuration and interoperability issues prior to assessments. Reports delivered by the LBRR document the results of network functional testing, routing, and thread testing.</p> <p>These funds provide for integration efforts such as design of installation kits on tactical platforms; fabrication of specialized cables, metal plates, racks, and brackets to enable platform installation/integration; and safety release testing. The scope of the integration effort also includes planning for Field Service Representatives (FSRs) and other technical support personnel, coordination and movement of the Fleet vehicles, and inventory management of systems.</p> <p>Following completion of platform integration efforts, these funds support a structured network VALEX consisting of four subordinate efforts: Load Exercise (LOADEX), ESTABLISH, INTEGRATE, and VALIDATE.</p> <p>-LOADEX; Support unit installation of new network capabilities into existing network, to include setting Internet Protocol (IP) addresses and configure network systems changes; modify radio mission plans, system configuration files and system parameters; and perform test/fix/test processes at the system and component levels.</p> <p>-ESTABLISH; Verification of new hardware and software performance at the platform level. Troubleshoot issues associated with network system configurations and verify that each integrated platform can perform its mission while operating on the network.</p> <p>-INTEGRATE; Verification of networked related hardware/software performance and networked communications at each echelon. Troubleshoot issues found with new capabilities and ensure tactical unit information exchange will enable units to support their intended missions.</p> <p>-VALIDATE; Support unit conduct of mission threads to verify the correct routing of messages and information transfer among critical nodes in the network.</p> <p>Execution:</p> <p>Funding supports all management and synchronization of field operations and support personnel during the events, and coordination with the supported command. It also includes monitoring of network operations in the field, trouble ticket management, continued LBRR support to troubleshoot technical issues, deployment of mobile facilities, and replacement parts/ components required to effectively support concepts and capabilities under assessment.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Closeout: These funds support all activities associated with the de-installation and recovery of systems, components, A-kits, cabling installed on platforms, and restoration of platforms to baseline configurations. Removal, inspection, repair/replacement, shipping, and storing of all materiel and infrastructure used to enable the unit to execute the event. Conduct AARs for process improvements.</p> <p>Future Planning: These funds support efforts to provide technical input on candidate systems at the Concepts and Capabilities Review Board and Strategic Planning Reviews for future events.</p> <p>FY 2020 Plans: JWA 20; and initial planning for JWA 21: These funds provide for execution, close-out and assessment for JWA 20; and initial planning for JWA 21. Execution of JWA 20 is expected at Grafenwoehr, Germany with JWA 21 planning expected to occur at Ft Bliss, TX and to be determined location supporting Pacific area. As the Army Future Command matures, Mission Engineering and Assessment Directorate also expects to support planning, preparation, execution, close-out, and assessment of other exercises within the JMC portfolio.</p> <p>Planning: These funds support the development and implementation of horse blanket architecture; conducting design activities for integration of capability onto unit platforms; development, engineering, and documentation of network; and exercise planning and coordination, to include: developing a Validation Exercise (VALEX) plan that configures and checks out the system of systems prior to the exercise; assigning unit locations within the VALEX location; identifying and resolving security issues associated with running classified and/ or coalition network operations; validating all Information Assurance Accreditations for networked C4ISR systems and developing of technical mission threads used to validate the capabilities.</p> <p>These funds also support defining the network system configurations and routing schemes for each event.</p> <p>These funds support efforts to provide technical input on candidate systems at the Concepts and Capabilities Review Board and Strategic Planning Reviews for future events.</p> <p>Preparation: These funds support efforts leading up to the execution of the assessment exercise, to include lab based risk reduction (LBRR), platform integration design and build, safety release, and conducting of VALEX. The LBRR risk reduction efforts are conducted in controlled laboratory environments to identify and resolve integration, configuration and interoperability issues prior to assessments. Reports delivered by the LBRR document the results of network functional testing, routing, and thread testing.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>These funds provide for integration efforts such as design of installation kits on tactical platforms; fabrication of specialized cables, metal plates, racks, and brackets to enable platform installation/integration; and safety release testing. The scope of the integration effort also includes planning for Field Service Representatives (FSRs) and other technical support personnel, coordination and movement of the Fleet vehicles, and inventory management of systems.</p> <p>Following completion of platform integration efforts, these funds support a structured network VALEX consisting of four subordinate efforts; Load Exercise (LOADEX), ESTABLISH, INTEGRATE, and VALIDATE:</p> <ul style="list-style-type: none"> - LOADEX; Support unit installation of new network capabilities into existing network, to include setting Internet Protocol (IP) addresses and configure network systems changes; modify radio mission plans, system configuration files and system parameters; and perform test/fix/test processes at the system and component levels. - ESTABLISH; Verification of new hardware and software performance at the platform level. Troubleshoot issues associated with network system configurations and verify that each integrated platform can perform its mission while operating on the network. - INTEGRATE; Verification of networked related hardware/software performance and networked communications at each echelon. Troubleshoot issues found with new capabilities and ensure tactical unit information exchange will enable units to support their intended missions. - VALIDATE; Support unit conduct of mission threads to verify the correct routing of messages and information transfer among critical nodes in the network. <p>Execution: Funding supports all management and synchronization of field operations and support personnel during the events and coordination with the supported command. It also includes monitoring of network operations in the field, trouble ticket management, continued LBRR support to troubleshoot technical issues, deployment of mobile facilities, and replacement parts/ components required to effectively support concepts and capabilities under assessment.</p> <p>Closeout: These funds support all activities associated with the de-installation and recovery of systems, components, A-kits, cabling installed on platforms, and restoration of platforms to baseline configurations. Removal, inspection, repair/replacement, shipping, and storing of all materiel and infrastructure used to enable the unit to execute the event. Conduct AARs for process improvements.</p> <p>Assessment: These funds support activities associated with providing documentation and technical assessment of the system of systems architecture to include interfaces between systems, compare and contrast between architecture characteristics, and compliance with published network standards.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>In FY2020 the Joint Warfighter Assessment (JWA), a key component of the Army's Force 2025 Maneuvers, will occur in Europe in support of US Army Europe and US European Command. The JWA is used to assess interim solutions to Army Warfighting Challenges. The JWA concept maximizes collective resources to advance joint and multinational interoperability, future force development, and unit training readiness priorities. Concepts and capabilities are embedded in a live, virtual, and constructive Multinational Division (MND) exercise that is representative of current and future operational environments. The JWA provides a unique opportunity to increase innovation, improve interoperability, and enhance unit readiness. JWA offers the triple pay-off with future force development, training readiness, and Joint / Multinational interoperability assessment opportunities. These funds support the following major efforts associated with an assessment:</p> <ul style="list-style-type: none"> - Planning: Coordination with multiple stakeholders on the participation and resourcing of personnel, services, equipment and prototypes, and other deliverables needed for risk reduction events, capability and platform integration, training, field support and logistics, event battle rhythm/schedule, and developing network data products. - Preparation: Conduct risk reduction, complete system integrated designs and builds, build prototype vehicles for safety release, conduct system installation and checkout, validate the network, and obtain Information Assurance certifications. A key preparation task is the full scale live network validation event, which includes Cyber Vulnerability and Penetration Assessment of the network. This ensures the technical architecture and security procedures are place to support an exercise of this scale and complexity. Additionally, preparation efforts will supports new system user training. - Execution: Technical and logistics support during soldier-led assessments, trouble ticket management and closeout, and field support management. - Close-out: Inventorying platforms/systems, de-installing equipment, returning platforms to their original configurations. All unit equipment will be returned to original configuration following the exercise to ensure unit is fully prepared to execute wartime mission. The final close out task is conduct of After Action Review (AAR) and capture of lessons learned both for systems and architecture, as well as process and procedures for support exercises. <p>These funds may also be used for procuring limited equipment and materials (to include prototypes, when required), event infrastructure, field services, personnel support (government and contractor), and travel. These funds may also support similar activities for smaller assessment events leading up to the Joint Warfighter Assessment. Additionally, these funds will support initial planning for the Joint Warfighter 21, scheduled to support US Pacific Command and US Army Pacific. Planning events may occur at home station or require travel to support unit locations. Planning activities will include things such as concept and capability solicitation, initial architecture considerations, and logistics planning.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding due to requirements to support Army's modernization priorities.</p>				
Title: Infrastructure and other support		2.461	1.135	0.707

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: Provides for setup, utilities, furniture, equipment and maintenance (of all equipment and facilities) used by SoSE&I (CPD) in support of Joint Warfighting Assessments (JWA).</p> <p>FY 2019 Plans: Provides for setup, utilities, furniture, equipment and maintenance (of all equipment and facilities) used by SoSE&I Capability Package Directorate (CPD) in support of assessments. It includes lease and support maintenance contracts for IT equipment/ support and facilities.</p> <p>FY 2020 Plans: Overview: These funds provide packing, shipping, and setup for setup of operations at locations outside of Fort Bliss TX in support of JWA or other required exercises. It also provides for utilities, furniture, equipment and maintenance of equipment and facilities used by Mission Engineering and Assessment Directorate while at Fort Bliss in support of exercise planning, preparation, closeout, and events at Fort Bliss. It includes lease and support maintenance contracts for IT equipment/ support and facilities.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding due to requirements to support Army's modernization priorities.</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>	-	0.703	-
Accomplishments/Planned Programs Subtotals	49.220	22.660	16.851

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
• DY5: <i>Production/Field Coordination for Capability Sets</i>	4.161	4.239	2.157	-	2.157	2.224	2.213	2.185	2.304	Continuing	Continuing
• DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	19.683	15.600	17.807	-	17.807	17.534	17.659	17.870	17.043	Continuing	Continuing
• DZ6: <i>Army Integration Management & Coordination</i>	8.315	6.751	5.819	-	5.819	5.906	6.060	6.209	6.238	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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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>
• FG7: <i>Emerging Technology Initiatives</i>	58.007	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

This project includes competitive contracts for test support services.
This project does not have any requirement for direct procurement of hardware or software.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>
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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			
Core Government Labor	Allot	SoSE&I : Various	-	4.056	Nov 2017	4.578	Nov 2018	3.205	Nov 2019	-		3.205	Continuing	Continuing	-
Matrix Government Labor	MIPR	SoSE&I : Various	-	3.131	Nov 2017	1.665	Nov 2018	1.247	Nov 2019	-		1.247	Continuing	Continuing	-
MITRE Labor	FFRDC	MITRE : Various	-	1.820	Nov 2017	0.910	Nov 2018	0.682	Nov 2019	-		0.682	Continuing	Continuing	-
Contractor SETA Labor	C/CPFF	TBD : Various	-	4.020	Nov 2017	2.467	Nov 2018	2.223	Nov 2019	-		2.223	Continuing	Continuing	-
Temporary Duty (TDY)	Allot	SoSE&I : Various	-	1.000	Nov 2017	0.827	Nov 2018	0.639	Nov 2018	-		0.639	Continuing	Continuing	-
Subtotal			-	14.027		10.447		7.996		-		7.996	Continuing	Continuing	N/A

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

Product Development (\$ in Millions)				FY 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			
Integrated Evaluations	Various	Various : TBD	39.000	-		-		-		-		-	0.000	39.000	-
FY 2019 SBIR / STTR Transfer	TBD	Various : None	-	-		0.703		-		-		-	0.000	0.703	-
Subtotal			39.000	-		0.703		-		-		-	0.000	39.703	N/A

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

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			
Vehicle Integration	C/CPFF	BRTRC : Various	-	7.825	Nov 2017	4.500	Mar 2019	4.645	Mar 2019	-		4.645	Continuing	Continuing	Continuing

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>
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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			
Network Integration and Baseline Systems	MIPR	PEO C3T : Various	-	7.000	Nov 2017	3.400	Mar 2019	2.119	Mar 2019	-		2.119	Continuing	Continuing	Continuing
Infrastructure and other support	TBD	TBD : Various	2.885	5.000	Nov 2017	1.135	Mar 2019	0.706	Mar 2019	-		0.706	Continuing	Continuing	Continuing
Subtotal			2.885	19.825		9.035		7.470		-		7.470	Continuing	Continuing	N/A

Remarks

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

Test and Evaluation (\$ in Millions)				FY 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			
ATEC Test and Evaluation Support	MIPR	ATEC : Various	18.117	3.500	Nov 2017	0.700	Mar 2019	0.733	Mar 2019	-		0.733	Continuing	Continuing	Continuing
Lab Based Risk Reduction (LBRR)	MIPR	CERDEC : APG, MD	-	5.300	Nov 2017	1.500	Mar 2019	0.407	Mar 2019	-		0.407	Continuing	Continuing	Continuing
Satellite Region Hub Node (RHN) Technical Support	MIPR	Cyber Battle Lab : Ft. Gordon, GA	-	2.139	Nov 2017	-		-		-		-	Continuing	Continuing	Continuing
Satellite Transponder Bandwidth	MIPR	DISA : Various	-	2.500	Nov 2017	-		-		-		-	Continuing	Continuing	Continuing
Cyber Vulnerability/Risk Assessments	MIPR	Army Research Laboratory : Various	-	0.700	Nov 2017	0.275	Mar 2019	0.245	Mar 2019	-		0.245	Continuing	Continuing	Continuing
Systems Under Evaluation (SUEs)	C/Various	TBD : Various	-	1.229	Nov 2017	-		-		-		-	Continuing	Continuing	Continuing
Subtotal			18.117	15.368		2.475		1.385		-		1.385	Continuing	Continuing	N/A

Remarks

- Program Test support through ATEC, Lab Based Risk Reduction through CERDEC, and Cyber Vulnerability/Risk Assessments through Army Research Laboratory (ARL).
- Satellite RHN Technical Support provided by the Cyber Battle Lab at Fort Gordon, GA and Satellite Transponder Bandwidth contracted through DISA.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army													Date: March 2019		
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>					Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>						
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
- Program Activities performed at Aberdeen Proving Grounds (MD), FT Bliss (TX), White Sands Missile Range (NM) and the selected NIE/JWA unit's home station.															
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
			60.002	49.220		22.660		16.851		-		16.851	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

Event Name	FY 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																													
JWA 20 Planning - Execution																																																									
JWA 20 DP 1																													▲ 1																												
JWA 20 DP 2a																													▲ 2																												
JWA 20 DP 2b																													▲ 4																												
JWA 20 Lab Integration/Testing																													■	■	■	■																									
JWA 20 Candidate Solution Integration																													■	■																											
JWA 20 ValEx																													■																												
JWA 20 Garrison CommEx																													■																												
JWA 20 Field CommEx																													■																												
JWA 20 Event																													■																												
JWA 20 Event Analysis & Summary																													■	■																											
JWA 21 Planning - Execution																																																									
JWA 21 DP 1																																																									▲ 3

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>	

Event Name	FY 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	
JWA 21 DP 2a									5 ▲																				
JWA 21 DP 2b									7 ▲																				
JWA 21 Lab Integration/Testing																													
JWA 21 Candidate Solution Integration																													
JWA 21 ValEx																													
JWA 21 Garrison CommEx																													
JWA 21 Field CommEx																													
JWA 21 Event																													
JWA 21 Event Analysis & Summary																													
JWA 22 Planning - Execution																													
JWA 22 DP 1									6 ▲																				
JWA 22 DP 2a											8 ▲																		
JWA 22 DP 2b													9 ▲																

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

Event Name	FY 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				
JWA 22 Lab Integration/Testing																																
JWA 22 Candidate Solution Integration																																
JWA 22 ValEx																																
JWA 22 Garrison CommEx																																
JWA 22 Field CommEx																																
JWA 22 Event																																
JWA 22 Event Analysis & Summary																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY3 / <i>NIE Test & Evaluation</i>

Schedule Details

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

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

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

Note

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

-NIEs eliminated after NIE 18.2

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>				Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>			
COST (\$ in Millions)	Prior Years	FY 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
DY5: <i>Production/Field Coordination for Capability Sets</i>	-	4.161	4.239	2.157	-	2.157	2.224	2.213	2.185	2.304	0.000	19.483
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

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

	FY 2018	FY 2019	FY 2020
Title: Production/Fielding Coordination for Capability Sets (CS)	4.161	4.140	2.157
Description: This project provides for the development of a synchronized Brigade/Division level plan for the Production equipment delivery and Fielding (hand-off logistics and new equipment training) of Capability Set (CS) components (both hardware/software in A and/or B Kits) upon completion of Network Integration Evaluation (NIE), Army Interoperability Certification (AIC) and Army CS fielding decision.			
This project includes the following efforts: Oversight and direct coordination between participating Program Executive Offices (PEOs), Program Managers (PMs), Research, Development and Engineering Commands (RDECOMs) and the Army's Brigade Combat Teams (BCT) throughout the CS Vehicle Integration and Synchronized Fielding process to ensure that a CS package is received, integrated, trained, and handed-off to the unit in a synchronized and efficient manner. Identification and assessment of available capabilities for inclusion into a CS. Alignment of the CS requirements with the appropriate Programs of Record (PoR)			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

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

and the recipient unit to define the unit's Network Basis of Issue (NBOI)/ Architecture by type of BCT. Coordination with PEOs, PMs, Army G-staff to ensure CS products are Materiel Released/Type Classified, fully resourced and synchronized by a single Integrated Master Schedule for design integration, testing, production, kitting, platform integration, training and fielding. Direct support during each of the unit's "New Equipment Training" and "New Equipment Fielding", along with the preparation for the BCT's rotation through one of the Army's Combat Training Centers, (Joint Readiness Training Center (JRTC) or National Training Center (NTC)). Ensuring that all training assets are reset and moved to the follow-on BCT. Manage all After Action activities.

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

FY 2019 Plans:

These funds provide for the following:

- Production/Fielding Coordination for CS:

Development, coordination, and execution management of the CS Fielding plan needed to produce, integrate, and field NIE tested Brigade improvements to the BCTs. Synchronize the integration and coordinate CS Fielding including CS18 closeout, CS19 execution, and detail plan for CS20 along with high level planning for CS20/21. This effort funds government and contractor personnel and travel to unit location and fielding sites for planning and coordination of resources, integrated schedule, training and fielding across CS Programs of Record (PoR). It does not fund the production, physical integration, or fielding of the CS.

- Production/Fielding Coordination for CS18 Products and Services:

Complete training and fielding of CS 18 units. Final close out of Materiel Fielding documentation and After Action Reports (AARs) for this includes synchronization, integration, and coordination of CS Fielding for the following CS18 Units (two (2) total): field upgrade to LTI for one (1) Total Army Analysis (TAA) IBCTs and one (1) TAA IBCT plus an LTI. Coordinate and execute the PM Mission Network (WIN-T Inc 2) TCN Lite fielding and the cascading/disposition of the TCN Heavy variants and two (2) BCT NCR SNE reduction efforts.

- Production/Fielding Coordination for CS19 Products and Services:

Synchronize the integration of the CS package into the Brigade Combat Team (BCT) consisting of multiple network systems, on various configurations of Joint Light Tactical Vehicle (JLTV), Mine Resistant Ambush Protected (MRAP) and High Mobility Multipurpose Wheeled Vehicle (HMMWV) platforms, at multiple locations. Complete synchronization, integration, and coordination of CS Fielding for the following CS19 Units (two (2) total): one (1) IBCT (OCONUS) and one (1) TAA IBCT with LTI (OCONUS). Synchronize the schedule for the execution of five Brigade Combat Team NCR SNE Reduction efforts and five Brigade Combat Team TCN Lite fieldings and corresponding TCN Heavy cascade/disposition. Coordinate the integrated designs by platform, role, echelon, and BCT for CS19 including LTI. Finalize CS19 fielding requirements. Develop and manage the Integrated Master Schedule (IMS) for CS19. Coordinate A-Kit design, development and production and B-Kit's Integration Kit (IK) design, between

FY 2018	FY 2019	FY 2020

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>system and platform Program Executive Offices (PEOs) and Program Managers (PMs) for CS19. Coordinate the delivery of prototype and production builds for CS19. Support Configuration Management (CM) of platform configuration implementations, designs, A-Kits, and B-Kits. Support fielding integration of Program of Record (PoR) assets in accordance with the defined BCT network architecture. Coordinate planning and execution of unit meetings, site inventories, A/B kit deliveries, chalk vehicle block schedules, assessment of Fully Mission Capable condition and integration of vehicle schedules (both component and complete vehicle installations). Coordinate and publish a synchronized New Equipment Training /New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for CS19 gaining units.</p> <p>- Production/Fielding Coordination for CS20 Products and Services: Conduct planning, synchronization and coordination of CS Fielding for the following CS20 Units (two (2) total): two (2) TAA IBCT with LTI. Coordinate for the execution of FY20 TCN Lite fielding and the cascading/disposition of the TCN Heavy variants. Execute a synchronized New Equipment Training /New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for fielding of CS20 to all gaining units. Begin CS20 NET/NEF requirements definition finalization and development of the NET/NEF integrated master schedule. This includes scheduling Program of Record unique NET, System of Systems NET (Capability Set holistic classes), and property accountability handoffs as an integrated process to enhance efficiency of the brigade modernization events.</p> <p>- Engineering and Integration coordination/planning efforts to develop and maintain CS unit-specific Network Basis of Issue (NBOI) architecture and Integrated Master Schedule (IMS): Developed and maintained unit-specific NBOI and IMS for the Army's Capability Set ? Synchronized Fielding (CSSF) efforts. Prepared ?as-built? NBOI and final IMS for units fielded during FY18, maintained unit-specific NBOI and IMS for units designated to undergo CS integration in FY19-20, and developed initial (draft-level) NBOI and IMS for planned units in FY21 thru FY23. Organized, prepared, and conducted incremental technical reviews to examine and assess key/crucial planning activities and associated data product development supporting CS integration at specific fielded locations. Collected and analyzed sub-schedule performance against the baseline IMS to identify schedule risks for the Army's CSSF efforts. Validated that established incremental integration points were achievable and, if not, identified the risk to schedule. Analyzed schedule and cost performance against schedule established baselines, identified variances and their causes, and identified risks and/or impacts to critical path. Performed ?what if? schedule and cost analyses of alternative program courses of action to determine impact on schedule critical path and mission requirements. Updated and posted schedules on SharePoint for visibility and increased collaboration across the entire CS community to include ASA (ALT). Led or participated in other key technical reviews to include: After Action Reviews, Lessons Learned, Synchronized Fielding Technical Exchange Meetings (TEMs) and mini-TEMs. Provided reports and briefings to key CS stakeholders to support mutual programmatic goals and objectives and to help resolve issues and concerns affecting the CS community at-large. Identified key program risks as well as specific risk mitigation plans. Coordinated,</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

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

	FY 2018	FY 2019	FY 2020
<p>prepared, and published a synchronized New Equipment Training / New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for CS fielding to all gaining units.</p> <p>FY 2020 Plans: These funds provide for the following: - Production/Fielding Coordination for Network Modernization CS: Development, coordination, and execution management of the CS Fielding plan needed to produce, integrate, and field tested Brigade improvements to the BCTs. Synchronize the integration and coordinate CS Fielding including CS19 closeout, CS20 execution, and detail plan for CS21 along with high level planning for CS21/22. This effort funds government and contractor personnel and travel to unit location and fielding sites for planning and coordination of resources, integrated schedule, training and fielding across CS Programs of Record (PoR). It does not fund the production, physical integration, or fielding of the CS.</p> <p>- Production/Fielding Coordination for CS19 Products and Services: Complete training, integration and fielding of CS 19 units. Final close out of Materiel Fielding documentation and After Action Reports (AARs) for this includes synchronization, integration, and coordination of CS Fielding for the following CS19 Units (three (3) total): field network modernization (WIN-T Inc 2, Mission Command Systems) to three OCONUS IBCTs. Coordinate and execute the PM Mission Network (WIN-T Inc 2) TCN Lite fielding and the cascading/disposition of the TCN Heavy variants and multiple BCT NCR reduction efforts. Provide support to the fielding efforts for three (3) Security Force Assistance Brigades (SFABs).</p> <p>- Production/Fielding Coordination for CS20 Products and Services: Synchronize the integration of the CS package into the Brigade Combat Team (BCT) consisting of multiple network systems, on various configurations of Stryker, Mine Resistant Ambush Protected (MRAP) and High Mobility Multipurpose Wheeled Vehicle (HMMWV) platforms, at multiple locations. Complete synchronization, integration, and coordination of CS Fielding for the following CS20 Units (two (2) total): two (2) SBCT (OCONUS) and modernizing and conducting NCR reduction on one (1) SBCT. Synchronize the schedule for the execution of up to five Brigade Combat Team NCR SNE Reduction efforts and six Brigade Combat Team TCN Lite fieldings and corresponding TCN Heavy cascade/disposition. Coordinate the integrated designs by platform, role, echelon, and BCT for CS20 including LTI. Finalize CS20 fielding requirements. Develop and manage the Integrated Master Schedule (IMS) for CS20. Coordinate A-Kit design, development and production and B-Kit's Integration Kit (IK) design, between system and platform Program Executive Offices (PEOs) and Program Managers (PMs) for CS20. Coordinate the delivery of prototype and production builds for CS20. Support Configuration Management (CM) of platform configuration implementations, designs, A-Kits, and B-Kits. Support fielding integration of Program of Record (PoR) assets in accordance with the defined BCT network architecture. Coordinate planning and execution of unit meetings, site inventories, A/B kit deliveries, chalk vehicle block schedules, assessment of Fully Mission Capable condition and integration of vehicle schedules (both component and complete</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>vehicle installations). Coordinate and publish a synchronized New Equipment Training /New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for CS20 gaining units.</p> <p>- Production/Fielding Coordination for CS21 Products and Services: Conduct planning, synchronization and coordination of CS Fielding for the following CS21 Units (two (2) total): two (2) TAA IBCT with LTI. Coordinate for the execution of FY21 TCN Lite fielding and the cascading/disposition of the TCN Heavy variants. Execute a synchronized New Equipment Training /New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for fielding of CS21 to all gaining units. Begin CS21 NET/NEF requirements definition finalization and development of the NET/NEF integrated master schedule. This includes scheduling Program of Record unique NET, System of Systems NET (Capability Set holistic classes), and property accountability handoffs as an integrated process to enhance efficiency of the brigade modernization events.</p> <p>- Engineering and Integration coordination/planning efforts to develop and maintain CS unit-specific Network Basis of Issue (NBOI) architecture and Integrated Master Schedule (IMS): Developed and maintained unit-specific NBOI and IMS for the Army's Capability Set ? Synchronized Fielding (CSSF) efforts. Prepared ?as-built? NBOI and final IMS for units fielded during FY19, maintained unit-specific NBOI and IMS for units designated to undergo CS integration in FY20-21, and developed initial (draft-level) NBOI and IMS for planned units in FY21 thru FY23. Organized, prepared, and conducted incremental technical reviews to examine and assess key/crucial planning activities and associated data product development supporting CS integration at specific fielded locations. Collected and analyzed sub-schedule performance against the baseline IMS to identify schedule risks for the Army's CS SF efforts. Validated that established incremental integration points were achievable and, if not, identified the risk to schedule. Analyzed schedule and cost performance against schedule established baselines, identified variances and their causes, and identified risks and/or impacts to critical path. Performed ?what if? schedule and cost analyses of alternative program courses of action to determine impact on schedule critical path and mission requirements. Updated and posted schedules on SharePoint for visibility and increased collaboration across the entire CS community to include ASA (ALT). Led or participated in other key technical reviews to include: After Action Reviews, Lessons Learned, Synchronized Fielding Technical Exchange Meetings (TEMs) and mini-TEMs. Provided reports and briefings to key CS stakeholders to support mutual programmatic goals and objectives and to help resolve issues and concerns affecting the CS community at-large. Identified key program risks as well as specific risk mitigation plans. Coordinated, prepared, and published a synchronized New Equipment Training / New Equipment Fielding (NET/NEF) Integrated Master Schedule (IMS) for CS fielding to all gaining units.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding due to requirements to support Army's modernization priorities.</p> <p>Title: FY 2019 SBIR / STTR Transfer</p>				
		-	0.099	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<i>FY 2019 Plans:</i> FY 2019 SBIR / STTR Transfer			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY19 SBIR/STTR Transfer			
Accomplishments/Planned Programs Subtotals	4.161	4.239	2.157

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>
• DY3: <i>NIE Test & Evaluation</i>	49.220	22.660	16.851	-	16.851	17.326	17.356	16.522	16.851	Continuing	Continuing
• DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	19.683	15.600	17.807	-	17.807	17.534	17.659	17.870	17.043	Continuing	Continuing
• DZ6: <i>Army Integration Management & Coordination</i>	8.315	6.751	5.819	-	5.819	5.906	6.060	6.209	6.238	Continuing	Continuing
• FG7: <i>Emerging Technology Initiatives</i>	58.007	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

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

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>
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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			
Production/Fielding Coordination for Capability Sets	TBD	Various Note: 1 : TBD	14.313	4.161	Nov 2017	4.140	Nov 2018	2.157	Nov 2019	-		2.157	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	Various : None	-	-		0.099		-		-		-	0.000	0.099	-
Subtotal			14.313	4.161		4.239		2.157		-		2.157	Continuing	Continuing	N/A

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

Support (\$ in Millions)				FY 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			
Facilities and IT Support	TBD	Various Note:1 : TBD	0.694	-		-		-		-		-	0.000	0.694	-
Subtotal			0.694	-		-		-		-		-	0.000	0.694	N/A

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

Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			15.007	4.161	4.239	2.157	-	2.157	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>	

Event Name	FY 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
FY18 Synchronized Fielding																												
FY18 NEW Equipment Training (NET)																												
FY18 NEW Equipment Fielding (NEF)																												
FY19 Synchronized Fielding																												
FY19 Architecture Design																												
FY19 Build & Integration																												
FY19 NEW Equipment Training (NET)																												
FY19 NEW Equipment Fielding (NEF)																												
FY20 Synchronized Fielding																												
FY20 Architecture Design																												
FY20 Build & Integration																												
FY20 NEW Equipment Training (NET)																												
FY20 NEW Equipment Fielding (NEF)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

Event Name	FY 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
FY21 Synchronized Fielding					█				█				█															
FY21 Architecture Design									█																			
FY21 Build & Integration									█				█															
FY21 NEW Equipment Training (NET)													█				█											
FY21 NEW Equipment Fielding (NEF)													█				█											
FY22 Synchronized Fielding													█				█				█							
FY22 Architecture Design													█				█											
FY22 Build & Integration													█				█				█							
FY22 NEW Equipment Training (NET)																	█				█							
FY22 NEW Equipment Fielding (NEF)																	█				█							
FY23 Synchronized Fielding																	█				█							
FY23 Architecture Design																	█				█							
FY23 Build & Integration																	█				█							

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>	

Event Name	FY 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
FY23 NEW Equipment Training (NET)																												
FY23 NEW Equipment Fielding (NEF)																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FY18 Synchronized Fielding	3	2017	2	2019
FY18 NEW Equipment Training (NET)	3	2018	2	2019
FY18 NEW Equipment Fielding (NEF)	4	2018	1	2019
FY19 Synchronized Fielding	1	2018	2	2018
FY19 Architecture Design	1	2018	3	2018
FY19 Build & Integration	2	2018	1	2020
FY19 NEW Equipment Training (NET)	2	2019	2	2020
FY19 NEW Equipment Fielding (NEF)	2	2019	4	2019
FY20 Synchronized Fielding	1	2018	2	2021
FY20 Architecture Design	1	2018	2	2019
FY20 Build & Integration	3	2018	4	2020
FY20 NEW Equipment Training (NET)	1	2020	2	2021
FY20 NEW Equipment Fielding (NEF)	1	2020	2	2021
FY21 Synchronized Fielding	1	2019	2	2022
FY21 Architecture Design	1	2019	2	2020
FY21 Build & Integration	3	2019	4	2021
FY21 NEW Equipment Training (NET)	1	2021	2	2022
FY21 NEW Equipment Fielding (NEF)	1	2021	2	2022
FY22 Synchronized Fielding	1	2020	2	2023
FY22 Architecture Design	1	2020	2	2021
FY22 Build & Integration	3	2020	4	2022
FY22 NEW Equipment Training (NET)	1	2022	2	2023

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY5 / <i>Production/Field Coordination for Capability Sets</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
FY22 NEW Equipment Fielding (NEF)	1	2022	2	2023
FY23 Synchronized Fielding	1	2021	2	2024
FY23 Architecture Design	1	2021	2	2022
FY23 Build & Integration	3	2021	4	2023
FY23 NEW Equipment Training (NET)	1	2023	2	2024
FY23 NEW Equipment Fielding (NEF)	1	2023	2	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>				Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>			
COST (\$ in Millions)	Prior Years	FY 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
DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	-	19.683	15.600	17.807	-	17.807	17.534	17.659	17.870	17.043	0.000	123.196
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

Under this Project we have five efforts: Army System of Systems Engineering and Analysis, COE, Cyber, Facilities / IT and Rapid Capabilities Office (RCO) Core Labor. The RCO core labor line is funded for RCO core labor for FY20 only. It supports the newly established FY20 RCO PROGRAM ELEMENT (PE) 0605054A PROJECT FI3 line which will fund the RCO projects.

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

	FY 2018	FY 2019	FY 2020
Title: Army System of Systems Engineering and Analysis	12.509	10.541	10.359

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Description: Provided coordinated SoS engineering, architectures, and analysis products for integrating new technologies with existing capabilities to stakeholders (e.g. materiel developers, TRADOC Capability Manager (TCM), Army Capabilities Integration Center (ARCIC), etc.) to deliver integrated solutions to Army formations.</p> <p>FY 2019 Plans: Army Formation Reference Architecture products: Develop and maintain all Army Combat Formations (Corps & below) SoS architecture and integration products. These products are used to design Objective, Base, and Modified Table of Organization & Equipment (TOE) for demonstration/test environments (e.g. NIE, Operational Test, and Army Interoperability Certification). Four core recurring products are: - Network Basis of Issue (NBOI): detailed database and spreadsheets describing the objective, basic, and modified TOE, TRADOC required BOI system placements, network and subnet assignment data, etc. - SoS View Diagram: Visual reference document diagramming all Soldier and platform roles, and their network connectivity and waveform assignments to each other as dictated by the NBOI. - Vehicle Interconnectivity Diagram (VID): Visual reference document diagramming software (operating systems, applications, etc), hardware (radios, computers, antennae?s, routers/switches, etc.), internal/external networks (protocols, ports, gateways, etc.), and waveforms (frequency bands) are connected for individual platforms. - SoS Thread: Visual reference diagram documenting technical use cases of the SoS architecture and the data/message flows throughout Brigade and below based on Army universal task lists, Army Interoperability Certification, and Joint Common System Function List.</p> <p>Architecture Planning Analysis, Integration and Coordination: These funds provide for the development of products which are necessary for modernization planning, technical and risk analysis, mitigation planning, and SoS engineering. It includes Cyber and Position Navigation & Timing (PNT) as well as Division & Corps echelons as it pertains to architecture development to meet MCN 2020 and F2025B initiatives.</p> <p>Engineering Design & Analysis: These funds provide support to engineering and analysis on current critical network shortfalls to address how the Army achieve expeditionary, uninterrupted mission command; through a network comprised of intuitive, secured, standards-based capabilities adapted to commander?s requirements; and integrated into a common operating environment, with network capabilities that are assured, interoperable, tailorable, collaborative, identity-based, and accessible at the point of need in operations that include unified action partners.</p>				

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Network Modernization engineering will include the 10 modernization priorities to address critical capability shortfalls : 1) Air and Missile Defense; 2) Long-Range Fires; 3) Munitions Shortfalls; 4) Mobility, Lethality, and Protection of Brigade Combat Teams; 5) Active Protection Systems (air and ground); 6) Assured Position, Navigation, and Timing (PNT); 7) Electronic Warfare; 8) Offensive and Defensive Cyber Capabilities; 9) Assured Communications ; and 10) Vertical Lift.</p> <p>Analyze Programs of Record (PoRs) and emerging technologies to maximize Warfighter effectiveness under cost, within schedule and meeting technology readiness constraints. Perform cross-PEO System of system engineering, integration and performance analysis. Develop strategic plans for providing key technologies in support of Army critical gaps or shortfalls. Conduct analyses of technical and performance requirements to support technology insertion for Warfighter capability (ie. Intel-related operations, spectral assignment risk mitigation, and PNT architecture placement).</p> <p>IMS: These funds provide a reliable IMS that synchronizes engineering, architecture, PoRs, network evaluation, and CS fielding schedules to ensure their alignment to the Program Objective Memorandum (POM) and the Army Force Generation (ARFORGEN) cycles. Efforts include implementation of IMS tools for POR input, analyses of Platform schedules, and MCN 2020 network components schedules to identify issues and opportunities. These funds also provide for analysis of Program Executive Office (PEO) portfolios and their IMS which identifies opportunities to incorporate capabilities earlier into CS configurations.</p> <p>Integration Risk Identification, Mitigation, Plans and Reports: These funds provide strategic planning in support of network modernization objectives and CNA efforts. It provides analysis of objectives, potential risks and mitigation plans to capability delivery.</p> <p>Strategic Process and Planning: These funds provide for strategic planning to achieve MCN 2020 FES, F2025B, and emerging solutions, to include: Strategic Planning Review events, Road map to MCN 2020 validation, Agile Process Standard Operating Procedure adaptation for rapid acquisition, Network Synchronization Working Group outcomes analysis, Proponent Integrated Product Teams (IPT), and database improvements to track/report progress.</p> <p>Integration Engineering Planning and Execution of Capability Sets (IEP&E-CS): These funds provide for the advanced collaboration and coordination with platform and network system Product Managers (PdMs) to ensure CS Fielding platform integration design decisions are based on CS Reference Architecture products for CS18-25 to be evaluated in Network Integration Evaluation (NIE) events. Develop the Unit-specific architecture (e.g., Network Basis of Issue (NBOI), Unit Transport Design (TD), etc.) for CS Fieldings. Engineering coordination with platform and equipment integrators</p>				

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

	FY 2018	FY 2019	FY 2020
<p>to ensure component level equipment is designed to meet platform level integrated design requirements established in the Unit NBOI and validate the integrated architecture design is functional.</p> <p>Develop the unit integration design for each CS. Update and transition architecture products to stakeholders by utilizing Unit specific NBOIs based on property book/maintenance analysis and physical inventory comparisons of Forces Command (FORSCOM) assets. Assess, synchronize, and status the production and installation of CS products and processes for platform integration and installation at the integration facilities to meet delivery schedules. Document and continuously improve engineering activities and process flows for efficiencies. Work with stakeholders to resolve problems such as conflicting requirements, funding and priorities. Seek innovative solutions to efficiently accomplish multiple efforts within allocated resources. Develop CS engineering products to include processes, schedule, established technical baselines through Technical Exchange Meetings (TEMs) and synchronization across stakeholder organizations.</p> <p>Additional system or systems architecture support is provided to Army organizations to support fielding of modernized network equipment in parallel to CS fielding activities. These activities include architecture development supporting Special Operations Forces (SOF) dismounted radio network, Army watercraft modernization initiatives, and Army wide radio crypto-modernization related divestiture/reallocation/fielding efforts.</p> <p>IEP&E-CS: CS18</p> <p>Synchronize and monitor platform and network system Size, Weight and Power (SWaP) assessment of Unit specific Architectures in collaboration and coordination with platform and network system PMs. Coordinate NRE funding requirements and delivery/ production schedules with the Synchronized Fielding (SF) ? Fielding team to ensure production schedules are met to field selected systems. Develop, update, and finalize the unit specific NBOI, assist in site inventory and analysis, develop CS vehicle/ equipment configurations, develop the CS Non-Recurring Engineering (NRE) integration configurations for design (based on NIE Original Equipment Manufacturer involvement). Provide integration status of equipment designs by platform, role, echelon and by BCT for the following CS18 Units (six (6) total): 2xIBCT retouch (brings CS17 BCT up to full CS18 capability) 1xANG IBCT without lower tactical internet, 1xANG IBCT Division HQ, and 1xIBCT without lower tactical internet.</p> <p>IEP&E-CS; CS19 Products and Services:</p> <p>Evaluate, synchronize, and monitor platform and network system program acquisition schedules, integration costs, and system requirements across organizations for the development of production ready A&B-kit Interface Control Documents (ICDs) and Level II Technical Data Packages (TDPs) supporting CS19 Unit specific baseline evaluations in collaboration and coordination with platform and network system PMs. Synchronize CS program schedules through coordination and communication with System of Systems Engineering and Integration (SoSE&I) Engineering and Integration (E&I) and other organizations within and outside of SoSE&I. Coordinate with associated PoRs for the integration, forecasting, procurement, testing and delivery of platform integrated Network equipment for CS baseline evaluations. Vet NBOIs with vehicle and equipment G3/5/7, G6, G8, PEOs, PMs,</p>			

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

	FY 2018	FY 2019	FY 2020
<p>TCMs, and other stakeholders. Develop, coordinate, document and assess the updated and final LTI integration activities on 700+ platforms and evaluate the integration flow of multiple production lines of numerous platform types. Develop, update, and finalize the Unit specific NBOIs (one for each Unit touched) and are then vetted with platform and equipment PMs, TRADOC Capability Managers (TCMs), Program Executive Offices (PEOs), G3/5/7, FORSCOM and other stakeholders. Perform Property Book Unit Supply Enhanced (PBUSE) and Standard Army Maintenance System (SAMS) unit analyses to determine the serial and bumper numbers that are used to align platform roles by echelon (based on the Modified Table of Organization and Equipment (MTOE) and Objective Table of Organization and Equipment (OTOE)). Assist in Unit Inventories to confirm vehicle and legacy equipment configurations, confirm vehicle roles and identify/coordinate in lieu of vehicles for shortages. Develop NRE designs for platform and equipment (legacy and CS) configurations that will be required for Safety Release/Confirmation (SR/SC) testing. Coordinate with platform PMs the NRE configurations that are combined to develop a CS Golden platform design candidate list to minimize SR/SC costs. Monitor and assess the development and maturation of the A-kit design and ensure the installation manuals and technical data packages produce a repeatable and consistent integration process to support new equipment fieldings.</p> <p>IEP&E-CS; CS20-25 Products and Services: Evaluate and synchronize platform and network system SWaP assessment of Network Architectures in collaboration and coordination with platform and network system PMs in support of the CS20-23 Reference Architectures. Evaluate, synchronize, and track platform and network system integration risks and mitigation plans for execution to the NBOI identified in collaboration and coordination with platform and network system PMs.</p> <p>Evaluate, synchronize and track disconnects in platform and network system program acquisition schedules, integration costs, and system requirements across organizations for the development of production ready A&B-kit ICDs and Level II TDPs supporting CS20-25 baseline evaluations. Resolve and elevate operational, technical and programmatic issues for Initial and Reference Architecture Products in collaboration and coordination with SoSE&I-E&I, platform PMs, network system PMs and TCMs. Synchronize CS program schedules through coordination and communication with other organizations within and outside of SoSE&I. Coordinate with associated PoRs for the management, integration, forecasting, procurement, testing and delivery of platform integrated Network equipment for CS baseline evaluations. Support PMs and PEOs in resolution of tasks associated with Network integration. Evaluate, synchronize, and track PM implementation of Vehicular Integration for Command, Control, Communication, Computers, Intelligence, Surveillance, Reconnaissance (C4ISR) / Electronic Warfare (EW) Interoperability (VICTORY) standards in Initial and CS20-25 Reference Architecture products. Begin the planning for CS20-25 Unit specific NBOI requirements and develop and coordinate the IMS with all stakeholders.</p> <p>FY 2020 Plans: Army Formation Reference Architecture products:</p>			

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

	FY 2018	FY 2019	FY 2020
<p>Develop and maintain all Army Combat Formations (Corps & below) System of Systems architecture and integration products. These products are used to design Objective, Base, and Modified Table of Organization & Equipment (TOE) for demonstration/test environments (e.g. Integration Exercise, Operational Test, and Army Interoperability Certification), as a reference for analysis conducted by either OCSE or other Army organizations, and for determining fielding quantities and configurations. Army formations include Corps, Infantry/Cavalry/Armored Divisions, Infantry/Stryker/Armored Brigade Combat Teams and Regiments, Combat Aviation Brigades, Field Artillery Brigades, Engineer Brigades, and other formations that may be deployed temporarily or permanently, such as the Air Defense Artillery Brigade, to support specific warfighting functions.</p> <p>Four core recurring products are:</p> <ul style="list-style-type: none"> - Basis of Issue (BOI) (Networked and Non-networked): detailed database and spreadsheets describing the objective, basic, and modified TOE, TRADOC required BOI system placements, network and subnet assignment data, etc. - SoS View Diagram: Visual reference document diagramming all Soldier and platform roles, and their network connectivity and waveform assignments to each other as dictated by the NBOI. - Vehicle Interconnectivity Diagram (VID): Visual reference document diagramming software (operating systems, applications, etc), hardware (radios, computers, antennae?s, routers/switches, etc.), internal/external networks (protocols, ports, gateways, etc.), and waveforms (frequency bands) are connected for individual platforms. - SoS Thread: Visual reference diagram documenting technical use cases of the SoS architecture and the data/message flows throughout Brigade and below based on Army universal task lists, Army Interoperability Certification, and Joint Common System Function List. <p>Document and maintain the Army?s tactical-to-enterprise end-to-end system of systems architecture. These products provide a holistic view of the entire Army network for each of the geographic combatant commands (Africa Command (AFRICOM), Central Command (CENTCOM), European Command (EUCOM), Pacific Command (PACOM), Northern Command (NORTHCOM), and Southern Command (SOUTHCOM)) and are used to support deployment decisions of enterprise resources and analysis of the comprehensive network.</p> <p>Provide subject matter expertise (SME) on the Army?s enterprise and tactical SoS architecture to all Program Executive Offices (PEO) and in support of the Army's Modernization program. SME support includes providing reference blueprints for the Army?s SoS architectures, assessment/test/deployment architecture development, and analysis planning for various Army activities ranging in scope from small training venues to full theatre events such as the Joint Warfighter Assessment.</p> <p>Engineering Design & Analysis: Analytic support will provide early insight into the technical health of key programs and to ensure leadership has the right data to make informed program decisions. Initial efforts will involve building the necessary MSBE infrastructure to allow end-to-end system evaluation against alternate courses of action through identification of critical interfaces and dependencies within</p>			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>programs against which key tasks are measured. The objective is an infrastructure, analytics, data, and processes that support continuous modernization of the Army to maintain overmatch. This vision will be achieved through four thrusts.</p> <p>Develop Model Based Systems Engineering (MBSE) that follows industry-standardized practices to develop SoS designs that fulfills key warfighter requirements. Funds will be used for development of the SoS model, maintenance/operation/training of the tools used to conduct modeling, and the production of output products.</p> <p>Perform cross-PEO System of system engineering, integration and performance analysis. Develop strategic plans for providing key technologies in support of Army critical gaps or shortfalls. Conduct analyses of technical and performance requirements to support technology insertion for Warfighter capability (i.e. Intel-related operations, spectral assignment risk mitigation, and PNT (Positioning, Navigation and Timing) architecture placement).</p> <p>Strategic Planning and Schedule Synchronization: These funds provide for strategic planning to achieve Army Modernization Objectives. Provides the ability to identify and track key milestones and interdependencies related to critical capabilities within the ASA(ALT) portfolio and Army Futures Command. Conduct schedule analysis to identify integration and fielding challenges and opportunities as well as track key capability readiness to meet Chief of Staff of the Army (CSA)/Army Modernization Objectives.</p> <p>These funds provide a reliable Integrated Master Schedule (IMS) that synchronizes key cross portfolio capabilities under development within a PoR and/or a Cross Functional Team. Efforts include implementation of IMS tools, analyses of Platform schedules, and key modernization components? schedules to identify issues and opportunities. These funds also provide for limited analysis of cross-cutting capabilities within the Program Executive Office (PEO) and Cross Functional Team portfolios to identify opportunities and challenges associated with implementation and fielding.</p> <p>Requirements Analysis: These funds provide for systems engineering analysis, synchronization, and tracking of PEO and Army S&T system development progress to ensure that Army Futures Command concepts, capabilities and requirements development is accurately reflected in program of records to successfully accelerate program acquisition. Synchronization of Army threats, concepts, capability gaps and documented requirements with modernization planning will enable early feasibility assessments, support trade studies, and execution of early systems engineering to inform decisions related to feasibility, affordability and sustainability of requirements.</p> <p>These funds provide for the development of cross Army Materiel Enterprise capabilities to synchronize threats, capabilities, gaps, requirements, programs, and interdependencies and ensure that acquisition programs support Army warfighting concepts and doctrine. These funds provide strategic planning to align Army modernization with requirements development. It provides analysis of objectives, identifies potential risks and mitigation plans to ensure capability delivery.</p>			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Standards and Interoperability: This organization is charged with providing a wide range of technical coordination and oversight functions in support of the Army Modernization Strategy including, but not limited to the following primary mission areas:</p> <ol style="list-style-type: none"> 1) Early program lifecycle technical standards coordination and oversight 2) Establish and maintain the ASA(ALT) unified standards baseline in support of all material development efforts 3) Coordination with CIO/G-6 for analysis of requested standards waivers and tailored alignment of Title 40 interoperability certification with agile acquisition strategies 4) provide engineering and technical support to program office level Model Based Systems Engineering (MBSE) activities to establish a "single source of truth" that traces operational capabilities to mission architecture and into actionable system level standards implementation and tailored Capability Drop (CD) requirements all the way through Test, Evaluation, and Certification 5) Horizontal synchronization of Cross Functional Team (CFT) architecture and requirements development. <p>These funds support staffing needed for effective engagement, fulfillment of staff coordination and oversight responsibilities on behalf of the Army Acquisition Executive such as Architecture and Standards Integrated Product Team (IPT) leadership, and information management of a broad range of widely used work products that support acquisition planning and execution such as the following: studies & analysis, program technical reviews, joint and coalition liaison, Integrated Master Schedule (IMS), architecture system and service views, systems engineering documentation, and software and standards baseline configuration management.</p> <p>Systems Engineering Policy Support: Serves as the Army level concurrence authority on System Engineering Plans (SEP) and Program Protection Plans (PPP) for all Army Major Defense Acquisition Programs. Teams of subject matter experts conduct reviews of products to ensure compliancy to OSD and Army requirements. Army Representative for the FY14 NDAA Section 937 Congressional requirement to stand up a Joint Federated Assurance Center (JFAC) to develop work plans, manage funding, track progress and report regular status to Army Leadership and OSD Leadership. In addition also maintains direct collaboration and communication with Army Research Developing Engineering Centers (RDECs), Army Research Labs, and specifically the Software, Hardware and Cyber Subject Matter Experts and Communities of Practice, to define, federate, maintain and evolve, Army Cyber, System Security Engineering, and allow access to available Assurance capabilities to meet today's threats and emerging threats. Conduct oversight, review, and development assistance for PPPs to determine/review risks/ vulnerabilities associated with Security Engineering Best Practices and assist with the development of sound mitigation strategies. Ensure program protection strategies use good systems engineering discipline and are referenced in the Systems Engineering Plan (SEP) and the Cyber Security Strategy (CSS). Provide advice and experience to influence system design in support of developing effective program protection strategies. Participate in the staffing of the PPP with applicable agencies across the Department of the Army (DA) staff. Conduct</p>			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>client advocacy and education forums (Road Show presentations) amongst Army PEOs, DASD(SE), other agencies and joint service stakeholders to inform and promulgate Critical Program Information (CPI) development best practices throughout the acquisition community. Interface as an executive agent on matters of Anti-Tamper and Supply Chain Risk Management with program personnel, systems security engineers and service providers. Act on behalf of the office of primary responsibility for Anti-Tamper and the Acquisition Security Database. Allows the Army to make informed tradeoffs that support system design and/or modification decisions upfront and early. Army systems require protection from proliferation and exploitation, for as long as possible, so they can effectively perform their missions in various operational environments. With OSD and Army laboratories ensure future access to state of the art microelectronics to reduce sole source dependence on microelectronics designs. Provide alternate assurance options for critical DoD unique parts as part of the US Microelectronic Strategy. Advance the Army's capability to perform hardware analysis of critical components transition to new microelectronics trust model that leverages commercial state of the art practices. Provide systems engineering advice on Critical Intelligence Parameter Breech recommendations through emerging Acquisition, Intelligence, Requirements (AIR) policy directives. Responsible for the conduct of Post-Preliminary and Critical Design Review (PDR/CDR) and Independent Technical Risk Assessments (ITRA) for all Army ACAT I and II programs where the Army Acquisition Executive serves as the Milestone Decision Authority. FY17 NDAA Sec 807 directs a change in Title 10 USC 2448b that the MDA will ensure an ITRA is conducted on all programs reaching MS A after 1 October 2016. The reviews will provide recommendations on Technical Risk and PDR/CDR sufficiency will be included in the Milestone Decision Authority (MDA) package for the Milestone Review, approval, and certification. Coordinate and prioritize requests for threat analysis of suppliers of critical components, assure the identification of mission critical functions and critical components as well as Trusted Systems and Networks (TSN) planning and implementation activities in Program Protection Plans. Assist in the conduct of criticality analysis to identify mission critical functions and critical components thus reducing the vulnerability of such functions and components through secure system design.</p> <p>Support the certification of Modular Open Systems Approach (MOSA) as defined in Title 10 USC, section 2446b (e). Confirm that Army programs proceeding to Milestone B have incorporated clearly defined major subsystem interfaces between the major system platform and major system components, between major system components, and between major system platforms. That these major system interfaces are consistent with the widely supported and consensus-based standards that exist at the time of the milestone decision. Assess if Army programs have arranged to obtain specific, appropriate and necessary intellectual property rights with respect to such major system interfaces upon completion of the development of the major system platform Lead the assessment of Reliability, Availability, and Maintainability (RAM) efforts of Army programs of record. Assist programs in the research for root causes of reliability issues and provide detailed assessment along with recommendation to senior leadership.</p> <p>Synchronize the Army's Modeling and Simulation Strategy with OSD's Digital Engineering Strategy to focus current and emerging efforts on the efficient development and use of M&S and Model Based Systems Engineering capabilities in order to advance the Army's system development efforts.</p>			

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Provide engineering support to OSD and the Army to oversee the growth of civilian talent to support Assistant Secretary of the Army (Acquisition, Logistics and Technology) Systems Engineering requirements. This includes recommending improvements in Training, Education, Rotational Assignments, and Mentoring a Systems Engineering (SE) work force across the Army. SEPS will support ASA(ALT) in the development of the Human Capital Strategic Plan (HCSP) and refinement of the System Engineering Functions with OSD.</p> <p>Common Operating Environment (COE): Provide Army representation at a wide spectrum of DoD and Industry professional forums for systems engineering, standards, and open design communities of practice.</p> <p>Provide formal staffing review and analysis of Service and DoD policy and strategy documents for impacts to Army modernization priorities, digital engineering, technical standards, and COE equities.</p> <p>Provide review and analysis of change requests and updates to the DoD Information Technology Standards Repository (DISR) baseline for impacts to Army inter and intra service interoperability with Joint and Coalition partners.</p> <p>Provide configuration management and knowledge management of approved Army baselines for architecture and technical standards in support of Common Operating Environment (COE) capability deliveries and Service level implementation of DoD Digital Engineering guidance and principles.</p> <p>Continue hosting systems engineering forums to promote convergence of legacy combat systems towards a common software and hardware infrastructure, effective migration of Army sensing capabilities towards common data sharing interface standards, and alignment of enterprise capabilities with tactical level services.</p> <p>Maintain enterprise wide Fielded Software Tracker Database via data curation, user requested functionality enhancements, systems administration, and user help desk support.</p> <p>Continue hosting bi-weekly and monthly systems engineering forums to optimize risk reduction and preparatory actions prior to execution of Army Interoperability Certification (AIC) test events.</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Host bi-weekly and monthly systems engineering forums to optimize risk reduction and preparatory actions prior to execution of Army Interoperability Certification (AIC) test events.				
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding in support of the Army's Modernization priorities.				
Title: COE		2.161	1.198	-
<p>Description: Provide governance and implementation oversight and for the Army SoS Common Operating Environment (COE) and synchronized programmatic planning for COE crossing multiple PEOs and Computing Environments (CEs) in coordination with the Army Staff, Training and Doctrine Command, Research and Development Command, Army Materiel Command, Army Testing and Evaluation Command, the Joint Staff and OSD Staff. This includes providing integrated, cross-portfolio system engineering technical products and configuration management cost benefit analysis, support for TRADOC requirements development and G-8 staffing through AROC approval. Lead COE standards development in support of Army and DoD Standards bodies and integrated architecture development. Provide COE related Verification & Validation (V&V) planning and assessment including management of the Federated Integration Environment, Cross-CE risk reduction and Army Interoperability Certification. Serve as the DA Staff advocate for COE and Cross-Cutting Capabilities (CCCs) development and Application Migration. Provides funding for supervision of Subject Matter Expert Staff used to support execution the tasks following.</p> <p>FY 2019 Plans: This organization provides engineering oversight for Cross-Cutting Capabilities development, standards, interoperability testing and Army Interoperability Certification and Governance for the Army System of Systems Common Operating Environment (COE). Products include cross portfolio system engineering products and architecture; synchronized acquisition planning for COE crossing multiple PEOs and Computing Environments (CEs); advocacy for COE and Cross Cutting Capabilities (CCCs) within the DA Staff, senior decision bodies and Army commands; oversight of the COE Integration Assessment Program (CIAP); leadership of the COE Standards Working Group; and Data Management of COE policy, guidance, specifications, and Engineering Change Proposals.</p> <p>These funds provide continued oversight and governance for the Army COE on behalf of the Army Acquisition Executive to include synchronization of planned COE efforts to deliver the COE materiel solution necessary for the Army to field the Mission Command tactical network and migration of legacy systems through divestiture. Funds provide staff support to the Executive Director System of Systems Engineering and Integration and the Army Acquisition Executive on COE matters, assessments and reports, and information to support decision-making. Funds provide configuration management, including software version tracking for fielded baselines and configuration management board review of system readiness for certification for to be fielded</p>				

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>baselines. Funds provide Federated Integration Environment Coordination. Funding support includes synchronized analysis, planning information and presentations to inform the Strategic Portfolio Analysis Review (SPAR).</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding is support of Army's Modernization priorities. As of FY 2020 reduced COE governance included in Army System of Systems Engineering and Analysis.</p>				
<p>Title: Cyber</p> <p>Description: This project funds cyber support to PEOs/PMs to include cybersecurity support to risk management framework, cyber engineering and architecture development, industry cybersecurity engagement, and cyber program oversight and governance, which ensures the secure, affordable, and effective delivery of Army materiel solutions that address critical Army modernization objectives, as well as the delivery of agile and advanced cyber solutions to equip the Army's offensive and defensive forces in the cyberspace domain. These funds support synchronization, analysis and integration of Cyber functions and products.</p> <p>FY 2019 Plans: These funds support synchronization, analysis and integration of Cyber functions and products. Cyber Programs Tasks: Manage the Cyber Acquisition Task Force (CATF) to provide to provide oversight and governance of cyber program planning and execution activities to include portfolio prioritization, resourcing alignment, requirements validation (Cyber Needs Forms, Requirements Definition Packages, and Capability Drops) and capability synchronization/deconfliction across OCO, DCO, PCTE, Cyber Situational Understanding, and related DoDIN initiatives. Co-lead Line of Effort (LOE) #3: Capability Development (Army Cyberspace Strategy) and provide weekly updates to the Army Cyberspace Council on the goals and objectives LOE #3 Project Plan in collaboration with TRADOC, ARCYBER, and HQDA. Provide architecture and system of systems engineering support to the cyber program portfolio to ensure solutions are optimally designed for efficiency and effectiveness. Support assignment of office of primary responsibility for emerging programs like Cyber Situational Understanding IS ICD and acquisition decisions for all programs. Serve as primary ASA(ALT) POC for joint deconfliction to include programs such as Unified Platform and Joint Command and Control and Situational Awareness and authorities such as USCYBERCOM's Section 807 Acquisition Authority. Identify disruptive and innovation technology for rapid prototyping for the primary purpose of dramatically improving the security posture of the Army's systems (weapon, business, or C4ISR). Host meetings and demonstrations, conduct market research, and coordinate with Army Contracting Command (ACC), PEOs, ARCYBER, TRADOC, AMC, and RDECOM as required. Establish improved transition of S&T projects into cyber programs of record.</p> <p>Mission Assurance and Resilience:</p>		4.256	3.310	2.931

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
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<p>Updates to the Cyber Threat Convergence as related to the current threat actors identified by the intel community.</p> <p>Maintenance of the Cyber Focal SharePoint site as necessary to ensure access to Cyber Focal, Cyber Programs, CIO Governance, Mission Assurance & Resilience, Cybersecurity, Defense Industrial Base, Internal Cyber Focal, HBSS/AESS, Unsupported Software, Windows 10 Migration, IAVM Patching, Cyber Engineering, Cyber Acquisitions Task Force, Innovation Challenge and Cyber I-WSR. Assist with the advancement of electronic patching compliance implementation. Continue to improve and simplify identification and reporting of cyber vulnerabilities.</p> <p>Monitor and facilitate PEO's and PM's migration towards Windows 10 for both their Desktop IT and all Windows based PoRs. Assist and respond with data call requests, synchronization efforts and IPR's from DoD CIO, CIO G6, ARCYBER, and the updates to the VCSA. Provide Army stakeholders with weekly updates to include which systems</p> <p>Monitor and track PEO's and PM's migration out of Windows XP and Server 2003 and report current numbers that will feed the DoD Cybersecurity Scorecard that tracks the use and migration out of unsupported software for all Services.</p> <p>Coordination of DoD and Army PKI and Authentication requirements across PEO's and PM's. Coordinate and review all program briefings, and input to the PKE Exemption SharePoint site.</p> <p>Lead for AVRT design, development and implementation, HBSS/AESS integration, IAVA patching.</p> <p>FY16 NDAA S. 1647 cyber vulnerabilities assessments. Manages, leads and develops annual and final reports, analysis, testing and assessments related to cyber vulnerabilities testing of weapon systems/PoRs. Provides recommendations and guides follow on activities as related to ASA(ALT) weapon systems/PoRs. Supports and leads capstone/Phase 3 NDAA 1647 activities.</p> <p>Supports cyber hardening events (1553 bus activities and DCGS-A) and other engagements in terms of FY16 NDAA S. 1647 application, leveraging lessons learned and analyses opportunities to further cyber resiliency goals.</p> <p>Co-lead responsibilities to coordinate, shape, develop and support G 3/5/7 DAMO-CY efforts for the creation of an enduring cyber resiliency program/effort for legacy systems in the Operations and Sustainment phase.</p> <p>Monitor, coordinate and facilitate responses back to DoDIG requirements related to cyber posture and plans in terms of Aviation/ UAS inquiries. In addition, respond and coordinate for audit reports (AAA, DAIG, etc.) that may arise that are related to the cyber mission assurance and resilience area.</p> <p>Support the Wideband Global SATCOM cyber working group with ASA(ALT) Cyber SME input to their study guidance activities.</p> <p>Support, facilitate, and coordinate Supply Chain Risk Management OPT activities and initiatives; analyze, assess and implement recommendations and findings where appropriate to ensure cyber resilience for ASA(ALT) POR's.</p> <p>Cybersecurity Tasks:</p> <p>Obtain Authorization to Operate (ATOs) for Army Rapid Capabilities (Army RCO) systems through the Risk Management Framework (RMF) for the USAEUR ONS Fielding.</p> <p>Lead the ASA(ALT) community and associated PEOs in preparing for upcoming Command Cyber Readiness Inspections (CCRI), unannounced CCRI's, and the addition of Command Cyber Operational Readiness Inspections (CCORI). Continue to assist the</p>			
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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>local NECs with acquiring support for patching, configuring, and implementing Programs of Record to increase cyber posture and achieve passing scores. Continue to support 7th Signal Command as the PEO liaison.</p> <p>Monitor Army Rapid Capabilities (Army RCO) systems through the Risk Management Framework (RMF), complete a Security Controls Assessor-Validator (SCA-V) assessment if systems will continue operation in FY19 and beyond.</p> <p>Defense Industrial Base (DIB) Cyber Security Tasks: Sustain or improve current damage assessment case completion levels at the Defense Cyber Crime Center. Continue to increase the Army acquisition workforce's awareness of Defense Industrial Base cybersecurity threats and mitigations and minimize unauthorized disclosure of Army information. Engage with the DIB through the DoD CIO DIB CS Program Office to encourage cyber information sharing and address potential long-term issue regarding enhanced cybersecurity and cyber incident damage assessment (CIDA) reporting policies. Deploy final operational capability for the Joint CIDA case management solution to share case data and metrics across all DOD damage assessment management offices and facilitate enterprise-wide risk analysis. In collaboration with the Army Intelligence and Security Command, secure funding to update information technology to meet future damage assessment demands. Work with the OSD Damage Assessment Management Office to modernize damage assessment tool suites to manage increased incident reporting and to identify trends in unauthorized technology transfers. Continue to integrate CIDA operations with Joint Acquisition Protection & Exploitation Cell (JAPEC) to facilitate proactive protection of Army controlled technical information (CTI) residing and transiting on contractor-owned systems. Update AR 70-77 to codify CTI identification and safeguarding processes and to improve intelligence support to CIDA process. Conduct cost benefit analysis additional Army resource requirements to meet JAPEC needs. Assist PEOs, PMs, and ASA(ALT) with forecasting costs and resources required with protection of CTI within the DIB, damage assessment recovery operations, and maintaining technology superiority.</p> <p>FY 2020 Plans: Strategic: Lead a coordinated, comprehensive acquisition approach to enhance cyber resiliency and survivability across ASA(ALT) communities and the materiel enterprise. Optimize cybersecurity as a critical enabler of capability delivery. Facilitate and ensure execution of cyber-related tasks and efforts by appropriate ASA(ALT) organizations. Represent and advocate for ASA(ALT) cyberspace equities in external governance bodies, senior leader forums, and partner engagements. Shape cyberspace policy, directives and orders that may impact acquisition. Deliver systemic and crosscutting value to PMs executing cyber-related missions.</p> <p>Cybersecurity:</p>				

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Lead the cybersecurity program for ASA(ALT). Fulfill cybersecurity functions mandated by public law, federal directives, and DoD/Army policy, and ensure PEOs and organizations meet all requirements. Perform delegated Authorizing Official functions for ASA(ALT), ensuring HQ Business systems maintain an acceptable level of risk and continue authorization throughout the system lifecycle. Provide oversight and management standards for the ASA(ALT) cybersecurity workforce. Support PEOs in implementing the Risk Management Framework, communications security (COMSEC) management, Federal Information Security Management Act (FISMA) compliance, and Command Cyber Readiness Inspections (CCRI). Provide technical support to facilitate compliance with ARCYBER orders and directives addressing software updates, patching, reporting, and named cyber operations.</p> <p>Support the secure operation of ASA(ALT) activities. Lead coordination across PEOs in preparing for both planned and unannounced Command Cyber Readiness Inspections (CCRI). Assist local Network Enterprise Centers as needed to support ASA(ALT) equities. Engage 7th Signal Command as the PEO liaison. Report to HQDA CIO/G-6 and ARCYBER for cybersecurity related requirements and issues. Monitor and coordinate response to the various cybersecurity inspection programs and audit findings related to Department of Defense Inspector General (DoDIG), APPA, and Army Audit Agency (AAA) audits.</p> <p>Co-lead RMF process improvement initiatives for the Army, lead for ASA(ALT). In connection with (ICW) HQDA CIO/G-6 and NETCOM, ensure resources are available to conduct further pilot efforts. Develop policies, procedures, and lessons learned to ensure RMF optimization for the Army.</p> <p>Co-lead the ASA(ALT) Chief Information Officer (CIO)/Chief Information Security Officer (CISO) Council. Ensure PEO involvement and coordination to meet the objectives and requirements identified in the council charter.</p> <p>Support critical modernization of unsupported software for secure operations. Monitor and facilitate PEO/PM migration plans and execution away from unsupported client/server operating systems and applications (e.g. Windows 10, Server 2003). Assist and respond with data call requests, synchronization efforts, and IPRs with DoD CIO, HQDA CIO/G-6, ARCYBER, and the Vice Chief of Staff of the Army (VCSA). Provide required data to support DoD Cybersecurity Scorecard.</p> <p>Coordinate DoD and Army requirements for public key infrastructure (PKI) and Multi-Factor Authentication across PEOs and PMs. Coordinate and review all program briefings, and input to the PKE Exemption SharePoint site.</p> <p>Coordinate priorities and tasks for ASA(ALT) from senior leadership forums such as the CIO Executive Board (CIO-EB).</p> <p>Provide holistic expertise and support for Cross-Domain Solutions (CDS). Establish and facilitate Army Tactical CDS WG to provide collaboration among tactical program stakeholders. Identify requirements and interoperability issues affecting multiple</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>systems in the tactical space. Evaluate emerging CDS technologies for the tactical environment and provide feedback to industry to shape investments.</p> <p>Mission Assurance/Resilience & Engineering: Facilitate technical exchange across ASA(ALT) community by maintaining Cyber Focal SharePoint site to collect and main PoR data as needed. Offload legacy data to authoritative sources/repositories as feasible. Facilitate internal coordination across Cyber Focal.</p> <p>Support Cyber Operational Resiliency Assessment-Platform (CORA-P) program. Facilitate identification, prioritization, and approval of vulnerability mitigations and advanced cyber hardening efforts for critical systems. Leverage lessons learned and analyses opportunities to further cyber resiliency goals.</p> <p>Enhance cyber assessments within acquisition process. Coordinate with testing community, PMs/PEOs, OSD/Joint Staff, to implement improvements to cyber assessment process across all ASA(ALT) lifecycles. This process will build on the community-established needs to better integrate testing (Red/Blue/Cyber Ranges), supply chain risk management (beyond Trusted Systems & Networks process), cyber teams (certification/standards), threat capabilities/intent, and risk-to-mission perspective. Institutionalize lessons learned and guidance via Army Acquisition Executive (AAE) directive for PM training and implementation.</p> <p>Enhance cyberspace acquisition governance. Operationalize the Cyber Acquisition Task Force (CATF) to synchronize and prioritize cyberspace capabilities in coordination with other critical governance forums. Army requires whole-of-service governance approach to accelerate and provide flexible delivery of cyberspace capabilities. Establish clear battle-rhythm with TCM Cyber, ARCYBER, and DAMO-CY G-3/5/7 working and assessment group. Integrate with CCIDS Configuration Control Board (CCB) and Cyberspace Requirements Evaluation Board (CREB). Ensure communications across the community.</p> <p>Provide ASA(ALT) technical representation and expertise at Unified Platform (UP) and Joint Cyberspace Command & Control (JCC2) decision forums. Ensure technical compatibility of joint efforts with current/planned Army systems across PEOs and advocate for Army programmatic equities in cyberspace. Specifically, Army will maximize coordination of Army capability and materiel development, to ensure both align to and support UP/JCC2 objectives. Improve communication and information sharing across all stakeholders to support PEO interests.</p> <p>Improve ASA(ALT) System Security Engineering (SSE). Set conditions for the formal appointment of the SSE workforce within each PEO. Establish duties with prescribed training, experience, and certification requirements IAW DoD 8570. Facilitate collaboration across ASA(ALT), and with the cybersecurity community.</p>				

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Improve cyberspace supply chain risk management (CySCRM). Support OCSE efforts with Army CySCRM WG to maintain readiness of Army forces, capabilities, and systems by identifying, scoping, and mitigating risks to the supply chain. The WG will provide a forum for stakeholders to review intelligence reports and assessments related to SCRM; review current SCRM policies, roles, and responsibilities; identify potential gaps; recommend mitigations; in accordance with AR 70-77, maximize the integration of SCRM across system lifecycles; and interface with joint and interagency SCRM activities to ensure whole-of-government execution.</p> <p>As needed, conduct engineering assessments of crosscutting cyber focused architectures, solutions, and capabilities proposed by PORs, CFTs, and RCO.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding to support Army's Modernization priorities.</p>				
<p>Title: Facilities and IT Support</p> <p>Description: Provides funding for infrastructure/facilities and IT support.</p> <p>FY 2019 Plans: Provides funding for infrastructure/facilities. It includes the costs for purchasing/leasing hardware, software, computers, communications equipment and services.</p> <p>FY 2020 Plans: Provides funding for infrastructure/facilities. It includes the costs for purchasing/leasing hardware, software, computers, communications equipment and services.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease in funding to support Army's Modernization priorities.</p>		0.757	0.212	0.186
<p>Title: Rapid Capabilities Office (RCO) Support</p> <p>Description: Rapid Capabilities Office (RCO) Support</p> <p>FY 2020 Plans: Expedite assessment, development and fielding of select, critical Army systems, conduct independent technical assessments of weapon or combat support system capabilities and vulnerabilities, provide holistic solutions that inform and provide essential information on the effects to force structure, training and sustainment, and identify cutting edge technologies for potential military application in support of critical capability gaps.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>		-	-	4.331

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
RCO Government matrix and contractor resource funding and infrastructure cost transitioned from PE 0604798A to PE 0605054A (Project FI3) in FY 2020.			
Title: FY 2019 SBIR / STTR Transfer	-	0.339	-
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	19.683	15.600	17.807

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
• DY3: <i>NIE Test & Evaluation</i>	49.220	22.660	16.851	-	16.851	17.326	17.356	16.522	16.851	Continuing	Continuing
• DY5: <i>Production/Field Coordination for Capability Sets</i>	4.161	4.239	2.157	-	2.157	2.224	2.213	2.185	2.304	Continuing	Continuing
• DZ6: <i>Army Integration Management & Coordination</i>	8.315	6.751	5.819	-	5.819	5.906	6.060	6.209	6.238	Continuing	Continuing
• FG7: <i>Emerging Technology Initiatives</i>	58.007	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

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

E. Performance Metrics

N/A

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

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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
Army System of Systems Engineering and Analysis	TBD	TBD : Various	44.603	-		-		-		-		-	0.000	44.603	-
Common Operating Environment (COE)	TBD	TBD : Various	12.969	-		-		-		-		-	0.000	12.969	-
Cyber	TBD	TBD : Various	4.764	-		-		-		-		-	0.000	4.764	-
Army System of System Engineering and Analysis Core Labor	Allot	SoSE&I : Various	-	6.479	Nov 2017	4.522	Nov 2018	3.884	Nov 2019	-		3.884	Continuing	Continuing	-
Army System of System Engineering and Analysis Matrix Labor	MIPR	CERDEC : Various	-	1.482	Nov 2017	0.913	Nov 2018	0.884	Nov 2019	-		0.884	Continuing	Continuing	-
Army System of System Engineering and Analysis SETA Labor	C/CPFF	TBD : Various	-	3.091	Nov 2017	1.025	Nov 2018	0.982	Nov 2019	-		0.982	Continuing	Continuing	-
Army System of System Engineering and Analysis FFRDC Labor	FFRDC	MITRE : Various	-	3.956	Nov 2017	4.081	Nov 2018	3.563	Nov 2019	-		3.563	Continuing	Continuing	-
Common Operating Environment (COE) Core Labor	Allot	SoSE&I : Various	-	1.161	Nov 2017	1.198	Nov 2018	1.045	Nov 2019	-		1.045	Continuing	Continuing	-
Cyber Core Labor	Allot	SoSE&I : Various	-	2.076	Nov 2017	2.210	Nov 2018	1.869	Nov 2019	-		1.869	Continuing	Continuing	-
Cyber Matrix Labor	MIPR	CERDEC : Various	-	0.300	Nov 2017	0.391	Nov 2018	0.269	Nov 2019	-		0.269	Continuing	Continuing	-
Cyber SETA Labor	C/CPFF	TBD : Various	-	0.248	Nov 2017	0.206	Nov 2018	0.224	Nov 2019	-		0.224	Continuing	Continuing	-
Cyber FFRDC Labor	FFRDC	MITRE : Various	-	0.633	Nov 2017	0.503	Nov 2018	0.570	Nov 2019	-		0.570	Continuing	Continuing	-
RCO Core Labor	C/BA	TBD : VA	-	-		-		4.331	Nov 2019	-		4.331	0.000	4.331	-
FY 2019 SBIR / STTR Transfer	TBD	Various : None	-	-		0.339		-		-		-	0.000	0.339	-
Subtotal			62.336	19.426		15.388		17.621		-		17.621	Continuing	Continuing	N/A

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

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

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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			
Facilities and IT Support	TBD	Various: Note: 1 : TBD	3.920	0.257	Nov 2017	0.212	Nov 2018	0.186	Nov 2019	-		0.186	0.000	4.575	-
Subtotal			3.920	0.257		0.212		0.186		-		0.186	0.000	4.575	N/A

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

	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	66.256	19.683	15.600	17.807	-	17.807	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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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
CS19 CS TDP (A/B Kit Design)	█																											
CS21 Golden Vehicle / NRE List [ABCT/SBCT]	█																											
CS21 Preliminary Reference IBOI [IBCT]	█																											
CS20 Unit NBOI (NRE Baseline) IBCT	█																											
CS20 Golden Vehicle / NRE List	█																											
CS19 Procurement	█																											
CS19 LTI Integration	█																											
CS19 Receive Kits (Production)	█																											
Capability Set (CS) Design:																												
CS19 Architecture Design	█																											
CS20 Architecture Design	█																											
CS21 Architecture Design	█																											
CS22 Architecture Design	█																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>

Event Name	FY 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																																				
CS23 Architecture Design																																																																
CS24 Architecture Design																																																																
Common Operating Environment (COE):																																																																
COE V3.0 CPCE/MCE CDR																																													▲																			
COE V3.0 CPCE/MCE OT at NIE 18.2																																																									■							
COE V3.0 AIC																																																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>

Schedule Details

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

Note

Capability Set (CS)

Common Operating Environment (COE):

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DY7 / <i>Army Systems Engineering, Architecture & Analysis</i>
Army Interoperability Certification (AIC), Command Post Computing Environment (CPCE), Critical Design Review (CDR), Mounted Computing Environment (MCE), Network Integration Evaluation (NIE), Operational Test (OT)		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019			
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>					Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>			
COST (\$ in Millions)	Prior Years	FY 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	
DZ6: <i>Army Integration Management & Coordination</i>	-	8.315	6.751	5.819	-	5.819	5.906	6.060	6.209	6.238	0.000	45.298	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

A. Mission Description and Budget Item Justification

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

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

	FY 2018	FY 2019	FY 2020
<p>Title: Program Management and Integration</p> <p>Description: This effort funds for all "shared" resources that supports SoSE&I and the Army Rapid Capabilities Office (RCO).</p> <p>FY 2019 Plans: This effort includes program, business, operations, and personnel management support. It includes the following types of activities: Program management, contracting, financial management, cost analysis, personnel management, operations, security management, information management, facilities, and infrastructure management. It also includes program oversight for Program Manager, Position, Navigation, and Timing (PNT).</p> <p>FY 2020 Plans: This project funds Government Labor, specifically resources that provide program management, resource management, acquisition, human resources, and operations aspects of the Army Rapid Capabilities Office (RCO).</p> <p>Funding for RCO Government technical resources aligned under project DY7.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: RCO Program Management contract support and Integration costs transitioning to PE0605054A project FI3.</p>	7.602	6.129	5.819
<p>Title: Facilities and IT Support</p> <p>Description: Provides funding for infrastructure/facilities and IT support.</p> <p>FY 2019 Plans:</p>	0.713	0.544	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Provides funding for infrastructure / facilities, and IT support from Network connectivity to purchasing/leasing hardware, software, computers, communications equipment and services.			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> RCO facilities and IT Support moved to PE0605054A project FI3			
<i>Title:</i> FY 2019 SBIR / STTR Transfer	-	0.078	-
<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	8.315	6.751	5.819

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>
• DY3: <i>NIE Test & Evaluation</i>	49.220	22.660	16.851	-	16.851	17.326	17.356	16.522	16.851	Continuing	Continuing
• DY5: <i>Production/Field</i>	4.161	4.239	2.157	-	2.157	2.224	2.213	2.185	2.304	Continuing	Continuing
<i>Coordination for Capability Sets</i>											
• DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	19.683	15.600	17.807	-	17.807	17.534	17.659	17.870	17.043	Continuing	Continuing
• FG7: <i>Emerging Technology Initiatives</i>	58.007	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing

Remarks

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

E. Performance Metrics
N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>
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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			
SoSE&I Program Management and Integration	TBD	Various Note: 1 : TBD	28.738	7.602	Nov 2017	6.129	Nov 2018	5.819	Nov 2019	-		5.819	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	Various : None	-	-		0.078		-		-		-	0.000	0.078	-
Subtotal			28.738	7.602		6.207		5.819		-		5.819	Continuing	Continuing	N/A

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

Support (\$ in Millions)				FY 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			
Facilities and IT Support	TBD	Various Note: 1 : TBD	3.807	0.713	Nov 2017	0.544	Nov 2018	-		-		-	Continuing	Continuing	Continuing
Subtotal			3.807	0.713		0.544		-		-		-	Continuing	Continuing	N/A

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

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
	32.545	8.315	6.751	5.819	-	5.819	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>	

Event Name	FY 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 Set 17 Fieldings																												
CS17 New Equipment Training (NET)																												
CS17 New Equipment Fielding (NEF)																												
JWA 18.1 Planning – Execution																												
AWA 18.1 Event																												
AWA 18.1 Event Analysis & Summary																												
NIE 18.2 Planning -- Execution																												
NIE 18.2 Planning/Prep - ValEx/CommEX/Pilot																												
NIE 18.2 Event																												
NIE 18.2 Event Analysis & Summary																												
Capability Set 18 Fieldings																												
CS18 Build and Integration																												
CS18 New Equipment Training (NET)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>

Event Name	FY 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
CS18 New Equipment Fielding (NEF)																												
JWA 19.1 Planning -- Execution																												
AWA 19.1 Planning/Prep - ValEx/CommEX/Pilot																												
AWA 19.1 Event																												
AWA 19.1 Event Analysis & Summary																												
Capability Set 19 Fieldings																												
JWA 18.1 Planning - Execution																												
NIE 18.2 Planning - Execution																												
JWA 19.1 Planning - Execution																												
NIE 19.2 Planning - Execution																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>

Schedule Details

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

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) DZ6 / <i>Army Integration Management & Coordination</i>		

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>				Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</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
FG7: <i>Emerging Technology Initiatives</i>	-	58.007	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	58.007
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

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

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

A. Mission Description and Budget Item Justification

This Project funds the prototyping and demonstration of selected technology enabled capabilities to support advanced Soldier, ground, aviation, and Command, Control, Communications, Computers Intelligence & Reconnaissance (C4ISR) systems and equipment.

The Primary goal is to take technologies to Technology Readiness Level (TRL) 7 and 8 through a collaborative and accelerated acquisition process. Technologies will be demonstrated in relevant environments, performing tactical/operational scenarios. Efforts will focus on high-priority, threat-based projects with the intent to deliver an operationally effective capability within one to five years. Efforts will include accelerated material development and competitive prototyping based on anticipated and emerging threats and opportunities. This Project provides the Army an improved mechanism to effectively confront emerging threats and advance America's military dominance. Efforts include development, acquisition, assessment, maturation, and transition of prototype technologies to acquisition programs in Cyber; Electronic Warfare (EW); Positioning, Navigation and Timing (PNT); Survivability and other high priority emerging threats and opportunities. Funds may also allow for acceleration of critical Program of Record capabilities to counter urgent and emerging threats. The Army Rapid Capabilities Office (RCO) assesses the provided capabilities to improve future solutions, to inform future Army capability requirements, and to potentially transition the capability to an Army acquisition program.

The Army RCO expedites the provisioning and fielding of critical combat materiel capabilities to the Warfighter to meet Combatant Commanders' needs. The Army RCO was established per Headquarters, Department of the Army, memo, SUBJECT: Establishment of the Army Rapid Capabilities Office, signed by the Secretary of the Army: Eric K. Fanning, dated 11 August 2016.

The RCO assesses Commercial-Off-The Shelf (COTS), Government Off-The- Shelf (GOTS), and Non-Developmental Item (NDI) (non-standard equipment) solutions for modification and/or integration to address changes in contested environments with enduring materiel solutions for forces deployed globally. Procure prototypes and evaluate solutions to be fielded and transition to an acquisition program for production and sustainment.

The RCO capabilities focus areas are:
Cyber

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</i>
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Electronic Warfare (EW)
Position, Navigation and Timing (PNT)
Survivability
Operational Needs Statements (ONS)
Any other operational needs that become a priority as designated by the Army Board of Directors (BOD)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Maturation, Prototyping, Assessment, and Integration of Emerging and Essential Technologies	58.007	-	-
Description: This effort selects technologies that show high promise for advancing and accelerating capabilities required under acquisition programs and develops and evaluates associated prototypes for accelerated identification, assessment, and transition to an acquisition program for production and fielding. It also demonstrates integrated technologies within a high fidelity and realistic operating environment and transitions them to a formal program of record on an accelerated basis. This effort also includes analysis, integration and evaluation of emerging capabilities on air and ground platforms to reduce risk and support technology insertions.			
Accomplishments/Planned Programs Subtotals	58.007	-	-

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
• DY3: <i>NIE Test & Evaluation</i>	49.220	22.660	16.851	-	16.851	17.326	17.356	16.522	16.851	Continuing	Continuing
• DY5: <i>Production/Field</i>	4.161	4.239	2.157	-	2.157	2.224	2.213	2.185	2.304	Continuing	Continuing
<i>Coordination for Capability Sets</i>											
• DY7: <i>Army Systems Engineering, Architecture & Analysis</i>	19.683	15.600	17.807	-	17.807	17.534	17.659	17.870	17.043	Continuing	Continuing
• DZ6: <i>Army Integration Management & Coordination</i>	8.315	6.751	5.819	-	5.819	5.906	6.060	6.209	6.238	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Army RCO capitalizes on current and emerging technologies to provide rapid solutions to address emerging threats and high impact capability opportunities of U.S. Army Forces deployed globally. This is accomplished in one of two ways: 1) adapting COTS/GOTS/NDI equipment to meet operational needs and 2) developing emerging deployable capability through research and development organizations, academia, and industry. The RCO uses streamlined acquisition methods, processes and techniques to rapidly acquire capability; these methods vary by project. The Rapid Capabilities Office will have a dedicated contracting staff, with the flexibility to use both traditional and non-traditional contracting approaches. To reach non-traditional vendors, RCO will use non-standard contracting methods, such as Other

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</i>

Transaction Authority instruments. Where practicable, prototypes will be acquired using competitive procedures. Projects will be transitioned to an approved acquisition program for production and sustainment. Operational assessments will be conducted to provide feedback in support of Army requirements generation, prototype maturation, and future capability development.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</i>
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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			
EW Program Management	Various	PM Electronic Warfare & Cyber : APG, MD	-	1.618		-		-		-		-	0.000	1.618	-
PNT Program Management	Various	PM PNT : Various	-	1.279		-		-		-		-	0.000	1.279	-
Subtotal			-	2.897		-		-		-		-	0.000	2.897	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			
Maturation, Prototyping, Assessment, and Integration of Emerging and Essential Technologies	C/TBD	TBD : TBD	27.665	27.596		-		-		-		-	Continuing	Continuing	Continuing
EW VROD/VMAX Software Development	MIPR	I2WD : APG, MD	-	1.197		-		-		-		-	0.000	1.197	-
EW Air Risk Reduction	C/CPFF	General Atomics : Multiple	-	7.760		-		-		-		-	0.000	7.760	-
EW TORO Development	MIPR	Air Force : TBD	-	5.300		-		-		-		-	0.000	5.300	-
EW Sabre Fury Development	C/CPFF	SRC : Syracuse, NY	-	2.088		-		-		-		-	0.000	2.088	-
EW ISA Software Development	C/CPFF	MTEQ : APG, MD	-	0.914		-		-		-		-	0.000	0.914	-
EW EWPMT Development	C/CPFF	Raytheon : Ft. Wayne, IN	-	1.977		-		-		-		-	0.000	1.977	-
PNT D3E Integration	C/CPFF	GPS Source : Pueblo, CO	-	0.752		-		-		-		-	0.000	0.752	-
Subtotal			27.665	47.584		-		-		-		-	Continuing	Continuing	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</i>
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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			
EW VROD/VMAX Information Assurance	MIPR	I2WD : APG, MD	-	0.522		-		-		-		-	0.000	0.522	-
EW Prophet Safety Support	MIPR	CECOM : APG, MD	-	0.075		-		-		-		-	0.000	0.075	-
PNT Engineering Support	C/CPFF	CERDEC : APG, MD	-	1.178		-		-		-		-	0.000	1.178	-
Subtotal			-	1.775		-		-		-		-	0.000	1.775	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			
EW Sabre Fury Software Test and Information Assurance	MIPR	TBD : TBD	-	0.950		-		-		-		-	0.000	0.950	-
EW RIM Test Articles	C/IDIQ	Army Research Laboratory : APG, MD	-	2.450		-		-		-		-	0.000	2.450	-
EW EWPMT Test	C/CPFF	Raytheon : Ft. Wayne, IN	-	0.727		-		-		-		-	0.000	0.727	-
PNT Customer Test	MIPR	ATEC WSMR : WSMR, NM	-	0.897		-		-		-		-	0.000	0.897	-
PNT Pseudolite test	MIPR	ATEC WSMR : WSMR, NM	-	0.217		-		-		-		-	0.000	0.217	-
PNT JWA 18.1/19.1	MIPR	ATEC : OCONUS	-	0.510		-		-		-		-	0.000	0.510	-
Subtotal			-	5.751		-		-		-		-	0.000	5.751	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		27.665	58.007	0.000	-	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</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
Technology Evaluation FY17																												
Technology Evaluation FY18																												
Prototype Procurement FY18																												
Technology Evaluation FY19																												
Prototype Procurement FY19																												
RCO EW Phase I YPG C&L Test																												
RCO EW Phase I Deployment																												
RCO EW Phase II Development																												
RCO PNT Sensor Development (fixed and mobile)																												
RCO PNT Test Planning																												
RCO PNT NRE and Integration on Stryker Platforms																												
RCO PNT NRE and Integration on Heavy Platforms																												
RCO PNT Laboratory Testing of PNT Systems																												

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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
RCO PNT Pseudolite Risk Reduction Testing		■																										
RCO PNT Safety Release for Customer Test			■																									
RCO PNT Customer Test				■																								
RCO PNT C&L and Safety Confirmation				▲1																								
RCO PNT Deployment Decision Package				▲2																								
RCO PNT BOD Deployment Decision				▲3																								
RCO PNT Purchase A Kits			■																									
RCO PNT Sensor Purchase/Site Surveys					■																							
RCO PNT Ship A kits to USAREUR						■																						
RCO Begin Deployment to USAREUR Units																												
RCO OSD Effort Initiation & Engineer Analysis																												
RCO OSD Operational Assessment FY19					■																							
RCO OSD Operational Assessment FY20																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</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
RCO OSD Residual OA Equipment Maintenance FY21																												
RCO OSD Residual OA Equipment Maintenance FY22																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Evaluation FY17	2	2017	3	2018
Prototype Procurement FY17	3	2017	4	2017
Technology Evaluation FY18	1	2018	3	2018
Prototype Procurement FY18	3	2018	4	2018
Technology Evaluation FY19	1	2019	3	2019
Prototype Procurement FY19	3	2019	4	2020
RCO EW Phase I Development	2	2017	4	2017
RCO EW Phase I Lab Based Risk Reduction	2	2017	3	2017
RCO EW Phase I NIE 17.2 NET	3	2017	3	2017
RCO EW Phase I NIE 17.2 VALEX	3	2017	3	2017
RCO EW Phase I NIE 17.2 EW Dry Run	4	2017	4	2017
RCO EW Saber Guardian 17	4	2017	4	2017
RCO EW Phase I NIE 17.2 EW Assessment	4	2017	4	2017
RCO EW Phase I YPG C&L Test	4	2017	1	2018
RCO EW Phase I Deployment	2	2018	2	2018
RCO EW Phase II Development	1	2018	4	2018
RCO PNT Sensor Development (fixed and mobile)	4	2017	3	2018
RCO PNT Test Planning	4	2017	2	2018
RCO PNT NRE and Integration on Stryker Platforms	4	2017	3	2018
RCO PNT NRE and Integration on Heavy Platforms	1	2018	3	2018
RCO PNT Laboratory Testing of PNT Systems	3	2017	2	2018
RCO PNT Pseudolite Risk Reduction Testing	2	2018	2	2018

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604798A / <i>Brigade Analysis, Integration and Evaluation</i>	Project (Number/Name) FG7 / <i>Emerging Technology Initiatives</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
RCO PNT Safety Release for Customer Test	2	2018	2	2018
RCO PNT Customer Test	3	2018	3	2018
RCO PNT C&L and Safety Confirmation	3	2018	3	2018
RCO PNT Deployment Decision Package	3	2018	3	2018
RCO PNT BOD Deployment Decision	4	2018	4	2018
RCO PNT Purchase A Kits	3	2018	2	2019
RCO PNT Sensor Purchase/Site Surveys	1	2019	2	2019
RCO PNT Ship A kits to USAREUR	1	2019	3	2019
RCO Begin Deployment to USAREUR Units	4	2019	4	2019
RCO OSD Effort Initiation & Engineer Analysis	1	2018	4	2018
RCO OSD Operational Assessment FY19	1	2019	4	2019
RCO OSD Operational Assessment FY20	1	2020	4	2020
RCO OSD Residual OA Equipment Maintenance FY21	1	2021	4	2021
RCO OSD Residual OA Equipment Maintenance FY22	1	2022	4	2022

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019	
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					PE 0604802A / Weapons and Munitions - Eng Dev							
COST (\$ in Millions)	Prior Years	FY 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	-	144.389	172.744	181.023	-	181.023	134.960	99.386	64.788	27.801	0.000	825.091
613: MORTAR SYSTEMS	-	17.582	28.071	5.792	-	5.792	1.410	0.000	0.000	0.000	0.000	52.855
EC4: Non-Standard Simulator Munitions	-	0.863	3.146	2.644	-	2.644	2.121	2.159	0.000	0.000	0.000	10.933
ED7: Advanced Multipurpose (AMP) Cartridge	-	30.390	21.802	14.100	-	14.100	0.000	0.000	0.000	0.000	0.000	66.292
EL9: Ammunitions Logistics Prototyping	-	0.684	2.014	2.329	-	2.329	1.703	0.705	1.000	1.020	0.000	9.455
EP2: Shoulder-Launched Munitions	-	3.000	0.000	4.100	-	4.100	10.400	0.000	0.000	0.000	0.000	17.500
EP3: Reduced Range Ammunition - Small Caliber	-	0.000	2.470	8.376	-	8.376	15.000	15.250	13.200	0.000	0.000	54.296
EP4: One-Way Luminescence for Small Caliber Ammo	-	0.000	6.077	8.547	-	8.547	12.391	5.387	6.500	3.000	0.000	41.902
EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	-	13.318	16.748	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.066
EP7: Aviation Airborne Expendable Countermeasures	-	0.000	7.213	4.920	-	4.920	4.480	8.250	0.000	0.000	0.000	24.863
EU4: 40mm HV Improved High Explosive Dual Purpose	-	2.191	7.201	13.055	-	13.055	2.935	2.313	0.000	0.000	0.000	27.695
EU5: .50 Caliber All-Purpose Tactical cartridge (APTC)*	-	0.000	0.000	0.000	-	0.000	8.500	9.400	0.000	0.000	0.000	17.900
EU6: 155mm HE Rocket Assist Project Extended Range	-	0.000	6.917	8.943	-	8.943	5.966	3.000	0.000	0.000	0.000	24.826
EU7: Enhanced Lethality Cannon Munitions	-	25.600	7.905	7.908	-	7.908	0.000	0.000	0.000	0.000	0.000	41.413
EU8: Improved Multi-Option Fuze	-	9.730	7.905	10.000	-	10.000	0.000	0.000	0.000	0.000	0.000	27.635

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)												
<i>2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	<i>PE 0604802A / Weapons and Munitions - Eng Dev</i>												
<i>EW1: 40mm Low Velocity Ammunition</i>	-	13.469	13.253	14.032	-	14.032	17.402	5.963	2.000	0.000	0.000	66.119	
<i>FA6: 30mm Lethality</i>	-	13.344	13.834	22.897	-	22.897	15.860	9.797	8.000	3.000	0.000	86.732	
<i>FL4: Small Caliber Ammo for Next Gen Squad Weapons</i>	-	0.000	0.000	22.880	-	22.880	30.630	28.750	25.000	11.750	0.000	119.010	
<i>S36: Precision Guidance Kit</i>	-	14.218	28.188	30.500	-	30.500	3.691	3.174	3.753	3.531	0.000	87.055	
<i>XV2: Extended Range 120mm Mortar*</i>	-	0.000	0.000	0.000	-	0.000	2.471	5.238	5.335	5.500	0.000	18.544	

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

Note

Project EP2, Shoulder-Launched Munitions is a New Start in FY 2020.
 Project EP5, Adv Armor-Piercing (ADVAP) for Small Cal Ammo will be realigned to PE 0604601 in FY2021.

A. Mission Description and Budget Item Justification

This Program Element funds multiple efforts for engineering development of weapons and munitions systems.

Project 613, Mortar Systems: This Project supports Fire Control Modernization (FCM) and High Explosive Guided Mortar (HEGM).

The Fire Control Modernization (FCM) Project funds engineering development of Common / Universal Fire Control Systems applicable to Indirect Fire mortar weapon systems. This includes a modernized digital pointing system that will be integrated with the M120A1 120mm mortar weapon systems, M121 120mm mortar weapon systems, and potentially digitize the M252 81mm mortar weapon systems. Fire Control Modernization will replace the current M67 sight unit and upgrade the M95 and M150 fire control systems with modernized pointing device and mount. The modernized pointing device will enhance responsiveness, survivability, mobility, maintainability, and minimize mortar crew exposure to enemy fire. Fire Control Modernization intends to include the addition of round counting capabilities, muzzle velocity sensing, reduced power draw, streamlined communication, and employ a common fire control software solution across mortar systems. FY 2020 funds will support engineering initiatives and prototyping of fire control line replaceable units (LRU) and software.

The High Explosive Guided Mortar (HEGM) Project funded engineering development of precision guidance systems applicable to Indirect Fire mortar weapon systems. HEGM provides a precision capability to support the close fight in urban and complex terrain, while at the same time, reducing collateral damage. HEGM provides precision accuracy and effectiveness for 120mm mortar systems using precision guidance systems that will effectively reduce target delivery error. The HEGM capability will be developed through the use of improved guidance and control components and advanced airframe design that allow sufficient maneuver of the cartridge in flight to correct for induced error providing the ability to engage targets without the need to adjust fire. The HEGM Project was terminated in FY 2018 with close-out completion in FY 2019.

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	
<p>Project EC4, Non-Standard Simulator Munitions: The Non-Standard Simulator Munitions Project will standardize various pyrotechnics that simulate battlefield effects. The Army's Combat Training Centers (CTCs) are currently using non-standard munitions to replicate both conventional and asymmetric warfare battlefield effects. These modified commercial-off-the-shelf products have not been type classified, material released, and are not safe or sustainable for use by Soldiers. This effort will develop and demonstrate various pyrotechnics/simulators to replicate both conventional and asymmetric warfare battlefield effects such as: Black smoke signature (burning vehicles, buildings, and equipment); Yellow smoke signature (chemical, biological or nuclear effects); Macro pyrotechnics to simulate hostile fire and small Improvised Explosive Devices (IEDs) during mounted operations in urban terrain; Micro pyrotechnics to simulate indoor hostile fire and IED effects that are capable of being integrated into existing facilities; Rocket Propelled Grenade (RPG) on a wire to replicate the flight of a Rocket Propelled Grenade; High Order Blast Effect (HiOBE) used to replicate a Vehicle Borne Improvised Explosive Device (VBIED), building explosions, and other significant explosive events; Artillery airburst (LA45) simulator to replicate indirect fire; simulator to replicate a STINGER (LA47) firing; Tracer Fire-back simulator to replicate enemy small arms fire and anti-aircraft fire. Standardization will reduce training costs, eliminate redundancies between systems, mitigate environmental concerns and safety risks associated with realistic scenario based training.</p> <p>Project ED7, Advanced Multipurpose (AMP) Cartridge: The Advanced Multi Purpose (AMP) Project is a direct fire line of sight 120mm large caliber munition under development for the Abrams Main Battle Tank. AMP has three modes of operation including point detonate, point detonate delay, and airburst. AMP is the materiel solution for breaching double reinforced concrete walls and defeating Anti Tank Guided Missile (ATGM) teams from 50m to 2000m threshold and 50m to 4500m objective, a validated gap that cannot currently be met with existing stockpiled ammunition. In addition to added capability, AMP will also consolidate the capabilities of four existing stockpiled 120mm munitions, thereby addressing the users' battle carry dilemma by allowing them to load a single munition that is capable of defeating multiple targets including Anti Tank Guided Missile teams, reinforced walls, personnel, light armor, bunkers, and obstacles. The full performance of the AMP is obtained with an Abrams equipped Ammunition Data Link breach modification, the same required by the 120mm M829A4 cartridge that achieved Milestone C in FY 2014 and achieved Full Materiel Release in FY 2015. FY 2020 funds supports continuation of Engineering and Manufacturing Development (EMD) efforts and testing in preparation for Milestone C and transition into Procurement.</p> <p>Project EL9, Ammunition Logistics Prototyping: The Ammunition Logistics Prototyping Project supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. FY 2020 funding will be used to continue integrating the munitions health monitoring system with additional ammunition items and conduct qualification tests and continue to integrate passive time/temperature exposure sensors with additional ammunition items and conduct qualification testing.</p> <p>Project EP2, Shoulder-Launched Munitions: This project previously funded the one-time acceleration of the Tandem Warhead type classification and completion of development and testing for use in the Shoulder Launched AT-4 Single-use 84mm Anti-Tank Weapon. The AT-4 Tandem Warhead provides a single shot solution with increased lethality for infantry crew formations against anti-armor and to defeat hardened structures. The AT-4 effort was part of the Secretary of Defense's Close Combat Lethality task force.</p>		

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<p>The Individual Assault Munition (IAM) will be a lightweight Shoulder Launched Munition (SLM) capability for combat units at the individual Soldier level. As an improvement over existing Shoulder Launched Munitions, the solution will allow Soldiers to conduct Urban Operations with an ability to defeat the enemy protected by a variety of field expedient, structural and lightly armored vehicles. This solution will be effective day or night at close ranges with an ability to safely engage targets from within enclosures using single hearing protection. This solution will combine the capability of multiple existing shoulder-launched munitions which will allow for reduced Soldier load, training complexity and logistics burden for Light Infantry, Combat Engineers and Special Operations Forces. FY 2020 funding will provide the Army the opportunity to evaluate various prototype munitions to achieve emerging increased capability as an Individual Assault Munition. The Individual Assault Munition Capabilities Development Document (CDD) was approved on 11 March 2016. The Individual Assault Munition effort is a new start in FY 2020.</p> <p>Project EP3, Reduced Range Ammunition - Small Caliber: The small caliber Reduced Range Ammunition (RRA) Project is a critical technology development in response to the 7.62mm and .50 caliber Capabilities Development Documents (CDD). The overall objective of Reduced Range Ammunition is to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. The relatively long maximum range of the 7.62mm and .50 caliber service ammunition poses challenges on training ranges in range restricted areas. Reduced Range Ammunition will mitigate a training gap on installations by providing a materiel solution that meets training needs while shortening and condensing the SDZ. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted ranges. The Reduced Range Ammunition cartridge design will be compatible with all Army 7.62mm and .50 caliber weapons, but specifically optimized to work in the M240 and M2 Machine Guns. FY 2020 funding supports continuing Engineering and Manufacturing Development (EMD) efforts and performing design/verification testing on the 7.62mm variant. FY 2020 funds also support Milestone (MS) B activities to include Preliminary Design Review (PDR) and Engineering and Manufacturing Development (EMD) Contract Award for the .50 caliber variant. FY 2020 funds also supports Reduced Range Ammunition concept development/evaluation for the Next Generation Squad Weapon (NGSW) systems.</p> <p>Project EP4, One-Way Luminescence for Small Caliber Ammo: The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62mm and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 Caliber Munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL projects objective is to develop and field a full day/night tracer round, replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability. 7.62mm is the immediate focus followed by 5.56mm OWL cartridges and later followed by .50 Caliber cartridges and Next Generation Squad Weapons (NGSW) ammunition. FY 2020 funding will support continuing Engineering and Manufacturing Development (EMD) efforts, conducting a Critical Design review (CDR), performing development tests, and a User Assessment (UA) for the 7.62mm variant. FY 2020 also supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NGSW.</p> <p>Project EP5, Adv Armor-Piercing (ADVAP) for Small Caliber Ammo: This Project supports both the Advanced Armor-Piercing ammunition and the Next Generation Squad Weapon (NGSW) Family of Ammunition.</p> <p>- Advanced Armor-Piercing (ADVAP): The ADVAP project is a critical technology development in response to the 7.62mm and 5.56mm Family of Ammunition Capabilities Development Documents (CDD). The nomenclature for the 7.62mm ADVAP is XM1158. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm. The ADVAP ammunition in</p>		

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<p>calibers below 7.62mm for the Next Generation Squad Weapons is referred to as the Special Purpose ammunition. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. No funding has been requested for ADVAP in FY 2020.</p> <p>- Next Generation Squad Weapon (NGSW) Family of Ammunition: The NGSW ammo is a new ammunition technology under development for use in the Next Generation Squad Weapon systems. The objective is to develop and Full Materiel Release (FMR) the new ammunition. No funding requested in FY 2020.</p> <p>Project EP7, Aviation Airborne Expandable Countermeasures: The Aviation Airborne Expandable Countermeasures Project will support Integrated System Design (ISD), System Capability (SC) and Manufacturing Process Demonstrations (MPD) on current pyrotechnic munitions and tunable pyrotechnic aircraft counter measures and decoys. The project will also support ISD, SC and MPD on new expendable countermeasure munitions that will protect Army aircraft from advanced and current guided missile threats. Activities include modeling and simulation, flight testing, qualification testing, engineering to reduce size and weight, environmental considerations, safety enhancements, manufacturing enhancements, qualification of other service and foreign munitions that could meet current requirements, product improvements, insertion of new technologies to increase performance, and enhancement of current flare solutions for new and existing aircraft. Systems include impulse cartridges and aircraft expendables (to include Radio Frequency (RF) expendables).</p> <p>Project EU4, 40mm HV Improved High Explosive Dual Purpose: 40mm High Velocity (HV) High Explosive Dual Purpose - Airburst (HEDP-AB) is a new capability identified in the 40mm High Velocity Improved High Explosive Dual Purpose Cartridge Capability Development Document (CDD) and will provide the Mk19 Mod 3 Grenade Machine Gun (GMG) an airburst capable cartridge with the ability of achieving required lethal effects against enemy targets in the open and in defilade while maintaining the capability to defeat unarmored and lightly armored vehicles. FY 2020 funding supports Engineering and Manufacturing Development (EMD) activities including Design Engineering Test (DET) 1, DET 2, Soldier Touch Point (Limited User Evaluation), Family of Weapon Sights - Crew Served (FWS-CS) Integration, and preparation for the contractor down-selection.</p> <p>Project EU6: The XM1113 High Explosive Extended Range Artillery Projectile is a critical munition that supports the Army's modernization priorities in support of the National Defense Strategy. The XM1113 is a government owned materiel solution for long-range cannon artillery projectiles that will attain ranges of 40km in 39 caliber weapon systems and 70km in future systems. The XM1113 will provide 33% increased range over obsolete and aging M549A1 Rocket Assisted Projectile using a larger, modern rocket motor and optimized aerodynamic airframe. The XM1113 will leverage enhanced lethality cannon munition technologies to compensate for increased rocket motor volume. The projectile body is filled with an insensitive munition (IM) high explosive (HE) and a supplementary charge to aid in soldier survivability. FY 2020 funds will support fuze performance evaluation and confirmation with XM1113 for Urgent Materiel Release (UMR) in FY 2021, as well as the continued engineering efforts of the XM1113 maturation in support of a Milestone C in FY 2022.</p> <p>Project EU7: The Enhanced Lethality Cannon Munitions (ELCM) Project will evaluate, develop, and qualify new lethality technologies for 155mm cannon artillery munitions and evaluate their effectiveness in mitigating evolving and derived capability gaps, and support transition to production. The ELCM Project supports testing and assessment of the Israeli Military Industries (IMI) Systems M999 advanced anti-personnel munition and also accelerates the qualification of the 155mm XM1128 High Explosive Projectile including the evaluation of Lithographic Fragmentation Technology (LFT); both of these initiatives support the Army Directed Requirement for a Rapid Bridging Solution for the replacement of the 155mm Dual Purpose Improved Conventional Munition (DPICM). FY 2020 funds will support fuze performance evaluation and confirmation with XM1128, as well as continued Insensitive Munitions (IM) testing, Sequential Environmental Test - Safety (SET-S), and Military Standard</p>		

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	
<p>Environmental Engineering Considerations and Laboratory Tests (MIL-STD-810). Engineering efforts will support the evaluation of the XM1128 test data to determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021.</p> <p>Project EU8: The Improved Multi-Option Fuze Project (MOFA II/iMOFM) is a technology refresh and modernization effort that provides an incremental capability with technology advancements and performance improvements on the current non-precision artillery and mortar ammunition proximity multi-option fuzes that will increase robustness to electronic countermeasures (ECM), eliminates the susceptibility of reverse engineering (RE), incorporates power source advancements, improves delay mode reliability, and integrates safe & arm improvements. This will develop and qualify safe, affordable, reliable Proximity Height of Burst fuzing solutions with robust Defense Exportability Features (DEF) for non-precision conventional Cannon artillery and Mortar munitions that are resistant to adversary exploitation via ECM and RE threats. FY 2020 will support the preparation and incrementing of Engineering and Manufacturing Development (EMD) contracts, the fabrication of MOFA II and iMOFM hardware to conduct developmental verification tests and Product Qualification Tests (PQT), the iMOFM Critical Design Review (CDR), and the preparations for transition into production.</p> <p>Project EW1: The 40mm Low Velocity High Explosive Air Burst (HEAB) is a new capability identified as a Warfighter requirement in the Capability Development Document (CDD), 40mm Low Velocity (LV) Family of Ammunition Annex. The 40mm Low Velocity HEAB tactical cartridge allows the warfighter to engage targets at increased effective ranges using the 40mm M320 Grenade Launcher. The HEAB cartridge provides the grenadier with a higher probability of achieving a first shot kill against enemy personnel, coupled with the ability to defeat personnel targets in defilade positions. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel beyond those offered by the current M433 High Explosive Dual Purpose (HEDP) cartridge. The cartridge provides lethal effects against targets with improved accuracy and greater standoff ranges increasing Soldier Survivability. FY 2020 will support Design Engineering Test (DET) 2 and DET 3 build, Soldier Touch Point (Limited User Evaluation), Test Readiness Reviews (TRRs) and DET 2 Testing.</p> <p>The 40mm Low Velocity (LV) Door Breach (DB), XM1167, cartridge allows the grenadier to conduct a ballistic breach of an existing door to create an entry point into a building or other structure. This capability is critical during Urban Operations, while having stand-off ability to conduct ballistic breach at ranges up to 50 meters away, with a single-shot, and without pause between actual breach and entry of initial force. The 40mm DB cartridge will provide the small unit with the capability to conduct efficient breaching operations; allowing the Warfighter to create an entry point into a structure for an assault element to enter and begin clearing operations, one of the most difficult types of operations that Soldiers may face in an urban environment. The 40mm DB cartridge will reduce collateral damage and friendly casualties associated with breaching operations. The deployment of 40mm Door Breach cartridges will enable the small unit to gain and maintain a tactical advantage through efficiency of combat power and momentum. No funding requested in FY 2020.</p> <p>Project FA6: The 30mm Lethality project funds the development of a suite of 30x173mm caliber cartridges, which includes anti-personnel tactical and training cartridges and anti-materiel tactical and training cartridges as well as Airburst Munition cartridges for Urgent Materiel Release (UMR) and Full Materiel Release (FMR). The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV), Next Generation Combat Vehicle (NGCV), and any Army Fighting Vehicles that are equipped with a 30x173mm weapon system. The tactical cartridges will provide an organic direct fire capability to support infantry at a greater range and will improve lethality when engaging dismounted infantry and light armored vehicles. The training cartridges will be ballistically matched to the tactical cartridges, allowing the Warfighter to train in a cost effective manner. The Airburst munitions will provide the Warfighter with increased lethality against troops in the open, counter defilade and anti-tank guided missiles (ATGM). This project will leverage earlier efforts in support of the Stryker Operational Needs Statement (ONS)</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>
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for Increased Lethality for the 2nd Calvary Regiment (2CR), United States Army Europe (USAREUR) (HQDA ONS 15-20590). FY 2020 funding will support three Design Engineering Tests (DET) and a Design Verification Test (DVT) for the non-airburst 30x173mm suite of ammunition. FY 2020 will also support Milestone B and Engineering and Manufacturing Development (EMD) contract award for the 30x173mm Airburst munition.

Project FL4: Next Generation Squad Weapons (NGSW) Family of Ammunition: The Small Caliber Ammo for Next Gen Squad Weapons project is a critical technology development in response to the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) for the ammunition required to support the rapid prototyping, development, and fielding of the Next Generation Squad Weapons (NGSW) under Section 804 Authority. The objective is to develop and Full Materiel Release (FMR) the new ammunition. The NGSW ammunition is split into two initial variants, the General Purpose (GP) and the Special Purpose (SP). FY 2020 funding supports continuing rapid prototyping/development of the GP projectile, building prototypes and maturing prototypes to provide to the weapon system contractors for performance evaluation, conducting a Critical Design Review (CDR), and conducting prototype testing. FY 2020 also supports continuing rapid prototyping for the SP projectile, conducting a Preliminary Design Review (PDR), conducting an Initial Product Review (IPR), and performing activities to increase prototype capacity to support planned weapon system testing. Follow-on NGSW ammunition types include: tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition. Development efforts on the follow-on NGSW ammunition variants are scheduled to begin in FY 2022. FY 2020 supports initial activities to evaluate potential solutions/prototypes and concepts to satisfy follow-on NGSW ammunition requirements.

Project S36: The Precision Guidance Kit (PGK) is a course correcting fuze that provides precision accuracy and efficiency for current and future 155mm High Explosive (HE) projectiles by eliminating a portion of the inherent errors associated with ballistic firing solutions which effectively reduces the number of projectiles required to execute fire missions. PGK utilizes a Global Positioning System (GPS) receiver and internal Guidance and Navigation Computer to accomplish its mission with point detonating and height of burst fuzing functions. The PGK M1156E1 effort will incorporate and qualify state of the art technologies to increase the functionality of PGK in GPS degraded environments as well as compatibility with the Army's new long range cannon (Extended Range Cannon Artillery (ERCA)) and projectiles which will be fielded during the PGK Life Cycle. PGK Anti-Jam (PGK-AJ) supports future 155mm projectiles and M777 Long Range Cannon (LRC) initiatives and Army Modernization Priorities in support of the National Defense Strategy. FY 2020 funding supports the award of the Engineering and Manufacturing Development (EMD) contract initiating system design and prototype development for PGK Anti-Jam.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	145.232	183.100	153.853	-	153.853
Current President's Budget	144.389	172.744	181.023	-	181.023
Total Adjustments	-0.843	-10.356	27.170	-	27.170
• Congressional General Reductions	-0.119	-0.215			
• Congressional Directed Reductions	-	-10.141			
• Congressional Rescissions	-	-			
• Congressional Adds	4.178	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.781	-			
• SBIR/STTR Transfer	-5.683	-			
• Adjustments to Budget Years	-	-	27.170	-	27.170

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	
<u>Change Summary Explanation</u> FY 2020 increase of \$13.070 million supports the Army's modernization priorities in support of the National Defense Strategy.		

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS
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COST (\$ in Millions)	Prior Years	FY 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
613: MORTAR SYSTEMS	-	17.582	28.071	5.792	-	5.792	1.410	0.000	0.000	0.000	0.000	52.855
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The Fire Control Modernization (FCM) Project funds engineering development of Common / Universal Fire Control Systems applicable to Indirect Fire mortar weapon systems. This includes a modernized digital pointing system that will be integrated with the M120A1 120mm mortar weapon systems, M121 120mm mortar weapon systems, and potentially digitize the M252 81mm mortar weapon systems. FCM will replace the current M67 sight unit and upgrade the M95 and M150 fire control systems with modernized pointing device and mount. The modernized pointing device will enhance responsiveness, survivability, mobility, maintainability, and minimize mortar crew exposure to enemy fire. FCM intends to include the addition of round counting capabilities, muzzle velocity sensing, reduced power draw, streamlined communication, and employ a common fire control software solution across mortar systems. FY 2020 funds will support engineering initiatives and prototyping of fire control line replaceable units (LRU) and software.

The High Explosive Guided Mortar (HEGM) Project funded engineering development of precision guidance systems applicable to Indirect Fire mortar weapon systems. HEGM provides a precision capability to support the close fight in urban and complex terrain, while at the same time, reducing collateral damage. HEGM provides precision accuracy and effectiveness for 120mm mortar systems using precision guidance systems that will effectively reduce target delivery error. The HEGM capability will be developed through the use of improved guidance and control components and advanced airframe design that allow sufficient maneuver of the cartridge in flight to correct for induced error providing the ability to engage targets without the need to adjust fire. The HEGM Project was terminated in FY 2018 with close-out completion in FY 2019.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Fire Control Modernization	2.242	-	5.792	-	5.792
Description: The Fire Control Modernization (FCM) initiatives include a modernized digital pointing system that will be integrated with the M120A1 120mm mortar weapon systems, M121 120mm mortar weapon systems, intends to digitize the M252 81mm mortar weapon systems, and will upgrade the M95 and M150 fire control systems with a modernized pointing device, mount displays and streamlined communications.					
FY 2020 Base Plans: FY 2020 funds will support engineering initiatives and prototyping of fire control line replaceable units (LRU) and software.					
FY 2019 to FY 2020 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) 613 / <i>MORTAR SYSTEMS</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2020 funding increase supports continuation of Fire Control Modernization efforts.					
Title: HEGM Description: Engineering and Manufacturing Development Phase (EMD). FY 2019 Plans: Project continues in the Detailed Design EMD phase. Activities will include System Design Review (SDR) and initiation of Production Prove Out phase. FY 2019 to FY 2020 Increase/Decrease Statement: The HEGM Project was terminated in FY2018 with close-out completion in FY 2019.	15.340	27.042	-	-	-
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	-	1.029	-	-	-
Accomplishments/Planned Programs Subtotals	17.582	28.071	5.792	-	5.792

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
• K99200: <i>Computer Ballistics: LHMBC XM32</i>	12.407	9.513	3.268	0.570	3.838	8.110	7.249	7.242	7.246	0.000	55.605
• K99300: <i>Mortar Fire Control System</i>	46.490	29.149	13.199	15.975	29.174	27.274	8.379	9.699	11.996	0.000	162.161

Remarks
Other Procurement, Army (OPA) Funding

D. Acquisition Strategy
The Fire Control Modernization (FCM) strategy is using the DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives for hardware and software development and will transition into a Federal Acquisition Regulation (FAR) contract for production using Performance Specifications (P-Specs).

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) 613 / <i>MORTAR SYSTEMS</i>
<p>The High Explosive Guided Mortar (HEGM) strategy used a DoD Ordnance Technology Consortium (DOTC) transaction Agreement (OTA) initiative with multiple contractors. The Program was terminated in FY 2018 with close-out completion in FY 2019. The DOTC initiatives will be completed in FY 2019 with guided flight tests of possible solutions and a preliminary design review.</p>		
<p><u>E. Performance Metrics</u> N/A</p>		

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS
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Management Services (\$ in Millions)				FY 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			
Fire Control Modernization - Project Manager Office Support	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.080	0.098	Dec 2017	-		0.150	Nov 2019	-		0.150	0.000	0.328	-
HEGM - Project Manager Office	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	0.575	0.225	Jan 2018	-		-		-		-	0.000	0.800	-
Subtotal			0.655	0.323		-		0.150		-		0.150	0.000	1.128	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			
Fire Control Modernization - Software Development	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		4.142	Nov 2019	-		4.142	0.000	4.142	-
Fire Control Modernization - Development	MIPR	DoD Ordnance Technology Consortium (DOTC) - Inertial Labs : Paeonian Springs, VA	1.100	1.094	Mar 2018	-		1.000	Mar 2020	-		1.000	0.000	3.194	-
HEGM System Engineering Phase 1	MIPR	DoD Ordnance Technology Consortium (DOTC) - General Dynamics OTS : Bothell, WA	4.413	0.831	Feb 2018	-		-		-		-	0.000	5.244	5.163
HEGM System Engineering Phase 1	MIPR	DoD Ordnance Technology	4.413	0.831	Feb 2018	-		-		-		-	0.000	5.244	5.163

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS
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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			
		Consortium (DOTC) - BAE Systems : Nashu, NH													
HEGM System Engineering Phase 1	MIPR	DoD Ordnance Technology Consortium (DOTC) - Orbital ATK : Plymouth, MN	4.413	2.067	Feb 2018	-		-		-		-	0.000	6.480	5.163
HEGM System Development Phase 2	MIPR	DoD Ordnance Technology Consortium (DOTC) - GDOTS : Bothell, WA	-	6.235	Jun 2018	-		-		-		-	0.000	6.235	44.593
HEGM - Fire Control	MIPR	Armament Reasech, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	0.115	0.250	Mar 2018	-		-		-		-	0.000	0.365	-
XM1113 Prototype Hardware	MIPR	DoD Ordnance Technology Consortium : Various	-	-		19.450	Jan 2019	-		-		-	0.000	19.450	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.029		-		-		-	0.000	1.029	-
Subtotal			14.454	11.308		20.479		5.142		-		5.142	0.000	51.383	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			
Fire Control Modernization - ARDEC Engineering Support	MIPR	Armament Reasech, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	0.743	1.050	Dec 2017	-		0.500	Dec 2019	-		0.500	0.000	2.293	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS
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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			
HEGM - ARDEC Engineering Support	MIPR	Armament Reasech, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	1.440	3.218	Dec 2017	-		-		-		-	0.000	4.658	-
XM1113 Software Updates	MIPR	Armament Research, Development, and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		1.750	Feb 2019	-		-		-	0.000	1.750	-
Project Management	MIPR	Armament Research, Development, and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		0.742	Mar 2019	-		-		-	0.000	0.742	-
Subtotal			2.183	4.268		2.492		0.500		-		0.500	0.000	9.443	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			
HEGM - Developmental Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	0.350	1.683	Apr 2018	-		-		-		-	0.000	2.033	-
XM1113 Lethality Testing	MIPR	Naval Surface Warfare Center (NSWC) : Dahlgren, VA	-	-		1.500	Mar 2019	-		-		-	0.000	1.500	-
XM1113 Urgent Materiel Release (UMR) Qualification Testing	MIPR	Army Test and Evaluation Command (ATEC)	-	-		3.600	Mar 2019	-		-		-	0.000	3.600	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS
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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			
		Yuma Proving Ground (YPG) : Yuma, AZ													
Subtotal			0.350	1.683		5.100		-		-		-	0.000	7.133	N/A
Project Cost Totals			17.642	17.582		28.071		5.792		-		5.792	0.000	69.087	N/A

Remarks
 FY 2019 funding from Project 613, MORTAR SYSTEMS, was realigned to Project EU6, 155mm HE Rocket Assist Project Extended Range. Both Projects are within the 0604802A Program Element. This funding will be utilized to complete XM1113 lethality testing, firing tables software updates, development of fuze integration efforts, and development of prototype hardware for qualification in support of the Urgent Materiel Release of 2,000 projectiles in FY 2021 to support the Army's modernization priorities in support of the National Defense Strategy.

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) 613 / MORTAR SYSTEMS

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
Fire Control Modernization																												
FCM- Engineering & Manufacturing Development (EMD)																												
FCM-Software Development																												
FCM- Preliminary Design (SYS Eng Phase 1)																												
FCM- Preliminary Design Review (PDR)																												
FCM- EMD Detailed Design (Sys Dev Phase 2)																												
FCM- Critical Design Review (CDR)																												
HEGM																												
HEGM - Engineering & Manufacturing Development (EMD)																												
HEGM - Preliminary Design (SYS Eng Phase 1)																												
HEGM - Preliminary Design Review (PDR)																												

Note
 Footnote FY18 Carryover funding used to continue WULF efforts due to cut in FY19 funding

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) 613 / <i>MORTAR SYSTEMS</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Fire Control Modernization	1	2020	1	2020
FCM- Engineering & Manufacturing Development (EMD)	1	2018	4	2021
FCM-Software Development	1	2020	4	2021
FCM- Preliminary Design (SYS Eng Phase 1)	1	2020	1	2021
FCM- Preliminary Design Review (PDR)	1	2021	1	2021
FCM- EMD Detailed Design (Sys Dev Phase 2)	2	2021	4	2021
FCM- Critical Design Review (CDR)	4	2021	4	2021
HEGM	1	2018	1	2018
HEGM - Engineering & Manufacturing Development (EMD)	1	2018	4	2019
HEGM - Preliminary Design (SYS Eng Phase 1)	3	2017	4	2018
HEGM - Preliminary Design Review (PDR)	4	2018	4	2018

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EC4 / Non-Standard Simulator Munitions			
COST (\$ in Millions)	Prior Years	FY 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
EC4: Non-Standard Simulator Munitions	-	0.863	3.146	2.644	-	2.644	2.121	2.159	0.000	0.000	0.000	10.933
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project will standardize various pyrotechnics that simulate battlefield effects. The Army's Combat Training Centers (CTCs) are currently using non-standard munitions to replicate both conventional and asymmetric warfare battlefield effects. These modified commercial-off-the-shelf products have not been type classified, material released, and are not safe or sustainable for use by Soldiers. This effort will develop and demonstrate various pyrotechnics/simulators to replicate both conventional and asymmetric warfare battlefield effects such as: Black smoke signature (burning vehicles, buildings, and equipment); Yellow smoke signature (chemical, biological or nuclear effects); Macro pyrotechnics to simulate hostile fire and small Improvised Explosive Devices (IEDs) during mounted operations in urban terrain; Micro pyrotechnics to simulate indoor hostile fire and IED effects that are capable of being integrated into existing facilities; Rocket Propelled Grenade (RPG) on a wire to replicate the flight of a Rocket Propelled Grenade; High Order Blast Effect (HiOBE) used to replicate a Vehicle Borne Improvised Explosive Device (VBIED), building explosions, and other significant explosive events; Artillery airburst (LA45) simulator to replicate indirect fire; simulator to replicate a STINGER (LA47) firing; Tracer Fire-back simulator to replicate enemy small arms fire and anti-aircraft fire. Standardization will reduce training costs, eliminate redundancies between systems, mitigate environmental concerns and safety risks associated with realistic scenario based training.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Standardize Special Use Ammunition	0.863	3.045	2.644	-	2.644
Description: Standardize non-standard pyrotechnic battlefield effects currently used by Combat Training Centers (CTCs) .					
FY 2019 Plans: This project will provide documentation support for Milestone C, Type Classification and Material Release. LA45/A47 adoption memo to transition TDP from the Marines to conduct type Classification/Material Release (TC/MR). Black and Yellow smoke Type Classification/ Full Material Release (TC/FMR). Evaluate the following COTS items:, Macro/Micro, Rocket Propelled Grenade (RPG) on a wire, High Order Blast Effect (HiOBE) and Tracer-Fire back.					
FY 2020 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
This project will support the Engineering Manufacturing and Development (EMD) phases for LA45/47, Black and Yellow smoke to include Energetic Material Qualification (EMQ) testing. Evaluate the following COTs items for environmental and safety considerations: Macro/Micro, RPG on a wire, HiOBE and Tracer-Fire back.					
FY 2019 to FY 2020 Increase/Decrease Statement: Program Requirements have been further defined resulting in more concise funding requirements.					
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	0.863	3.146	2.644	-	2.644

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
• E88404: SIMULATORS, Non-Standard, Special Effects, f/CTCs	-	1.652	0.000	1.699	1.699	1.750	0.283	0.289	0.289	0.000	5.962

Remarks

D. Acquisition Strategy

The Acquisition strategy is for a family of special use ammunition that will be developed in incremental phases as funding and requirements are approved. Milestone Decision Document (MDD) Approval 4th Qtr FY 2018. Initial special use ammunition will be black and yellow smoke munitions followed by new increments that will defeat threats outlined in the requirements documents developed by US Army Training and Doctrine Command (TRADOC).

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EC4 / Non-Standard Simulator Munitions							
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	PM Close Combat Systems : PICATINNY ARSENAL	0.289	-		0.061	Feb 2019	0.031	Feb 2020	-		0.031	0.000	0.381	-
Subtotal			0.289	-		0.061		0.031		-		0.031	0.000	0.381	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
Product Development	C/FFP	ARDEC : PICATINNY ARSENAL	1.134	-		1.384	May 2019	0.800	May 2020	-		0.800	0.000	3.318	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.101		-		-		-	0.000	0.101	-
Subtotal			1.134	-		1.485		0.800		-		0.800	0.000	3.419	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	ARDEC : Picatinny Arsenal	0.802	0.863	Feb 2018	0.600	Feb 2019	1.163	Feb 2020	-		1.163	0.000	3.428	-
Subtotal			0.802	0.863		0.600		1.163		-		1.163	0.000	3.428	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 and Evaluation	MIPR	ARDEC : Picatinny	0.541	-		1.000	Jun 2019	0.650	Jun 2020	-		0.650	0.000	2.191	-
Subtotal			0.541	-		1.000		0.650		-		0.650	0.000	2.191	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army							Date: March 2019				
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EC4 / Non-Standard Simulator Munitions				

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.766	0.863	3.146	2.644	-	2.644	0.000	9.419	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EC4 / Non-Standard Simulator Munitions

Event Name	FY 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 Development Decision Approval Special Use Ammunition Pyrometric MDD	████████████████				████████████████																							
LA 45/47 Transition TDP from Marines	████████████████																											
Energetic Material Qualification Testing Black and Yellow Smoke									████████████████																			
MS C for LA 45/47													▲ 1															
MS C for Black & Yellow Smokes													▲ 2															
Evaluate RPG on a wire, HIOBE, Macro/Micro Pyrotechnics and Tracer-Fireback COTS									████████████████				████████████████															

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EC4 / <i>Non-Standard Simulator Munitions</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Materiel Development Decision Approval Special Use Ammunition Pyrotechnics	1	2018	2	2019
LA 45/47 Transition TDP from Marines	2	2018	3	2019
Energetic Material Qualification Testing Black and Yellow Smoke	1	2020	2	2021
MS C for LA 45/47	2	2021	2	2021
MS C for Black & Yellow Smokes	2	2021	2	2021
Evaluate RPG on a wire, HIOBE, Macro/Micro Pyrotechnics and Tracer-Fireback COTS	3	2019	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge			
COST (\$ in Millions)	Prior Years	FY 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
ED7: Advanced Multipurpose (AMP) Cartridge	-	30.390	21.802	14.100	-	14.100	0.000	0.000	0.000	0.000	0.000	66.292
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The project is not a new start.

A. Mission Description and Budget Item Justification

The Advanced Multi Purpose (AMP) program is a direct fire line of sight 120mm large caliber munition under development for the Abrams Main Battle Tank. AMP has three modes of operation including point detonate, point detonate delay, and airburst. AMP is the materiel solution for breaching double reinforced concrete walls and defeating Anti Tank Guided Missile (ATGM) teams from 50m to 2000m threshold and 50m to 4500m objective, a validated gap that cannot currently be met with existing stockpiled ammunition. In addition to added capability, AMP will also consolidate the capabilities of four existing stockpiled 120mm munitions, thereby addressing the users' battlecary dilemma by allowing them to load a single munition that is capable of defeating multiple targets including ATGM teams, reinforced walls, personnel, light armor, bunkers, and obstacles. The full performance of the AMP is obtained with an Abrams equipped Ammunition Data Link breech modification, the same required by the 120mm M829A4 cartridge that achieved Milestone C in FY 2014 and achieved Full Materiel Release in FY 2015. In FY 2020 the program will transition into Procurement.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Engineering and Manufacturing Development (EMD) Phase 2	29.890	20.064	14.100	-	14.100
Description: Design, develop and test components and cartridges leading to a design freeze. The final design will then be carried forward to Developmental Test and Evaluation (DT&E) qualification testing to demonstrate the cartridge's ability to meet performance requirements prior to production.					
FY 2019 Plans: Continue engineering efforts to further mature the design and conduct testing to verify performance expectations will be met prior to the Critical Design Review (CDR). Begin manufacture of mature long lead components required for the DT&E build and delivery. Initiate efforts in preparation for CDR.					
FY 2020 Base Plans: Engineering Manufacturing Development Phase 2 will continue with the completion of the Developmental Test & Evaluation (DT&E) build, initiation and completion of DT&E which will include Limited User and Live Fire Testing,					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Initial Operation Test Planning, preparation for transition to Low Rate Initial Production at Milestone C, and Milestone C approval. FY 2019 to FY 2020 Increase/Decrease Statement: AMP Program transitioning from RDTE to Procurement in FY 2020					
Title: Evaluation for Future Combat Platforms Description: Evaluation of the scalability for future combat platforms. FY 2019 Plans: Efforts will continue on the evaluation of the scalability for future combat platforms FY 2019 to FY 2020 Increase/Decrease Statement: AMP Program transitioning from RDTE to Procurement in FY 2020	0.500	0.250	-	-	-
Title: Training Round Demonstration Description: Demonstrate feasibility of a training round for AMP FY 2019 Plans: Feasibility of a training round for AMP will be demonstrated. FY 2019 to FY 2020 Increase/Decrease Statement: AMP Program transitioning from RDTE to Procurement in FY 2020	-	0.500	-	-	-
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	-	0.988	-	-	-
Accomplishments/Planned Programs Subtotals	30.390	21.802	14.100	-	14.100

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge

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	
• E88105: CTG, 120MM TANK, HEMP-T, XM1147	-	16.398	0.000	15.002	15.002	39.029	46.941	46.949	44.507	0.000	208.826

Remarks

D. Acquisition Strategy

The AMP Program achieved Milestone B and entered EMD in FY 2015. EMD consists of two phases; Phase 1 awarded two contracts in FY 2015 to competitively prototype. A cartridge demonstration test was conducted and was used to support downselect to a single contractor for EMD Phase 2, which will lead to Milestone C in 2020 followed by two Low Rate Initial Productions in FY 2020 and FY 2021 and one optional year of full procurement in FY 2023. Explore options to increase future competition and facilitate effective training.

E. Performance Metrics

N/A

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				ED7 I Advanced Multipurpose (AMP) Cartridge							
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
Program Manager Maneuver Ammunition Systems (PM-MAS)	Various	Picatinny : NJ	3.497	1.550	Oct 2017	0.624	Dec 2018	0.426	Dec 2019	-		0.426	Continuing	Continuing	Continuing
Northrop Grumman Innovation Systems (NGIS)	C/CPIF	NGIS : Plymouth, MN	54.804	22.188	Nov 2017	5.759	Dec 2018	3.365	Nov 2019	-		3.365	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.988		-		-		-	0.000	0.988	-
Subtotal			58.301	23.738		7.371		3.791		-		3.791	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
Army Research, Development and Engineering Center (ARDEC)	MIPR	Picatinny : NJ	6.361	3.582	Jan 2018	2.565	Feb 2019	1.565	Nov 2019	-		1.565	Continuing	Continuing	Continuing
Subtotal			6.361	3.582		2.565		1.565		-		1.565	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
Yuma Test Center	MIPR	Yuma Proving Ground : AZ	3.923	2.570	Aug 2018	9.931	Jan 2019	7.604	Jan 2020	-		7.604	Continuing	Continuing	Continuing
Aberdeen Test Center	MIPR	Aberdeen Proving Ground : MD	3.756	0.500	Aug 2018	1.935	Jan 2019	1.140	Jan 2020	-		1.140	Continuing	Continuing	Continuing
Subtotal			7.679	3.070		11.866		8.744		-		8.744	Continuing	Continuing	N/A

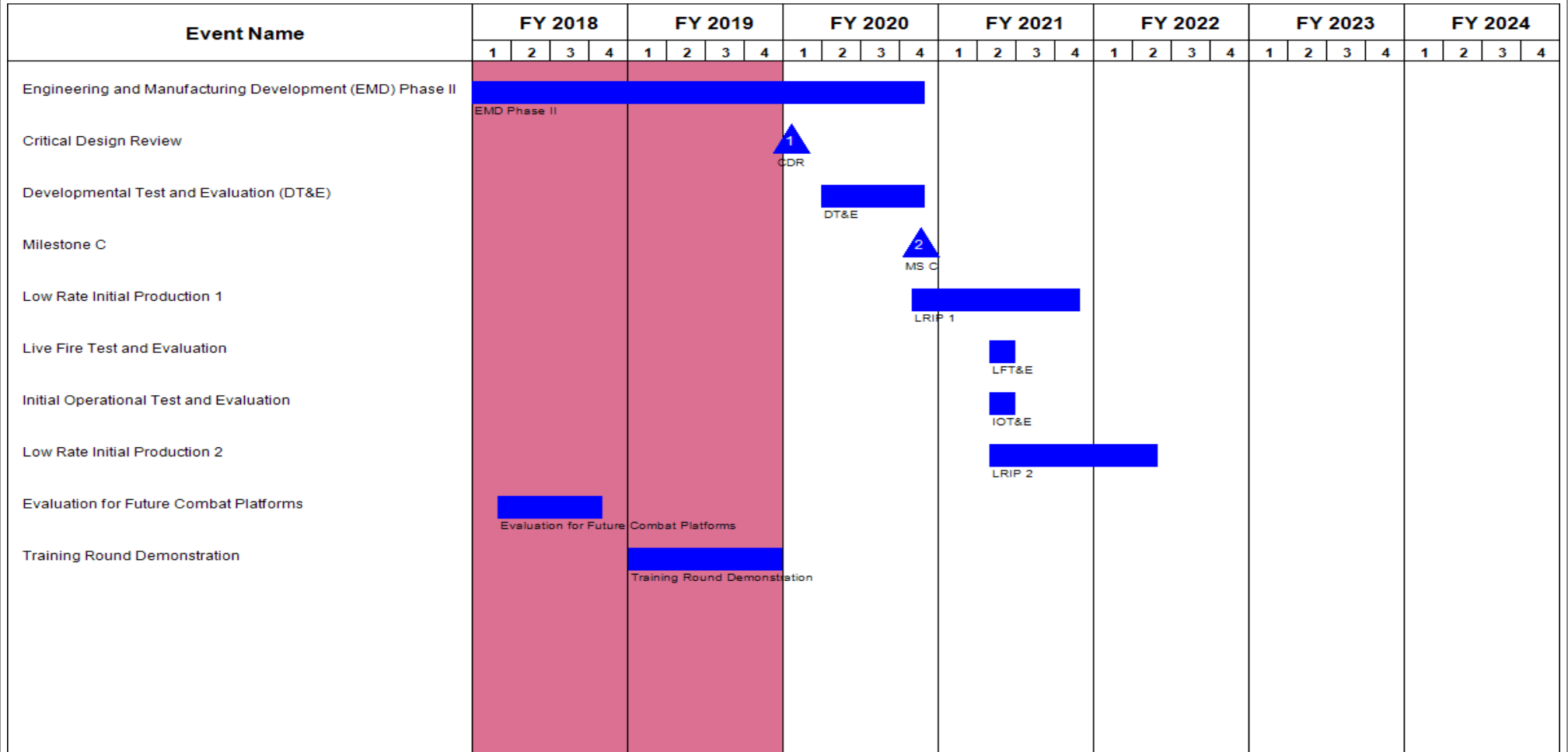
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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge					
	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	72.341	30.390		21.802		14.100		-		14.100	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 / Advanced Multipurpose (AMP) Cartridge



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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) ED7 I Advanced Multipurpose (AMP) Cartridge

Schedule Details

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EL9 / Ammunitions Logistics Prototyping			
COST (\$ in Millions)	Prior Years	FY 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
EL9: Ammunitions Logistics Prototyping	-	0.684	2.014	2.329	-	2.329	1.703	0.705	1.000	1.020	0.000	9.455
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports the future force by improving the distribution, management, reliability and survivability of ammunition through the advanced development, integration, and demonstration of logistics system enablers. These enablers will improve the efficiency and effectiveness of ammunition operations, to include retrograde, while reducing the logistics footprint on the battlefield. Technology areas addressed include handling, distribution, and management (strategic and tactical), prognostics, diagnostics, and asset visibility, explosives safety, and adaptive and environmentally friendly packaging and palletization. The efficient deployment and sustainment of reliable ammunition is vital to success on the battlefield. This project enhances the operational effectiveness of the ammunition logistics system to ensure the distribution of reliable ammunition to the warfighter. FY 2020 funding will be used to continue integrating the munitions health monitoring system with additional ammunition items and conduct qualification tests and continue to integrate passive time/temperature exposure sensors with additional ammunition items and conduct qualification testing.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Munitions Survivability and Logistics Enablers	0.684	1.949	2.329	-	2.329
Description: This program will develop ammunition logistics systems that improve munitions survivability and logistics					
FY 2019 Plans: Integrate the munitions health monitoring system with additional developmental ammunition items and conduct qualification tests. Continue to integrate passive time/temperature exposure sensor with developmental ammunition items and conduct qualification testing.					
FY 2020 Base Plans: Continue to integrate the munitions health monitoring system with additional ammunition items and conduct qualification tests. Continue to integrate passive time/temperature exposure sensor with ammunition items and conduct qualification testing.					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding is slightly higher than FY 2019 due to anticipated increase in labor costs.					
Title: FY 2019 SBIR/STTR Transfer	-	0.065	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<i>Description:</i> FY 2019 SBIR/STTR Transfer					
<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	0.684	2.014	2.329	-	2.329

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

N/A

Remarks

D. Acquisition Strategy

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

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping
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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			
Contractor	C/FFP	Karagozian & Case : Glendale, CA	-	0.534	Aug 2018	0.750	Feb 2019	1.629	Dec 2019	-		1.629	0.000	2.913	-
Subtotal			-	0.534		0.750		1.629		-		1.629	0.000	2.913	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			
ARDEC	MIPR	Picatinny Arsenal : NJ	0.102	0.150	Jun 2018	0.614	Dec 2018	0.400	Dec 2019	-		0.400	0.000	1.266	-
Subtotal			0.102	0.150		0.614		0.400		-		0.400	0.000	1.266	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			
Operational Testing - RRAPDS	RO	Yuma Prooving Ground : Yuma Arizona	-	-		0.650	Mar 2019	0.300	Mar 2020	-		0.300	0.000	0.950	-
Subtotal			-	-		0.650		0.300		-		0.300	0.000	0.950	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		0.102	0.684	2.014	2.329	-	2.329	0.000	5.129	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev		Project (Number/Name) EL9 / Ammunitions Logistics Prototyping	

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

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EL9 / Ammunitions Logistics Prototyping

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
System Development - Munitions Health Monitoring System	2	2018	4	2023
System Development - Low Cost Thermal Indicator	3	2017	2	2023
System Development - Plastic Cylindrical Container	1	2021	4	2022
System Development - Plastic Rectangular Container	1	2021	4	2023
System Development - Next Generation Temperature/Humidity Sensor	2	2019	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP2 / Shoulder-Launched Munitions			
COST (\$ in Millions)	Prior Years	FY 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
EP2: <i>Shoulder-Launched Munitions</i>	-	3.000	0.000	4.100	-	4.100	10.400	0.000	0.000	0.000	0.000	17.500
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The Individual Assault Muniton effort is a new start in FY 2020.

A. Mission Description and Budget Item Justification

Project EP2, Shoulder-Launched Munitions: This project previously funded the one-time acceleration of the Tandem Warhead type classification and completion of development and testing for use in the Shoulder Launched AT-4 Single-use 84mm Anti-Tank Weapon. The AT-4 Tandem Warhead provides a single shot solution with increased lethality for infantry crew formations against anti-armor and to defeat hardened structures. The AT-4 effort was part of the Secretary of Defense's Close Combat Lethality task force.

The Individual Assault Muniton (IAM) will be a lightweight Shoulder Launched Muniton (SLM) capability for combat units at the individual Soldier level. As an improvement over existing Shoulder Launched Munitions, the solution will allow Soldiers to conduct Urban Operations with an ability to defeat the enemy protected by a variety of field expedient, structural and lightly armored vehicles. This solution will be effective day or night at close ranges with an ability to safely engage targets from within enclosures using single hearing protection. This solution will combine the capability of multiple existing shoulder-launched munitions which will allow for reduced Soldier load, training complexity and logistics burden for Light Infantry, Combat Engineers and Special Operations Forces. FY 2020 funding will provide the Army the opportunity to evaluate various prototype munitions to achieve emerging increased capability as an Individual Assault Muniton. The Individual Assault Muniton Capabilities Development Document (CDD) was approved on 11 March 2016.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Individual Assault Muniton (IAM)	-	-	4.100	-	4.100
FY 2020 Base Plans: FY 2020 funding support the Shoulder Launched Munitions team to evaluate and develop system technology advancements to ensure the soldier has increased capabilities to engage targets at close ranges within enclosures.					
FY 2019 to FY 2020 Increase/Decrease Statement: This is a new start in FY 2020.					
Title: Shoulder Launched AT-4 Single Use 84mm Anti-tank Weapon	3.000	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP2 / <i>Shoulder-Launched Munitions</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Accomplishments/Planned Programs Subtotals	3.000	-	4.100	-	4.100

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

N/A

Remarks

D. Acquisition Strategy

The Individual Assault Munition (IAM) acquisition strategy is to conduct market research on draft Capability Production Document (CPD) requirements for developing product improvements such as making the system lighter with more anti armor protection capabilities. These improvements will then be incorporated into the technical data package for future procurements.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev					Project (Number/Name) EP2 / Shoulder-Launched Munitions					
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
Dept of Defense Ordnance Technology Consortium (DOTC)	MIPR	DOTC : Picatinny Arsenal, NJ	-	3.000		-		3.400	Mar 2020	-		3.400	0.000	6.400	-
Subtotal			-	3.000		-		3.400		-		3.400	0.000	6.400	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 Support of Items in Production (ESIP)	MIPR	ARDEC : Picatinny Arsenal, NJ	-	-		-		0.700	Dec 2019	-		0.700	0.000	0.700	-
Subtotal			-	-		-		0.700		-		0.700	0.000	0.700	N/A
Project Cost Totals			-	3.000		0.000		4.100		-		4.100	0.000	7.100	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP2 / Shoulder-Launched Munitions

Event Name	FY 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 IN SUPPORT OF ITEMS IN PRODUCTION (ESIP)													ENGINEERING IN SUPPORT OF ITEMS IN PRODUCTION (ESIP)															
DOD DEFENSE ORDNANCE TECHNOLOGY CONSORTIUM AWARD 1 & 2													▲ 1															
PROTOTYPE HARDWARE BUILD																	PROTOTYPE HARDWARE BUILD											
GOVERNMENT RANGE TESTING																					■							
CRITICAL DESIGN REVIEW																					▲ 2							
HARDWARE BUILD																					HARDWARE BUILD							
TEST EVALUATION																									■			
MS C / TYPE CLASSIFICATION DOCUMENTATION																									■			
MS C / TYPE CLASSIFICATION DECISION																									▲ 3			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP2 / Shoulder-Launched Munitions

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ENGINEERING IN SUPPORT OF ITEMS IN PRODUCTION (ESIP)	1	2021	1	2022
DOD DEFENSE ORDNANCE TECHNOLOGY CONSORTIUM AWARD 1 & 2	2	2020	2	2020
PROTOTYPE HARDWARE BUILD	2	2020	3	2020
GOVERNMENT RANGE TESTING	3	2020	4	2020
CRITICAL DESIGN REVIEW	3	2021	3	2021
HARDWARE BUILD	3	2021	1	2022
TEST EVALUATION	2	2022	3	2022
MS C / TYPE CLASSIFICATION DOCUMENTATION	3	2022	4	2022
MS C / TYPE CLASSIFICATION DECISION	4	2022	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber			
COST (\$ in Millions)	Prior Years	FY 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
EP3: <i>Reduced Range Ammunition - Small Caliber</i>	-	0.000	2.470	8.376	-	8.376	15.000	15.250	13.200	0.000	0.000	54.296
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber Reduced Range technology applies to multiple calibers. The effort under Budget Activity 04, Program Element (PE) 0603639A, Project EL7, Reduced Range Ammunition (RRA), transitions in FY 2019 to Budget Activity 05, PE 0604802A, Project EP3, Reduced Range Ammunition - Small Caliber. PE 0604802A, Project EP3, RRA funding continues the development work of 7.62mm and supports Engineering and Manufacturing Development (EMD) in FY 2019 and the .50 Caliber EMD effort beginning in FY 2020. RRA technologies will be assessed for adaptability to the new Next Generation Squad Weapons (NGSW) ammunition; which will be further developed and fielded under a separate funding line in the future.

A. Mission Description and Budget Item Justification

The small caliber Reduced Range Ammunition (RRA) Project is a critical technology development in response to the 7.62mm and .50 caliber Capabilities Development Documents (CDD). The overall objective of RRA is to provide training ammunition suitable for use on military installations with Surface Danger Zone (SDZ) restrictions. The relatively long maximum range of the 7.62mm and .50 caliber service ammunition poses challenges on training ranges in range restricted areas. RRA will mitigate a training gap on installations by providing a materiel solution that meets training needs while shortening and condensing the SDZ. This will allow soldiers to train with 7.62mm and .50 caliber weapons on restricted ranges. The RRA cartridge design will be compatible with all Army 7.62mm and .50 caliber weapons, but specifically optimized to work in the M240 and M2 Machine Guns. FY 2020 funding supports continuing Engineering and Manufacturing Development (EMD) efforts and performing design/verification testing on the 7.62mm variant. FY 2020 funds also support Milestone (MS) B activities to include Preliminary Design Review (PDR) and Engineering and Manufacturing Development (EMD) Contract Award for the .50 caliber variant. FY 2020 funds also supports RRA concept development/evaluation for the Next Generation Squad Weapon (NGSW) systems.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Engineering and Manufacturing Development 7.62mm	-	2.391	3.500	-	3.500
Description: Engineering and Manufacturing Development (EMD) Activities for 7.62mm Reduced Range Ammunition.					
FY 2019 Plans: FY 2019 activities will include various Milestone B activities for 7.62mm to include Industry Day, release Request for Proposal (RFP), perform a System Functional Review, conduct bid sample testing in support of contract					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
award for Engineering and Manufacturing Development (EMD), and conduct a Preliminary Design Review (PDR). FY 2020 Base Plans: Continue EMD efforts and perform 7.62mm RRA design review and qualification testing. FY 2019 to FY 2020 Increase/Decrease Statement: Planned increase for 7.62mm EMD contract efforts.					
Title: Engineering and Manufacturing Development .50 Caliber Description: Engineering and Manufacturing Development (EMD) Activities for .50 Cal Reduced Range Ammunition. FY 2020 Base Plans: Continue EMD efforts and perform .50 Cal RRA Preliminary Design Review (PDR) and qualification testing. FY 2019 to FY 2020 Increase/Decrease Statement: Planned EMD contract award for the .50 Cal RRA effort.	-	-	4.676	-	4.676
Title: NGSW Reduced Range Technology Evaluation Description: Concept development/evaluation of RRA ammunition for the Next Generation Squad Weapons. FY 2020 Base Plans: Explore/evaluate RRA ammunition concepts for the NGSW. FY 2019 to FY 2020 Increase/Decrease Statement: Begin exploring RRA ammunition solutions for the new NGSW.	-	-	0.200	-	0.200
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	-	0.079	-	-	-
Accomplishments/Planned Programs Subtotals	-	2.470	8.376	-	8.376

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber
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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>
• EL7: <i>Reduced Range Ammunition</i>	3.429	7.609	0.000	-	0.000	-	-	-	-	0.000	11.038

Remarks

Budget Activity 05, Program Element 0604802A, Project EP3, Reduced Range Ammunition transitioned from Budget Activity 04, PE 0603639A, Project EL7, RRA in FY 2019 for the 7.62mm variant. The .50 Caliber variant transitions in FY 2020.

D. Acquisition Strategy

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

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber
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Product Development (\$ in Millions)				FY 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 Contract 7.62mm	Option/CPFF	OLIN Winchester Corporation : Oxford, MS	-	-		0.855	Jan 2019	1.550	Jan 2020	-		1.550	Continuing	Continuing	Continuing
Development Contract .50 Cal	C/CPFF	To be Determined : To be Determined	-	-		-		2.500	Jan 2020	-		2.500	Continuing	Continuing	Continuing
NGSW RRA Concept Evaluation	MIPR	Armament Research Development and Engineering Center (ARDEC) : New Jersey	-	-		-		0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing
Prototype Development	Option/CPAF	Booz Allen Hamilton : Dover, NJ	-	-		0.103	Nov 2018	-		-		-	0.000	0.103	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.079		-		-		-	0.000	0.079	-
Subtotal			-	-		1.037		4.250		-		4.250	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) 7.62mm	MIPR	Picatinny Arsenal : New Jersey	-	-		0.950	Oct 2018	1.250	Oct 2019	-		1.250	Continuing	Continuing	Continuing
Armament Research Development and Engineering Center (ARDEC) .50 Cal	MIPR	Picatinny Arsenal : New Jersey	-	-		-		1.750	Oct 2019	-		1.750	Continuing	Continuing	Continuing
Subtotal			-	-		0.950		3.000		-		3.000	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army	Date: March 2019
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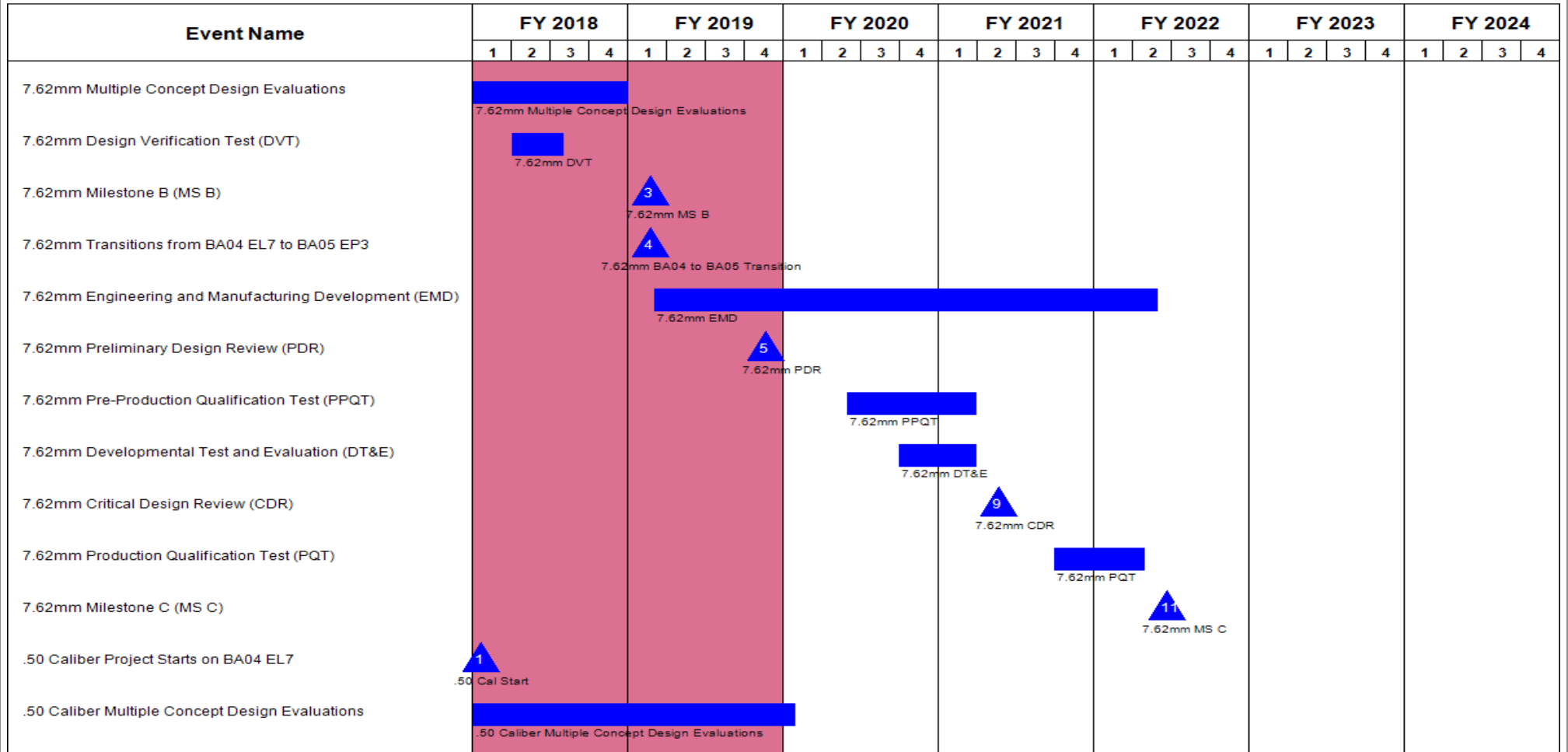
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber
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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 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			
Engineering Tests 7.62mm	MIPR	U.S. Army Test Center : Aberdeen, Maryland	-	-		0.483	Oct 2018	0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing
Engineering Tests .50 Cal	MIPR	Aberdeen Test Center : Aberdeen, Maryland	-	-		-		0.626	Oct 2019	-		0.626	Continuing	Continuing	Continuing
Subtotal			-	-		0.483		1.126		-		1.126	Continuing	Continuing	N/A
Project Cost Totals			-	-		2.470		8.376		-		8.376	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP3 / Reduced Range Ammunition - Small Caliber



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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP3 / <i>Reduced Range Ammunition - Small Caliber</i>

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 Materiel Development Decision (MDD)	▲ 2 .50 Cal MDD																											
.50 Caliber Design Verification Test (DVT)					■ .50 Cal DVT																							
.50 Caliber Milestone B (MS B)									▲ 6 .50 Cal MS B																			
.50 Caliber Transitions from BA04 EL7 to BA05 EP3									▲ 7 .50 Cal BA04 to BA05 Transition																			
.50 Caliber Engineering and Manufacturing Development (EMD)									■ .50 Cal EMD																			
.50 Caliber Preliminary Design Review (PDR)									▲ 8 .50 Cal PDR																			
.50 Caliber Pre-Production Qualification Test (PPQT)									■ .50 Cal PPQT																			
.50 Caliber Critical Design Review (CDR)													▲ 10 .50 Cal CDR															
.50 Caliber Production Qualification Test (PQT)																	■ .50 Cal PQT											
.50 Caliber Milestone C (MS C)																									▲ 12 .50 Cal MS C			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP3 / <i>Reduced Range Ammunition - Small Caliber</i>

Schedule Details

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

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP3 / <i>Reduced Range Ammunition - Small Caliber</i>		

Events	Start		End	
	Quarter	Year	Quarter	Year
.50 Caliber Milestone C (MS C)	2	2023	2	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo			
COST (\$ in Millions)	Prior Years	FY 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
EP4: One-Way Luminescence for Small Caliber Ammo	-	0.000	6.077	8.547	-	8.547	12.391	5.387	6.500	3.000	0.000	41.902
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber One Way Luminescence (OWL) technology applies to multiple calibers. In FY 2019, Budget Activity 4 Program Element (PE) 0603639A, Project EB8, 7.62mm OWL transitions to Budget Activity 5 (BA5) PE 0604802A, Project EP4, 7.62mm OWL. OWL technologies will be assessed for adaptability to the new Next Generation Squad Weapons (NGSW) ammunition; which will be further developed and fielded under a separate funding line in the future.

A. Mission Description and Budget Item Justification

The One Way Luminescence (OWL) project is a critical technology development in response to the 7.62mm and 5.56mm Families of Ammunition Capabilities Development Documents (CDD) and .50 Caliber Munitions CDD. Current small caliber ammunition tracer rounds are a pyrotechnic tracer mix which allows enemy forces to see the trace round and track its trajectory back to the shooter. The OWL projects objective is to develop and field a full day/night tracer round, replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability. 7.62mm is the immediate focus followed by 5.56mm OWL cartridges and later followed by .50 Caliber cartridges and Next Generation Squad Weapons (NGSW) ammunition. FY 2020 funding will support continuing Engineering and Manufacturing Development (EMD) efforts, conducting a Critical Design review (CDR), performing development tests, and a User Assessment (UA) for the 7.62mm variant. FY 2020 also supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NSGW.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Engineering and Manufacturing Development (EMD)	-	5.855	8.347	-	8.347
Description: Engineering and Manufacturing Development (EMD) efforts for the 7.62mm variant followed by OWL tracer solutions for .50 Caliber weapons.					
FY 2019 Plans: FY 2019 activities supports EMD and early manufacturing efforts with the 7.62mm OWL design. 7.62mm designs will undergo Verification Testing, Preliminary Design Review (PDR), and a User Assessment (UA).					
FY 2020 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue Engineering and Manufacturing Development (EMD) efforts, conduct a Critical Design review (CDR), perform development tests, and a User Assessment (UA) for the 7.62mm OWL ammunition. Evaluate OWL prototypes/concepts ammunition for .50 Caliber Weapons. FY 2019 to FY 2020 Increase/Decrease Statement: Planned EMD contract.					
Title: Prototype and Concept Evaluation for Next Generation Squad Weapons (NGSW) Description: Supports concept development/evaluation of OWL tracer solutions for .50 Caliber weapons and NGSW. FY 2020 Base Plans: Evaluate OWL prototypes/concepts ammunition for the Next Generation Squad Weapons (NGSW). Assess OWL technologies for potential to adapt the technology into the NGSW ammunition. FY 2019 to FY 2020 Increase/Decrease Statement: Planned assessment of OWL technologies.	-	-	0.200	-	0.200
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	-	0.222	-	-	-
Accomplishments/Planned Programs Subtotals	-	6.077	8.547	-	8.547

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
• EB8: OWL for Small Caliber Ammunition	4.097	2.174	2.000	-	2.000	-	-	-	-	0.000	8.271

Remarks
One Way Luminescence (OWL) is a new tracer technology that will be applied to multiple calibers. The initial focus was on 7.62mm ammunition in FY 2015 followed by 5.56mm in FY 2018; and later followed by the .50 Caliber and NGSW ammunition. As the technology matures the effort transitions from Budget Activity 4 (BA4) Program Element 0603639A, Project EB8 to Budget Activity 5 (BA5) Program Element 0604802A, Project EP4 in FY 2019 for 7.62mm, and FY 2021 for 5.56mm. The

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP4 / <i>One-Way Luminescence for Small Caliber Ammo</i>

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>
OWL cartridge will be compatible with all Army Small Caliber weapon systems, but optimized for Machine Guns and will provide improved lethality/target effects over the current tracer munition.											

D. Acquisition Strategy

The OWL concept will be developed through Government and Industry prototyping efforts. A Technology Readiness Assessment (TRA) was conducted in FY 2015 and FY 2016 to measure the progress of the designs. The FY 2017 and FY 2018 TRAs were conducted to evaluate the industry and Government concepts in order to proceed with the 7.62mm Engineering and Manufacturing Development (EMD). The 5.56mm, NGSW, and .50 Caliber cartridges will follow the 7.62mm schedule with Engineering and Manufacturing Development (EMD) starting in FY 2021 for the 5.56mm variant. The new tracer cartridges will replace legacy tracers in each of the various small caliber configurations.

E. Performance Metrics

N/A

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP4 / One-Way Luminescence for Small Caliber Ammo							
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
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	-	-		0.028	Oct 2018	0.027	Oct 2019	-		0.027	Continuing	Continuing	Continuing
EMD Contractor # 1	Option/CPFF	General Dynamics : Florham Park, NJ	-	-		1.300	Jan 2019	2.100	Jan 2020	-		2.100	Continuing	Continuing	Continuing
EMD Contractor # 2	Option/CPFF	Nammo Tally : Mesa, AZ	-	-		1.300	Jan 2019	2.100	Jan 2020	-		2.100	Continuing	Continuing	Continuing
OWL Manufacturing Tooling Development	Option/CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	-		0.206	Nov 2018	-		-		-	0.000	0.206	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.222		-		-		-	0.000	0.222	-
Subtotal			-	-		3.056		4.227		-		4.227	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
Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	-	-		1.716	Oct 2018	2.070	Oct 2019	-		2.070	Continuing	Continuing	Continuing
Subtotal			-	-		1.716		2.070		-		2.070	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
U.S. Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	-	-		0.650	Oct 2018	1.250	Oct 2019	-		1.250	Continuing	Continuing	Continuing

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

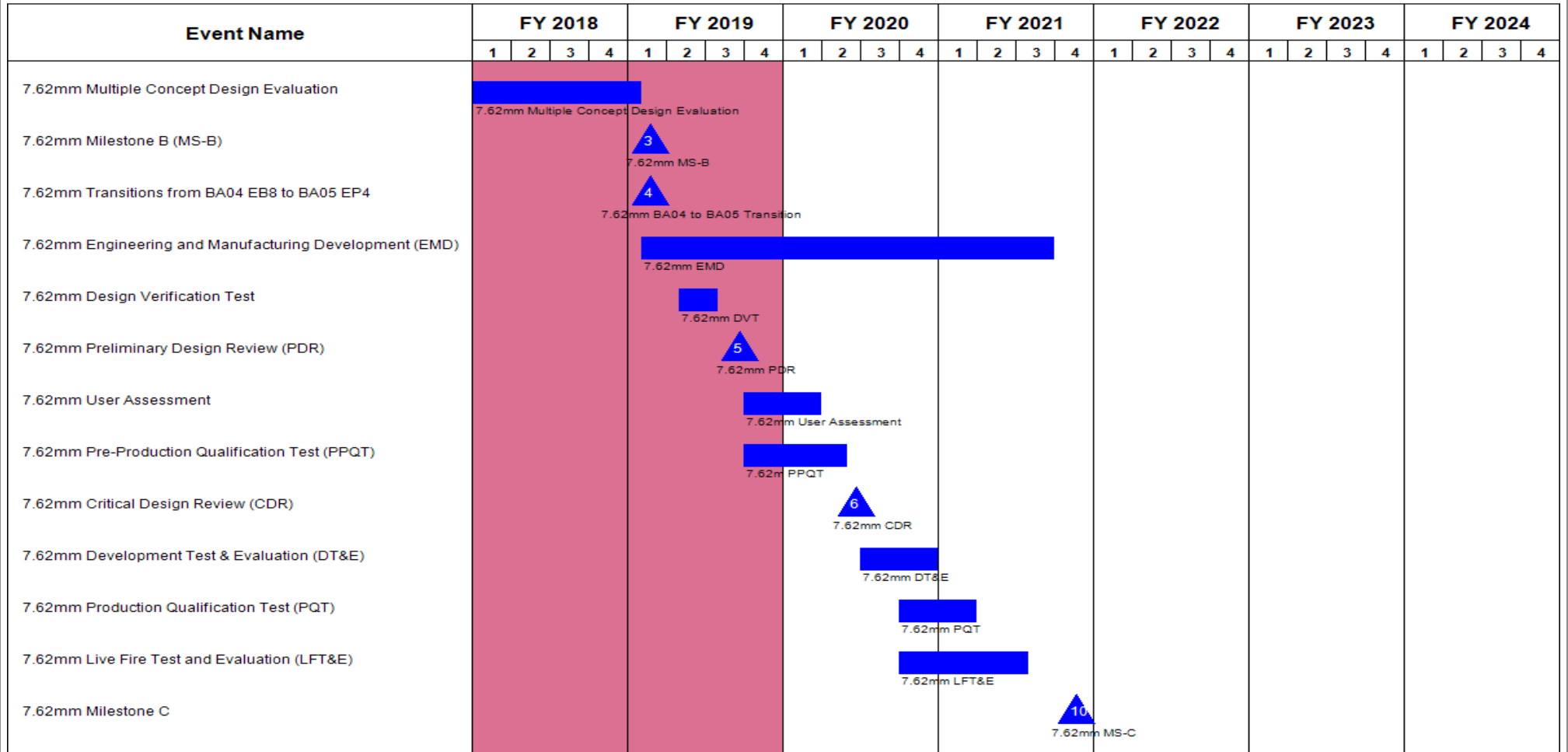
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo
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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		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			
Independent Testing	MIPR	Joint Munitions Command/ Bullet Suuply Organization : Lake City, MO	-	-		0.035	Oct 2018	-		-		-	0.000	0.035	-
User Evaluation	MIPR	US Army Maneuver Battle Labs : Fort Benning, GA	-	-		0.400	Oct 2018	-		-		-	0.000	0.400	-
Development Testing & Evaluation	TBD	To Be Determined : To Be Determined	-	-		-		1.000	Oct 2019	-		1.000	Continuing	Continuing	Continuing
Radar Testing	MIPR	US Army Research Lab : Aberdeen, MD	-	-		0.200	Oct 2018	-		-		-	0.000	0.200	-
Tracer Testing	MIPR	US Army Night Vision Lab : Aberdeen, MD	-	-		0.020	Oct 2018	-		-		-	0.000	0.020	-
Subtotal			-	-		1.305		2.250		-		2.250	Continuing	Continuing	N/A
Project Cost Totals			-	-		6.077		8.547		-		8.547	Continuing	Continuing	N/A

Remarks

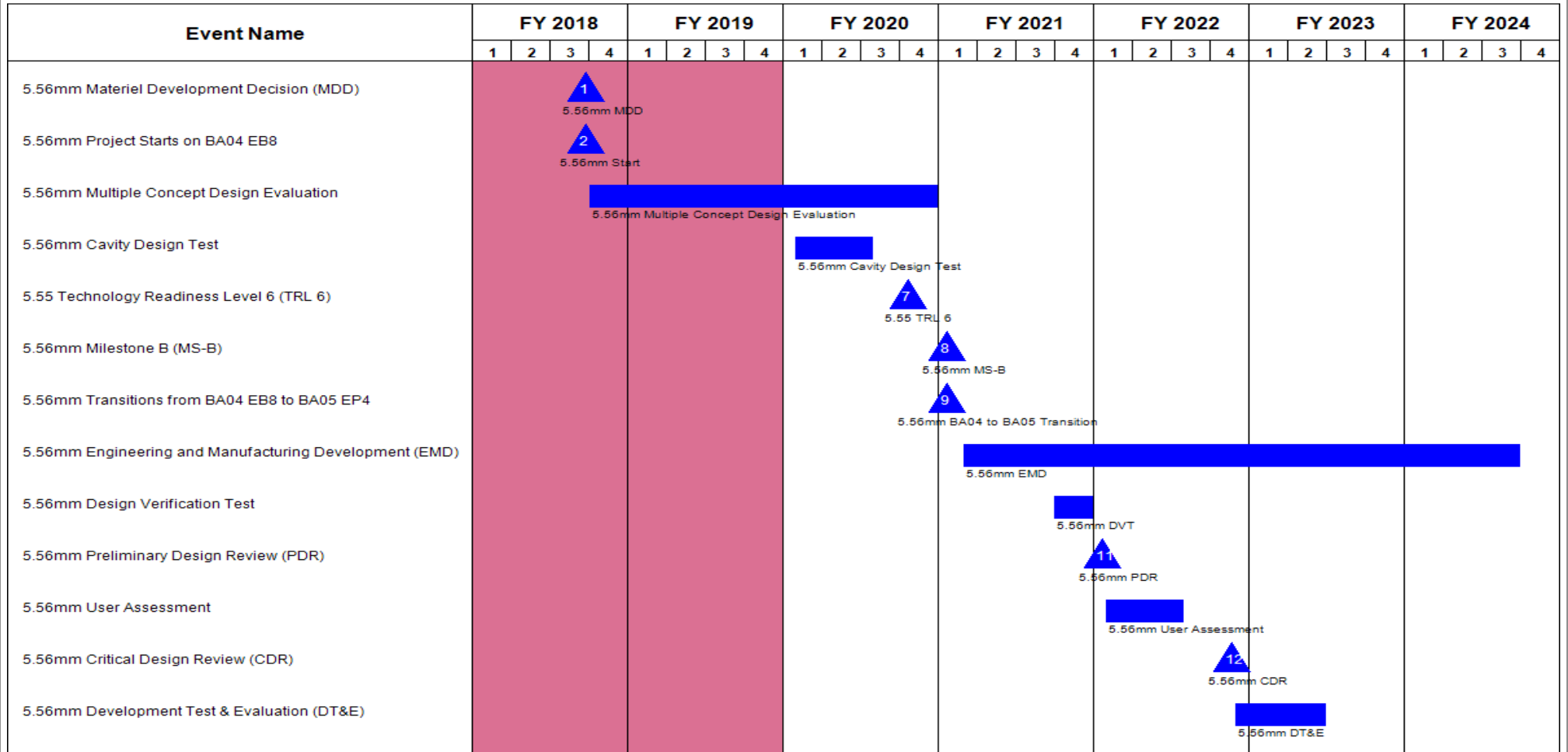
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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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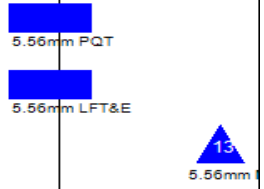
Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP4 / One-Way Luminescence for Small Caliber Ammo



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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP4 / <i>One-Way Luminescence for Small Caliber Ammo</i>

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
5.56mm Production Qualification Testing (PQT)																												
5.56mm Live-Fire Test and Evaluation (LFT&E)																												
5.56mm Milestone C (MS-C)																												
NGSW & .50 caliber Concept Design Evaluation																												



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

Events	Start		End	
	Quarter	Year	Quarter	Year
7.62mm Multiple Concept Design Evaluation	1	2015	1	2019
7.62mm Milestone B (MS-B)	1	2019	1	2019
7.62mm Transitions from BA04 EB8 to BA05 EP4	1	2019	1	2019
7.62mm Engineering and Manufacturing Development (EMD)	1	2019	3	2021
7.62mm Design Verification Test	2	2019	3	2019
7.62mm Preliminary Design Review (PDR)	3	2019	3	2019
7.62mm User Assessment	4	2019	1	2020
7.62mm Pre-Production Qualification Test (PPQT)	4	2019	2	2020
7.62mm Critical Design Review (CDR)	2	2020	2	2020
7.62mm Development Test & Evaluation (DT&E)	3	2020	4	2020
7.62mm Production Qualification Test (PQT)	4	2020	1	2021
7.62mm Live Fire Test and Evaluation (LFT&E)	4	2020	3	2021
7.62mm Milestone C	4	2021	4	2021
5.56mm Materiel Development Decision (MDD)	3	2018	3	2018
5.56mm Project Starts on BA04 EB8	3	2018	3	2018
5.56mm Multiple Concept Design Evaluation	4	2018	4	2020
5.56mm Cavity Design Test	1	2020	3	2020
5.55 Technology Readiness Level 6 (TRL 6)	4	2020	4	2020
5.56mm Milestone B (MS-B)	1	2021	1	2021
5.56mm Transitions from BA04 EB8 to BA05 EP4	1	2021	1	2021
5.56mm Engineering and Manufacturing Development (EMD)	1	2021	3	2024
5.56mm Design Verification Test	4	2021	4	2021

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

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

Note

As the technology matures, the One Way Luminescence (OWL) projects transitions from Budget Activity 4 (BA4) PE 0603639A, Project EB8 to Budget Activity 5 (BA5) PE 0604802A, Project EP4.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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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
EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	-	13.318	16.748	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	30.066
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The small caliber Advanced Armor-Piercing (ADVAP) technology applies to multiple calibers. In FY 2017, Program Element (PE) 0603639A, Project EC2, Adv Armor-Piercing (ADVAP) for Small Cal Ammo transitioned to PE 0604802A, Project EP5, Adv Armor-Piercing (ADVAP) for Small Cal Ammo for development of the 7.62mm ammunition. The follow-on effort for ADVAP ammunition calibers below 7.62mm begins in FY 2019. In FY 2020, PE 0604802A, Project EP5, Adv Armor-Piercing (ADVAP) for Small Cal Ammo transitions to PE 0604802A, Project FL4, Small Caliber Ammo for Next Gen Squad Weapons (NGSW) to continue development efforts on ADVAP ammunition for the NGSW.

A. Mission Description and Budget Item Justification

Advanced Armor-Piercing (ADVAP): The ADVAP project is a critical technology development in response to the 7.62mm and 5.56mm Family of Ammunition Capabilities Development Documents (CDD). The nomenclature for the 7.62mm ADVAP is XM1158. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm. The ADVAP ammunition in calibers below 7.62mm for the Next Generation Squad Weapons is referred to as the Special Purpose ammunition. The objective is to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. No funding requested in FY 2020.

Next Generation Squad Weapon (NGSW) Family of Ammunition: The NGSW ammo is a new ammunition technology under development for use in the Next Generation Squad Weapon systems. The objective is to develop and Full Materiel Release (FMR) the new ammunition. No funding requested in FY 2020.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: 7.62mm Engineering & Manufacturing Development (EMD)	13.318	11.978	-	-	-
Description: Develop, demonstrate, and qualify XM1158 Small Caliber Ammunition 7.62mm Advanced Armor Piercing (ADVAP) cartridges in order to defeat threat targets and provide overmatch capability versus a broad spectrum of hard targets.					
FY 2019 Plans: FY 2019 efforts will focus on continuing the support of Engineering and Manufacturing Development (EMD) activities such as Developmental Testing and Evaluation (DT&E). FY 2019 also includes an Urgent Materiel					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Release (UMR) to accelerate the fielding of the 7.62mm ADVAP cartridge and preparation for an accelerated Milestone C accomplishment at the end of FY 2019. FY 2019 to FY 2020 Increase/Decrease Statement: The project has a planned Milestone C in FY 2019. No RDTE funding in FY 2020 because the project transitions to production.					
Title: NGSW Rapid Prototyping and Development Description: Develop, demonstrate, and qualify new ammunition for the Next Generation Squad Weapon (NGSW) systems. FY 2019 Plans: Begin rapid prototyping/development efforts on the General Purpose (GP) projectile for the Next Generation Squad Weapons (NGSW), build and evaluate concepts/prototypes, conduct Initial Product Reviews (IPRs), and perform activities to prepare for the Preliminary Design Review (PDR) and Prototype Testing planned in FY 2020. FY 2019 to FY 2020 Increase/Decrease Statement: The effort transitions to PE 0604802A / Project FL4 in FY 2020.	-	4.019	-	-	-
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	-	0.751	-	-	-
Accomplishments/Planned Programs Subtotals	13.318	16.748	-	-	-

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
• EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	3.755	6.821	-	6.821	-	-	-	-	0.000	10.576
• F57510: CTG, 7.62mm Advanced Armor Piercing, XM1158	-	25.000	0.000	21.013	21.013	22.984	25.682	25.692	-	0.000	120.371

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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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
• FL4: <i>Small Caliber Ammo for Next Gen Squad Weapons</i>	-	-	22.880	-	22.880	30.630	28.750	25.000	11.750	0.000	119.010

Remarks

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

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

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

D. Acquisition Strategy

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

Next Generation Squad Weapon (NGSW) Family of Ammunition: The Next Generation Squad Weapon (NGSW) ammunition program will utilize rapid prototyping acquisition strategy under Section 804 Authority to develop ammunition concepts/designs for the General Purpose (GP) variant and the Special Purpose (SP) variant. Contractors will be funded to rapidly develop projectile designs/concepts with a final down-select to one design prior to Urgent Material Release (UMR) in FY 2022. Follow-on development efforts for additional NGSW ammunition variants including tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition will start in FY 2022.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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Product Development (\$ in Millions)				FY 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			
ADVAP Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	0.190	0.230	Oct 2017	0.048	Oct 2018	-		-		-	0.000	0.468	-
ADVAP Raw Materials	Various	Various : New Jersey	3.196	1.812	Mar 2018	2.622	Jan 2019	-		-		-	0.000	7.630	-
ADVAP Facilitization and Prototyping	MIPR	Picatinny Arsenal : New Jersey	1.142	1.200	Mar 2018	1.200	Jan 2019	-		-		-	0.000	3.542	4.900
NGSW Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	-	-		0.028	Oct 2018	-		-		-	0.000	0.028	-
NGSW Rapid Prototyping Contract (Vendor 1)	C/CPFF	Northrop Grumman Innovation Systems : Independence, MO	-	-		2.564	Jan 2019	-		-		-	0.000	2.564	-
NGSW Rapid Prototyping Contract (Vendor 2)	C/CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	-		1.151	Jan 2019	-		-		-	0.000	1.151	-
Prototype Packaging Development	Option/CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	0.284	Mar 2018	-		-		-		-	0.000	0.284	-
Packaging Components	Option/FFP	OLIN Winchester Corporation : Oxford, MS	-	0.438	Apr 2018	-		-		-		-	0.000	0.438	-
Propellant Dvelopment	Option/CPFF	St. Marks Powder : Summerville, SC	-	0.083	Oct 2017	-		-		-		-	0.000	0.083	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.751		-		-		-	0.000	0.751	-
Subtotal			4.528	4.047		8.364		-		-		-	0.000	16.939	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo
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Support (\$ in Millions)				FY 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			
ADVAP Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	4.687	5.441	Oct 2017	4.303	Oct 2018	-		-		-	0.000	14.431	-
ADVAP Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	1.566	1.250	Oct 2017	1.010	Oct 2018	-		-		-	0.000	3.826	-
ADVAP Manufacturing Support	C/FP	UTRS : New Jersey	0.600	1.330	Oct 2017	-		-		-		-	0.000	1.930	-
ADVAP Facilitization Support	MIPR	Armament Research Development and Engineering Center : Picatinny Arsenal, New Jersey	0.618	-		-		-		-		-	0.000	0.618	-
NGSW Armament Research Development and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : New Jersey	-	-		0.201	Oct 2018	-		-		-	0.000	0.201	-
NGSW Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	-	-		0.075	Oct 2018	-		-		-	0.000	0.075	-
Subtotal			7.471	8.021		5.589		-		-		-	0.000	21.081	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			
ADVAP U.S. Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	0.103	0.400	Jan 2018	0.870	Oct 2018	-		-		-	0.000	1.373	-
ADVAP Limited User Test	MIPR	Maneuver Battle Labs : Fort Benning, Georgia	-	-		0.150	Oct 2018	-		-		-	0.000	0.150	-
ADVAP ARDEC Testing	MIPR	ARDEC : Picatinny Arsenal, New Jersey	0.350	0.850	Feb 2018	0.650	Oct 2018	-		-		-	0.000	1.850	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo					
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
ADVAP ARL Live Fire Test and Evaluation	MIPR	ARL : Aberdeen, Maryland	-	-		1.125	Oct 2018	-		-		-	0.000	1.125	-
Subtotal			0.453	1.250		2.795		-		-		-	0.000	4.498	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			12.452	13.318	16.748	-	-	-	-	0.000	42.518	N/A			
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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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
ADVAP 7.62mm Engineering & Manufacturing Development																												
	ADVAP 7.62mm EMD																											
ADVAP 7.62mm Pre-Production Qualification Testing (PPQT)																												
	ADVAP 7.62mm PPQT																											
ADVAP 7.62mm Critical Design Review (CDR)	▲ 1 ADVAP 7.62mm CDR																											
ADVAP 7.62mm Development Test & Evaluation																												
					ADVAP 7.62mm DT&E																							
ADVAP 7.62mm Urgent Materiel Release (UMR)					▲ 2 ADVAP 7.62mm UMR																							
ADVAP 7.62mm Milestone C									▲ 5 ADVAP 7.62mm MS-C																			
ADVAP 7.62mm Full Materiel Release (FMR)									▲ 8 ADVAP 7.62mm FMR																			
NGSW Ammo Rapid Prototyping																												
					NGSW Ammo RP																							
NGSW Ammo Initial Product Review 1 (IPR 1) Special Purpose					▲ 3 NGSW Ammo IPR 1 SP																							
NGSW Ammo Preliminary Design Review General Purpose (PDR-GP)					▲ 4 NGSW Ammo PDR-GP																							
NGSW Ammo Initial Product Review 2 (IPR 2) Special Purpose					▲ 6 NGSW Ammo IPR 2 SP																							
NGSW Ammo Project BA05 EP5 to Project BA05 FL4 Transition					▲ 7 NGSW Ammo EP5 to FL4 Transition																							
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)					▲ 9 NGSW Ammo PDR-SP																							

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo

Event Name	FY 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								
NGSW Ammo Critical Design Review General Purpose (CDR-GP)									10																											
NGSW Ammo CDR-GP																																				
NGSW Ammo Prototype Test 1																																				
NGSW Ammo PT1																																				
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose																	11																			
NGSW Ammo IPR 3 SP																																				
NGSW Ammo CDR-SF																					12															
NGSW Ammo CDR-SF																																				
NGSW Ammo Prototype Test 2																																				
NGSW Ammo PT2																																				
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)																	13																			
NGSW Ammo UMR GP																																				
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)																	14																			
NGSW Ammo UMR SP																																				
NGSW Ammo Rapid Fielding																																				
NGSW Ammo RF																																				
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)																					15															
NGSW Ammo PQT SP																																				
NGSW Ammo Full Materiel Release (FMR)																																				
NGSW Ammo FMR																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP5 / Adv Armor-Piercing (ADVAP) for Small Caliber Ammo

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
ADVAP 7.62mm Advanced Concept Development	1	2015	1	2017
ADVAP 7.62mm Prototype Test & Evaluation	1	2015	1	2017
ADVAP 7.62mm Engineering & Manufacturing Development	2	2017	4	2019
ADVAP 7.62mm Pre-Production Qualification Testing (PPQT)	1	2018	1	2018
ADVAP 7.62mm Critical Design Review (CDR)	2	2018	2	2018
ADVAP 7.62mm Development Test & Evaluation	1	2019	3	2019
ADVAP 7.62mm Urgent Materiel Release (UMR)	2	2019	2	2019
ADVAP 7.62mm Milestone C	4	2019	4	2019
ADVAP 7.62mm Full Materiel Release (FMR)	2	2020	2	2020
NGSW Ammo Rapid Prototyping	1	2019	2	2024
NGSW Ammo Initial Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019
NGSW Ammo Preliminary Design Review General Purpose (PDR-GP)	3	2019	3	2019
NGSW Ammo Initial Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
NGSW Ammo Project BA05 EP5 to Project BA05 FL4 Transition	1	2020	1	2020
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)	2	2020	2	2020
NGSW Ammo Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
NGSW Ammo Prototype Test 1	3	2020	4	2020
NGSW Ammo Initial Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
NGSW Ammo Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
NGSW Ammo Prototype Test 2	2	2021	3	2021
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022

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

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures			
COST (\$ in Millions)	Prior Years	FY 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
EP7: Aviation Airborne Expendable Countermeasures	-	0.000	7.213	4.920	-	4.920	4.480	8.250	0.000	0.000	0.000	24.863
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project will support Integrated System Design (ISD), System Capability (SC) and Manufacturing Process Demonstrations (MPD) on current pyrotechnic munitions and tunable pyrotechnic aircraft counter measures and decoys. The project will also support ISD, SC and MPD on new expendable countermeasure munitions that will protect Army aircraft from advanced and current guided missile threats. Activities include modeling and simulation, flight testing, qualification testing, engineering to reduce size and weight, environmental considerations, safety enhancements, manufacturing enhancements, qualification of other service and foreign munitions that could meet current requirements, product improvements, insertion of new technologies to increase performance, and enhancement of current flare solutions for new and existing aircraft. Systems include impulse cartridges and aircraft expendables (to include Radio Frequency (RF) expendables).

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Improvements to countermeasure flares	-	6.948	4.920	-	4.920
Description: This program will develop improvements to legacy countermeasure flare solutions and qualify them for Army use.					
FY 2019 Plans: Develop required documentation to support milestone A decision. Develop and execute demonstration efforts to analyze various potential solutions. Conduct flight effectiveness testing on Army platforms based on Modeling and Simulation (M&S) results.					
FY 2020 Base Plans: Continue data analysis and evaluation of prototypes and flight effectiveness testing on Army platforms based on modelling and simulation (M&S) results. Down select potential solutions to transition to the Engineering, Manufacturing and Development (EMD) Phase for XM215 and Radio Frequency (RF) Passive countermeasure solutions.					
FY 2019 to FY 2020 Increase/Decrease Statement: Funding has been adjusted from FY19 to FY20 as the program approaches Milestone B.					
Title: FY 2019 SBIR / STTR Transfer	-	0.265	-	-	-
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures
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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	-	7.213	4.920	-	4.920

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>
• EB9: Aviation Airborne Expandable Countermeasures	8.500	2.471	3.186	-	3.186	4.500	6.060	-	-	0.000	24.717

Remarks

D. Acquisition Strategy

The Acquisition strategy is under development and Milestone Decision Authority (MDA) was approved in 3Q FY2017. It is anticipated that these items will be restricted to the National Technology and Industrial Base (NTIB).

E. Performance Metrics

N/A

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EP7 / Aviation Airborne Expendable Countermeasures							
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
Product Development	C/FFP	ACC : PICATINNY ARSENAL	-	-		2.550	Apr 2019	2.570	May 2020	-		2.570	0.000	5.120	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.265		-		-		-	0.000	0.265	-
Subtotal			-	-		2.815		2.570		-		2.570	0.000	5.385	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 XM215	MIPR	ARDEC : Picatinny Arsenal	-	-		2.598	Feb 2018	0.103	Dec 2019	-		0.103	0.000	2.701	-
Engineering Support RF	MIPR	ARDEC : Picatinny Arsenal	-	-		-		0.250	Dec 2019	-		0.250	0.000	0.250	-
Subtotal			-	-		2.598		0.353		-		0.353	0.000	2.951	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
Flight Testing RF	MIPR	AED : Redstone Arsenal	-	-		1.800	Aug 2019	1.997	Jun 2020	-		1.997	0.000	3.797	-
Subtotal			-	-		1.800		1.997		-		1.997	0.000	3.797	N/A
Project Cost Totals			-	-		7.213		4.920		-		4.920	0.000	12.133	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EP7 / Aviation Airborne Expendable Countermeasures	

Event Name	FY 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																																
Develop Modeling and Simulation solutions and payload configurations																																																												
Milestone B XM 215																																	■				■				■				■				■				■							
Milestone C XM215																																	■				■				■				■				■				■				■			
Milestone B RF																																	■				■				■				■				■				■				■			
RF Final Prototype Development																																	■				■				■				■				■				■				■			
RF Flight Effectiveness Testing																																	■				■				■				■				■				■				■			
Milestone C RF																																	■				■				■				■				■				■				■			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EP7 / <i>Aviation Airborne Expendable Countermeasures</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Develop Modeling and Simulation solutions and payload configurations	4	2018	1	2021
Milestone B XM 215	4	2020	4	2020
Milestone C XM215	4	2022	4	2022
Milestone B RF	3	2020	3	2020
RF Final Prototype Development	4	2020	1	2021
RF Flight Effectiveness Testing	4	2020	1	2021
Milestone C RF	1	2022	1	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose			
COST (\$ in Millions)	Prior Years	FY 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
EU4: 40mm HV Improved High Explosive Dual Purpose	-	2.191	7.201	13.055	-	13.055	2.935	2.313	0.000	0.000	0.000	27.695
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

40mm High Velocity (HV) High Explosive Dual Purpose - Airburst (HEDP-AB) is a new capability identified in the 40mm High Velocity Improved High Explosive Dual Purpose Cartridge Capability Development Document (CDD) and will provide the Mk19 Mod 3 Grenade Machine Gun (GMG) an airburst capable cartridge with the ability of achieving required lethal effects against enemy targets in the open and in defilade while maintaining the capability to defeat unarmored and lightly armored vehicles. FY 2020 funding supports Engineering and Manufacturing Development (EMD) activities including Design Engineering Test (DET) 1, DET 2, Soldier Touch Point (Limited User Evaluation), Family of Weapon Sights - Crew Served (FWS-CS) Integration, and preparation for the contractor down-selection.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Engineering Manufacturing Development Activities	2.191	-	-	-	-
Description: Prepare for Milestone B approval, develop Request for Proposal (RFP) documentation, and create test plans.					
Title: Engineering Manufacturing Development	-	6.937	13.055	-	13.055
Description: Award EMD contracts to support Design Engineering Testing (DET) and Design Verification Testing (DVT) of the 40mm dual purpose airburst capability.					
FY 2019 Plans: Funding in FY 2019 supports EMD activities including Source Selection, Contract Award, Design Engineering Test (DET) 1, and Test Readiness Review.					
FY 2020 Base Plans: FY 2020 funding supports EMD activities including Design Engineering Test (DET) 1, DET 2, Limited User Evaluation (LUE), Family of Weapon Sights - Crew Served (FWS-CS) Integration, and preparation for the contractor down-selection.					
FY 2019 to FY 2020 Increase/Decrease Statement: Program increase required for continued contractor development, DET, and LUE.					
Title: FY 2019 SBIR / STTR Transfer	-	0.264	-	-	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 I 40mm HV Improved High Explosive Dual Purpose
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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	2.191	7.201	13.055	-	13.055

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>
• E70505: CTG, 40mm HV GMG, I-HEDP	-	-	0.000	-	0.000	11.549	15.222	17.535	-	0.000	44.306

Remarks

D. Acquisition Strategy
 The 40mm High Velocity High Explosive Dual Purpose Airburst (HEDP-AB) cartridge will be developed through a competitive Engineering and Manufacturing Development (EMD) program. Milestone B approval will be followed by a competitive award for up to two EMD contractors for Design Engineering Test (DET) 1 and DET 2 to qualify the design to support requirements with sufficient confidence to enter into Developmental Test and Evaluation (DT&E). The contractors will develop an Airburst capable fuze to be retrofitted onto the currently fielded, High Explosive Point Detonating cartridges and develop a Programming Unit. Shortcomings and deficiencies will be corrected prior to subjecting the final design to DT&E. Down-select to a single contractor will occur before DT&E and production options. Test results will support the documentation for Milestone C and Type Classification-Limited Procurement (TC-LP). After Milestone C is achieved, a contract will be awarded for Low Rate Initial Production (LRIP) and two production year options.

E. Performance Metrics
 N/A

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				EU4 I 40mm HV Improved High Explosive Dual Purpose							
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
Project Manager Maneuver Ammunition Systems (PM MAS)	MIPR	Picatinny Arsenal : NJ	0.014	0.228	Nov 2017	-		-		-		-	0.000	0.242	-
EMD Contract Award 1	C/CPFF	TBD : TBD	-	-		2.430	Jun 2019	4.548	Oct 2019	-		4.548	Continuing	Continuing	Continuing
EMD Contract Award 2	C/CPFF	TBD : TBD	-	-		2.430	Jun 2019	4.548	Oct 2019	-		4.548	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.264		-		-		-	0.000	0.264	-
Subtotal			0.014	0.228		5.124		9.096		-		9.096	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
Armament Research Development Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	0.278	1.875	Oct 2017	1.927	Oct 2018	2.000	Oct 2019	-		2.000	Continuing	Continuing	Continuing
Defense Information Systems Agency (DISA)	MIPR	Defense Information Systems Agency (DISA) : Annapolis, MD	-	0.088	Jul 2018	-		-		-		-	0.000	0.088	-
Subtotal			0.278	1.963		1.927		2.000		-		2.000	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
Design Engineering Test (DET) 1	MIPR	Aberdeen Test Center : Aberdeen Proving Ground, MD	-	-		0.150	Aug 2019	0.584	Oct 2019	-		0.584	0.000	0.734	-
Design Engineering Test (DET) 2	MIPR	Aberdeen Test Center : Aberdeen Proving Ground, MD	-	-		-		1.375	Mar 2020	-		1.375	0.000	1.375	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose
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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			-	-		0.150		1.959		-		1.959			
Project Cost Totals			0.292	2.191		7.201		13.055		-		13.055	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 / 40mm HV Improved High Explosive Dual Purpose

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
Milestone B Support Documents	[Redacted]																											
Milestone B	Documentation																											
Engineering Manufacturing Development					[Redacted]																							
Test Readiness Review for Design Engineering Test 1																												
Design Engineering Test (DET) 1									[Redacted]																			
Test Readiness Review for Design Engineering Test 2																												
Design Engineering Test (DET) 2													[Redacted]															
Developmental Test & Evaluation (DT&E) Down Select																												
Developmental Test & Evaluation (DT&E)													[Redacted]															
Milestone C /Type Classification-Limited Procurement																												
Low Rate Initial Production (LRIP) Contract Award 1																												
Live Fire Test and Evaluation (LFT&E)																					[Redacted]							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU4 I 40mm HV Improved High Explosive Dual Purpose

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone B Support Documents	2	2017	4	2018
Milestone B	4	2018	4	2018
Engineering Manufacturing Development	4	2018	2	2022
Test Readiness Review for Design Engineering Test 1	4	2019	4	2019
Design Engineering Test (DET) 1	4	2019	1	2020
Test Readiness Review for Design Engineering Test 2	2	2020	2	2020
Design Engineering Test (DET) 2	3	2020	4	2020
Developmental Test & Evaluation (DT&E) Down Select	1	2021	1	2021
Developmental Test & Evaluation (DT&E)	2	2021	4	2021
Milestone C /Type Classification-Limited Procurement	3	2021	3	2021
Low Rate Initial Production (LRIP) Contract Award 1	4	2021	4	2021
Live Fire Test and Evaluation (LFT&E)	1	2022	2	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range			
COST (\$ in Millions)	Prior Years	FY 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
EU6: 155mm HE Rocket Assist Project Extended Range	-	0.000	6.917	8.943	-	8.943	5.966	3.000	0.000	0.000	0.000	24.826
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY 2020 funding increase supports the Army's modernization priorities in support of the National Defense Strategy.

A. Mission Description and Budget Item Justification

The XM1113 High Explosive Extended Range Artillery Projectile is a critical munition that supports the Army's modernization priorities in support of the National Defense Strategy. The XM1113 is a government owned materiel solution for long-range cannon artillery projectiles that will attain ranges of 40km in 39 caliber weapon systems and 70km in future systems. The XM1113 will provide 33% increased range over obsolete and aging M549A1 Rocket Assisted Projectile using a larger, modern rocket motor and optimized aerodynamic airframe. The XM1113 will leverage enhanced lethality cannon munition technologies to compensate for increased rocket motor volume. The projectile body is filled with an insensitive munition (IM) high explosive (HE) and a supplementary charge to aid in soldier survivability. FY 2020 funds will support fuze performance evaluation and confirmation with XM1113 for Urgent Materiel Release (UMR) in FY 2021, as well as the continued engineering efforts of the XM1113 maturation in support of a Milestone C in FY 2022.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: 155mm High Explosive Rocket Assist Project (RAP) Extended Range	-	6.664	8.943	-	8.943
Description: Evaluate, Develop, and Qualify Extended Range Technologies.					
FY 2019 Plans: FY 2019 supports the completion of the Developmental Test phase of Engineering & Manufacturing Development (EMD) and the completion of the Critical Design Review (CDR) in 4Q FY 2019.					
FY 2020 Base Plans: FY 2020 funds will support fuze performance evaluation and confirmation with XM1113 for Urgent Materiel Release (UMR) in FY 2021, as well as the continued engineering efforts of the XM1113 maturation in support of a Milestone C in FY 2022.					
FY 2019 to FY 2020 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase in funding in FY 2020 due to acceleration of qualification efforts per Long Range Precision Fires (LRPF) Cross Functional Team (CFT) priority.					
Title: FY 2019 SBIR / STTR Transfer	-	0.253	-	-	-
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	-	6.917	8.943	-	8.943

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
• E66501: PROJ, 155mm ARTY HE RAP, XM1113	-	-	0.000	30.000	30.000	36.000	53.000	-	-	0.000	119.000

Remarks
Procurement of Ammunition, Army (PAA) Funding

D. Acquisition Strategy
The XM1113 Project is utilizing four DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives for early development and prototyping: One DOTC OTA will be with General Dynamics Ordnance and Tactical Systems (GD-OTS) at Scranton Army Ammunition Plant (SCAAP) in Scranton, PA for the projectile body, the second with Savit Corporation in Rockaway, NJ to procure multiple small components and conduct the Load, Assemble, and Pack (LAP) with American Ordnance (AO) at Iowa Army Ammunition Plant (IAAP), the third with Northrop Grumman in Plymouth, MN for fuze compatibility efforts, and the fourth with Nammo Talley in Mesa, AZ for the rocket grains. The parts will support test activities in Yuma, Arizona. In FY 2019, the U.S. Government is evaluating a single DOTC OTA to cover the XM1113 system to support the accelerated timeline and Urgent Materiel Release (UMR) of 2,000 projectiles in 3Q FY 2021, as well as the maturation XM1113 to meet Milestone C requirements in FY 2022. The Program will transition to a Federal Acquisition Regulation (FAR) based production contract after Milestone C for Low Rate Initial Production (LRIP) and Full Rate Production (FRP).

E. Performance Metrics
N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range
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Management Services (\$ in Millions)				FY 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			
XM1113 Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		0.190	Oct 2018	0.150	Oct 2019	-		0.150	0.000	0.340	-
Subtotal			-	-		0.190		0.150		-		0.150	0.000	0.340	N/A

Remarks
Program Management support includes XM1113 travel and milestone 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			
XM1113 HE-RAP Prototyping	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	-	-		1.874	Nov 2018	5.688	Nov 2019	-		5.688	17.000	24.562	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.253		-		-		-	0.000	0.253	-
Subtotal			-	-		2.127		5.688		-		5.688	17.000	24.815	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			
XM1113 Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		4.000	Oct 2018	1.750	Oct 2019	-		1.750	11.400	17.150	-
Subtotal			-	-		4.000		1.750		-		1.750	11.400	17.150	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range
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Test and Evaluation (\$ in Millions)				FY 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			
XM1113 Testing	MIPR	Army Research Lab (ARL) : Adelphi, MD	-	-		0.600	Mar 2020	-		-		-	0.000	0.600	-
XM1113 Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	-		-		1.355	Mar 2020	-		1.355	9.500	10.855	-
Subtotal			-	-		0.600		1.355		-		1.355	9.500	11.455	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		-	-	6.917	8.943	8.943	37.900	53.760	N/A

Remarks
 In FY 2018, PE 604802A, Project EU7 Enhanced Lethality Cannon Munitions received \$5.100M as part of the FY 2018 OMNIBUS in support of the acceleration of XM1113 High Explosive Rocket Assisted Projectile (HE-RAP) fuze compatibility and prototyping efforts to support the Army's modernization priorities in support of the National Defense Strategy.

FY 2019 funding in the amount of \$26.300M from Project 613, MORTAR SYSTEMS, was realigned to Project EU6, 155mm HE Rocket Assist project Extended Range. Both Projects are within the 0604802A Program Element. This funding will be utilized to complete XM1113 lethality testing, firing tables software updates, development of fuze integration efforts, and development of prototype hardware for qualification in support of the Urgent Material Release of 2,000 projectiles in FY 2021 to support the Army's modernization priorities in support of the National Defense Strategy.

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range

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				
XM1113 Engineering Manufacturing and Development (EMD)																																
XM1113 Lethality Testing																																
XM1113 Urgent Materiel Release (UMR) Qualification Testing																																
XM1113 UMR					1 UMR																											
XM1113 Milestone C Qualification Testing																																
XM1113 Milestone C																					2 MS-C											
XM1113 Full Materiel Release (FMR)																									3 FMR							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU6 / 155mm HE Rocket Assist Project Extended Range

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
XM1113 Engineering Manufacturing and Development (EMD)	3	2019	4	2022
XM1113 Lethality Testing	1	2019	1	2020
XM1113 Urgent Materiel Release (UMR) Qualification Testing	3	2019	2	2020
XM1113 UMR	3	2021	3	2021
XM1113 Milestone C Qualification Testing	1	2021	3	2022
XM1113 Milestone C	4	2022	4	2022
XM1113 Full Materiel Release (FMR)	4	2023	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions			
COST (\$ in Millions)	Prior Years	FY 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
EU7: Enhanced Lethality Cannon Munitions	-	25.600	7.905	7.908	-	7.908	0.000	0.000	0.000	0.000	0.000	41.413
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018, Program Element 0604802A, Project EU7 Enhanced Lethality Cannon Munitions received \$5.100 million as part of the FY 2018 OMNIBUS Prior Approval Above Threshold Reprogramming (FY 18-17 PA) in support of the acceleration of XM1113 High Explosive Rocket Assisted Projectile (HE-RAP) fuze compatibility and prototyping efforts to support the Army's modernization priorities in support of the National Defense Strategy.

A. Mission Description and Budget Item Justification

The Enhanced Lethality Cannon Munitions (ELCM) Project will evaluate, develop, and qualify new lethality technologies for 155mm cannon artillery munitions and evaluate their effectiveness in mitigating evolving and derived capability gaps, and support transition to production. The ELCM Project supports testing and assessment of the Israeli Military Industries (IMI) Systems M999 advanced anti-personnel munition and also accelerates the qualification of the 155mm XM1128 High Explosive Projectile including the evaluation of Lithographic Fragmentation Technology (LFT); both of these initiatives support the Army Directed Requirement for a Rapid Bridging Solution for the replacement of the 155mm Dual Purpose Improved Conventional Munition (DPICM). FY 2020 funds will support fuze performance evaluation and confirmation with XM1128, as well as continued Insensitive Munitions (IM) testing, Sequential Environmental Test - Safety (SET-S), and Military Standard Environmental Engineering Considerations and Laboratory Tests (MIL-STD-810). Engineering efforts will support the evaluation of the XM1128 test data to determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: 155mm XM1128 High Explosive Projectile	18.027	7.615	7.908	-	7.908
Description: Evaluate, Develop, and Qualify Enhanced Lethality Technologies.					
FY 2019 Plans: FY 2019 supports the completion of the Product Qualification Testing (PQT) test series for the XM1128 and the finalization of the Capability Production Document (CPD) by 4Q FY 2019.					
FY 2020 Base Plans: FY 2020 funds will support fuze performance evaluation and confirmation with XM1128, as well as continued Insensitive Munitions (IM) testing, Sequential Environmental Test - Safety (SET-S), and Military Standard environmental testing (MIL-STD-810). Engineering efforts will support the evaluation of the XM1128 test data to					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
determine that the Program is safe, suitable and operationally effective, as well as the gathering of all statutory and regulatory requirements in support of a Milestone C in FY 2021. FY 2019 to FY 2020 Increase/Decrease Statement: N/A					
Title: 155mm M999 IMI Projectile with M99 Submunitions Description: M999 testing assessment of performance, safety, and unexploded ordnance (UXO) rates.	2.473	-	-	-	-
Title: 155mm XM1113 High Explosive Rocket Assisted Projectile Description: Evaluate, Develop, and Qualify Enhanced Lethality Technologies.	5.100	-	-	-	-
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	-	0.290	-	-	-
Accomplishments/Planned Programs Subtotals	25.600	7.905	7.908	-	7.908

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>
• E67802: PROJ, 155mm ARTY HE-BB, XM1128	-	-	0.000	14.994	14.994	34.503	50.240	119.781	128.366	0.000	347.884

Remarks
Procurement of Ammunition, Army (PAA) Funding

D. Acquisition Strategy
The XM1128 High Explosive munition has been accelerated for qualification, per the Army Directed Requirement for a Rapid Bridging Solution for the 155mm Dual Purpose Improved Conventional Munition (DPICM) as of 22 December 2016, as an inherent part of the Rapid Bridging solution for 155mm DPICM. Prototyping was awarded in 1Q FY 2018 through DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) initiatives to multiple vendors (subcontractors to U.S. Government system integrator) through Engineering & Manufacturing Development (EMD). The U.S. Government will lead EMD efforts to complete development

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) EU7 / <i>Enhanced Lethality Cannon Munitions</i>

by end 4Q FY 2020. Milestone C approval is in 2Q FY 2021. Following Milestone C, the XM1128 will be competed via Federal Acquisition Regulation (FAR) based contracts for Load, Assemble, and Pack (LAP) and metal parts in support of Low Rate Initial Production (LRIP) and follow-on production activities. Full Material Release (FMR) is planned for 1Q FY 2022.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions
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Management Services (\$ in Millions)				FY 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			
ELCM Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.347	Oct 2017	0.140	Oct 2018	0.150	Oct 2019	-		0.150	0.000	0.637	-
Subtotal			-	0.347		0.140		0.150		-		0.150	0.000	0.637	N/A

Remarks
Program Management support includes XM1128 and M999 travel and milestone 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			
XM1128 PQT Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	-	10.074	Nov 2017	3.054	Feb 2019	1.875	Oct 2019	-		1.875	0.140	15.143	-
XM1113 Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : Various	-	4.494	Oct 2018	-		-		-		-	0.000	4.494	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.290		-		-		-	0.000	0.290	-
Subtotal			-	14.568		3.344		1.875		-		1.875	0.140	19.927	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			
XM1128 Engineering Support	MIPR	Armament Reasech Development and Engineering Center	-	5.294	Nov 2017	1.032	Mar 2019	4.283	Oct 2019	-		4.283	1.377	11.986	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions
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Support (\$ in Millions)				FY 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													
XM1128 Firing Table Software Updates	MIPR	Armament Research Development and Engineering Center (ARDEC) : Adelphi, MD	-	2.123	Feb 2019	-		-		-		-	0.000	2.123	-
M999 Engineering Support	MIPR	Armament Reasech, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.750	Jun 2018	-		-		-		-	0.000	0.750	-
XM1113 Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.606	Oct 2018	-		-		-		-	0.000	0.606	-
Subtotal			-	8.773		1.032		4.283		-		4.283	1.377	15.465	N/A

Remarks
FY 2020: Additional XM1128 Engineering Support in FY 2020 required to facilitate individual Production Qualification Testing (PQT) events, reviews, and Milestone C preparation

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			
XM1128 Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	-		1.891	Mar 2019	1.250	Mar 2020	-		1.250	0.000	3.141	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions
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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			
XM1128 Testing	MIPR	Naval Surface Warfare Center (NSWC) ? Dahlgren : Dahlgren, VA	-	-		0.898	Nov 2018	-		-		-	0.000	0.898	-
XM1128 Testing	MIPR	National Technical Systems (NTS) : Camden, AR	-	0.067	May 2018	0.600	Jan 2019	0.350	Mar 2020	-		0.350	0.000	1.017	-
M999 Testing	MIPR	Combating Terrorism Technical Support Office (CTTSO) : Alexandria, VA	-	1.770	Sep 2018	-		-		-		-	0.000	1.770	-
XM1128 Testing	MIPR	Army Research Lab (ARL) : Adelphi, MD	-	0.075	May 2018	-		-		-		-	0.000	0.075	-
Subtotal			-	1.912		3.389		1.600		-		1.600	0.000	6.901	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
-	25.600	7.905	7.908	-	7.908	1.517	42.930	N/A

Remarks
 FY 2018: \$5.100M received as part of the FY 2018 OMNIBUS in support of the acceleration of XM1113 High Explosive Rocket Assisted Projectile (HE-RAP) fuze compatibility and prototyping efforts to support the Army's modernization priorities in support of the National Defense Strategy.

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

Event Name	FY 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
XM1128																												
XM1128 Prototyping																												
XM1128 Milestone B																												
XM1128 Lethality Testing and Assessment																												
XM1128 Critical Design Review (CDR)																												
XM1128 Performance Qualification Testing (PQT)																												
XM1128 Baseline Prototyping																												
XM1128 Milestone C																												
XM1128 Full Materiel Release (FMR)																												
M999																												
M999 Testing																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU7 / Enhanced Lethality Cannon Munitions

Schedule Details

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EU8 / Improved Multi-Option Fuze			
COST (\$ in Millions)	Prior Years	FY 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
EU8: Improved Multi-Option Fuze	-	9.730	7.905	10.000	-	10.000	0.000	0.000	0.000	0.000	0.000	27.635
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY 2020 funding increase supports the Army's modernization priorities in support of the National Defense Strategy.

A. Mission Description and Budget Item Justification

The Improved Multi-Option Fuze Project (MOFA II/iMOFM) is a technology refresh and modernization effort that provides an incremental capability with technology advancements and performance improvements on the current non-precision artillery and mortar ammunition proximity multi-option fuzes that will increase robustness to electronic countermeasures (ECM), eliminates the susceptibility of reverse engineering (RE), incorporates power source advancements, improves delay mode reliability, and integrates safe & arm improvements. This will develop and qualify safe, affordable, reliable Proximity Height of Burst (HoB) fuzing solutions with robust Defense Exportability Features (DEF) for non-precision conventional Cannon artillery and Mortar munitions that are resistant to adversary exploitation via electronic countermeasures and reverse engineering threats. FY 2020 will support the preparation and incrementing of Engineering and Manufacturing Development (EMD) contracts, the fabrication of MOFA II and iMOFM hardware to conduct developmental verification tests and Product Qualification Tests (PQT), the iMOFM Critical Design Review (CDR), and the preparations for transition into production.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Improved Multi-Option Fuze Development	9.730	7.615	10.000	-	10.000
Description: Develop and qualify improved multi-option fuze technologies.					
FY 2019 Plans: FY 2019 is supporting the preparation and award of EMD contract utilizing the DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) for preliminary iMOFM design and detailed MOFA II design, the fabrication of hardware and conducting of development verification tests, the preparations for and execution of an iMOFM Preliminary Design Review (PDR) and MOFA II Critical Design Review (CDR), and the completion of MOFA II Product Qualification (PQT) plans and the fabrication of test hardware.					
FY 2020 Base Plans: FY 2020 funding will support the EMD contract increments utilizing the DOTC OTA for MOFA II detailed designs, the fabrication of hardware and the execution of MOFA II Product Qualification Tests (PQT), ballistic engineering					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and qualification testing, iMOFM developmental verification tests, iMOFM Critical Design Review, the execution of iMOFM PQT and the preparations for transition into production.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2020 increase supports the test assets required for both execution of Production Qualification Testing (PQT) and Development Verification Testing (DVT).					
<i>Title:</i> FY 2019 SBIR / STTR Transfer	-	0.290	-	-	-
<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	9.730	7.905	10.000	-	10.000

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
• E99909: Multi-Option Fuze, Artillery M782	-	-	0.000	2.700	2.700	16.250	32.500	-	-	0.000	51.450

Remarks
Budget Activity (BA) 4, Program Element (PE) 0603639A Project EU2: Improved Multi-Option Fuze (MOFA II/iMOFM) - FY 2017 \$7.588 million Project was transitioned in FY 2018 to BA5 PE 0604802A Project EU8: Improved Multi-Option Fuze (MOFA II/iMOFM).

D. Acquisition Strategy
The Improved Multi-Option Fuze Project will utilize the DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) with incrementally funded Engineering and Manufacturing Development (EMD) contracts for improved and modernized MOFA II detailed designs and the fabrication of hardware. Improved Multi-Option Fuze programs of record via subsequent Engineering and Manufacturing Program for Type Classification (TC) into existing multi-option fuzes for Cannon Artillery and Mortar Munitions with supporting detailed government-owned Technical Data Packages (TDPs) to enable "build to print" by Industry to facilitate competitive Federal Acquisition Regulation (FAR) based contracting for procurement. Qualified MOFA II will be a Technology Readiness Level 8 (TRL-8) TC design with a mature technical design packages for production. Parallel iMOFM effort will be a qualified TRL-8 design and replace current MOFMs in appropriate ongoing production mortar cartridges.

E. Performance Metrics
N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze
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Management Services (\$ in Millions)				FY 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	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.898	May 2018	0.200	Nov 2018	0.300	Nov 2019	-		0.300	0.000	1.398	-
Subtotal			-	0.898		0.200		0.300		-		0.300	0.000	1.398	N/A

Remarks
Program management supports travel and Milestone C documentation.

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			
Improved Multi-Option Fuze Development and Component Prototypes	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	6.278	Oct 2017	-		-		-		-	0.000	6.278	-
Improved Multi-Option Fuze Test Hardware & PQT Support	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		5.200	Apr 2019	3.000	Mar 2020	-		3.000	0.000	8.200	-
MOFA II Fuze Test Hardware & PQT Support	MIPR	DoD Ordnance Technology Consortium (DOTC) - TBD : Various	-	-		0.300	Jun 2019	3.800	Jun 2020	-		3.800	0.000	4.100	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.290		-		-		-	0.000	0.290	-
Subtotal			-	6.278		5.790		6.800		-		6.800	0.000	18.868	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze
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Support (\$ in Millions)				FY 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			
Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	1.551	Oct 2017	0.869	Nov 2018	1.025	Nov 2019	-		1.025	0.000	3.445	-
Subtotal			-	1.551		0.869		1.025		-		1.025	0.000	3.445	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			
Improved Multi-Option Fuze Test and Evaluations	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.666	Oct 2017	0.300	Nov 2018	0.500	Nov 2019	-		0.500	0.000	1.466	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	-	0.187	May 2018	0.596	Jun 2019	1.300	Jun 2020	-		1.300	0.000	2.083	-
Improved Multi-Option Fuze Test and Evaluations	MIPR	U.S. Army Research Lab (ARL) : Adelphi, MD	-	0.150	Oct 2017	0.150	Nov 2018	0.075	Nov 2019	-		0.075	0.000	0.375	-
Subtotal			-	1.003		1.046		1.875		-		1.875	0.000	3.924	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		-	9.730	7.905	10.000	-	10.000	0.000	27.635	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

Event Name	FY 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
Fabricate Prototypes																												
Conduct Evaluations and Design Reviews																												
Fabricate System Level Qualification Hardware																												
Safety, Reliability, Environmental, EMD and Qualification Testing																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EU8 / Improved Multi-Option Fuze

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Fabricate Prototypes	3	2018	3	2019
Conduct Evaluations and Design Reviews	2	2019	4	2019
Fabricate System Level Qualification Hardware	3	2019	3	2020
Safety, Reliability, Environmental, EMD and Qualification Testing	2	2020	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) EW1 / 40mm Low Velocity Ammunition			
COST (\$ in Millions)	Prior Years	FY 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
EW1: 40mm Low Velocity Ammunition	-	13.469	13.253	14.032	-	14.032	17.402	5.963	2.000	0.000	0.000	66.119
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 40mm Low Velocity High Explosive Air Burst (HEAB) is a new capability identified as a Warfighter requirement in the Capability Development Document (CDD), 40mm Low Velocity (LV) Family of Ammunition Annex. The 40mm Low Velocity HEAB tactical cartridge allows the warfighter to engage targets at increased effective ranges using the 40mm M320 Grenade Launcher. The HEAB cartridge provides the grenadier with a higher probability of achieving a first shot kill against enemy personnel, coupled with the ability to defeat personnel targets in defilade positions. When deployed against point and area targets, the cartridge inflicts incapacitating effects against personnel beyond those offered by the current M433 High Explosive Dual Purpose (HEDP) cartridge. The cartridge provides lethal effects against targets with improved accuracy and greater standoff ranges increasing Soldier Survivability. FY 2020 will support Design Engineering Test (DET) 2 and DET 3 build, Soldier Touch Point (Limited User Evaluation), Test Readiness Reviews (TRRs) and DET 2 Testing.

The 40mm Low Velocity (LV) Door Breach (DB), XM1167, cartridge allows the grenadier to conduct a ballistic breach of an existing door to create an entry point into a building or other structure. This capability is critical during Urban Operations, while having stand-off ability to conduct ballistic breach at ranges up to 50 meters away, with a single-shot, and without pause between actual breach and entry of initial force. The 40mm Door Breach cartridge will provide the small unit with the capability to conduct efficient breaching operations; allowing the Warfighter to create an entry point into a structure for an assault element to enter and begin clearing operations, one of the most difficult types of operations that Soldiers may face in an urban environment. The 40mm Door Breach cartridge will reduce collateral damage and friendly casualties associated with breaching operations. The deployment of 40mm Dor Breach cartridges will enable the small unit to gain and maintain a tactical advantage through efficiency of combat power and momentum. No funding requested in FY 2020.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: 40mm Low Velocity High Explosive Air Burst (HEAB), XM1166	9.291	12.767	14.032	-	14.032
Description: Engineering Manufacturing Development (EMD) of the 40mm Low Velocity, High Explosive Airburst (HEAB) munition.					
FY 2019 Plans: FY 2019 activities include awarding two development contracts for competing prototyping, a Low Velocity-High Explosive Air Burst (LV-HEAB) Preliminary Design Review (PDR), a Test Readiness Review (TRR), Design Engineering Test (DET 1) build and DET 1 Testing.					
FY 2020 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2020 Engineering and Manufacturing Development (EMD) activities will include Test Readiness Reviews (TRRs), Design Engineering Test (DET) hardware build, DET 2 testing, a Limited User Evaluation (LUE), and DET 3 hardware build.					
FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to continued 40mm Low Velocity High Explosive Air Burst (HEAB) development.					
Title: 40mm Low Velocity Door Breach (DB), XM1167	4.178	-	-	-	-
Description: Conduct limited qualification testing to mature technology and manufacturing readiness.					
Title: FY 2019 SBIR / STTR Transfer	-	0.486	-	-	-
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	13.469	13.253	14.032	-	14.032

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
• E71005: CTG, 40mm LV, IRAP	-	-	0.000	-	0.000	-	11.601	13.594	14.500	0.000	39.695

Remarks

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

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
2040 / 5	PE 0604802A / Weapons and Munitions - Eng Dev	EW1 / 40mm Low Velocity Ammunition

The Door Breach cartridge development will consist of characterization testing of multiple designs provided by industry which will be used to further inform a potential future requirement.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition
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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			
LV HEAB XM1166 Project Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : NJ	-	0.241	Nov 2017	-		-		-		-	0.000	0.241	-
LV HEAB XM1166 Contractor 1	C/CPFF	Day & Zimmerman, Inc (DZI) : Middletown, IA	-	3.900	Sep 2018	5.243	Jan 2019	5.716	Oct 2019	-		5.716	Continuing	Continuing	Continuing
LV HEAB XM1166 Contractor 2	C/CPFF	Chemring Ordnance, Inc : Perry, FL	-	3.900	Sep 2018	5.243	Jan 2019	5.716	Oct 2019	-		5.716	Continuing	Continuing	Continuing
LV Door Breach XM1167 Testing Contractor 1	C/CPFF	ATI : Arlington, VA	-	0.842	Nov 2018	-		-		-		-	0.000	0.842	-
LV Door Breach XM1167 Testing Contractor 2	C/CPFF	ATI : Arlington, VA	-	0.842	Nov 2018	-		-		-		-	0.000	0.842	-
LV Door Breach XM1167 Testing Contractor 3	C/CPFF	ATI : Arlington, VA	-	0.842	Nov 2018	-		-		-		-	0.000	0.842	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.486		-		-		-	0.000	0.486	-
Subtotal			-	10.567		10.972		11.432		-		11.432	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			
LV HEAB XM1166 Armament Research Development Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	-	1.250	Nov 2017	1.300	Nov 2018	1.350	Oct 2019	-		1.350	Continuing	Continuing	Continuing
LV Door Breach XM1167 Armament Research Development Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	-	0.902	Jan 2018	-		-		-		-	0.000	0.902	-
Subtotal			-	2.152		1.300		1.350		-		1.350	Continuing	Continuing	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition
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Test and Evaluation (\$ in Millions)				FY 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			
LV HEAB XM1166 Design Engineering Test (DET) 1	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		0.981	May 2019	-		-		-	0.000	0.981	-
LV HEAB XM1166 Design Engineering Test (DET) 2	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		-		1.250	Feb 2020	-		1.250	0.000	1.250	-
LV Door Breach XM1167 Testing and Materials	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	0.750	May 2018	-		-		-		-	0.000	0.750	-
Subtotal			-	0.750		0.981		1.250		-		1.250	0.000	2.981	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			-	13.469	13.253	14.032	-	14.032	Continuing	Continuing	N/A				

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition

Event Name	FY 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
40mm HEAB XM1166 Cooperative Research & Development Agreement (CRADA) Testing	[Redacted]																											
40mm HEAB XM1166 Milestone B	[Redacted]																											
40mm HEAB XM1166 Engineering Manufacturing Development	[Redacted]																											
40mm HEAB XM1166 Preliminary Design Review	[Redacted]																											
40mm HEAB XM1166 Design Engineering Test DET 1	[Redacted]																											
40mm HEAB XM1166 Design Engineering Test DET 2	[Redacted]																											
40mm HEAB XM1166 Design Engineering Test DET 3	[Redacted]																											
40mm HEAB XM1166 Critical Design Review	[Redacted]																											
40mm HEAB XM1166 Developmental Test & Evaluation	[Redacted]																											
40mm HEAB XM1166 Milestone C	[Redacted]																											
40mm HEAB XM1166 Low Rate Initial Production	[Redacted]																											
LV Door Breach XM1167 Development	[Redacted]																											
LV Door Breach XM1167 Test Hardware Builds	[Redacted]																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition

Event Name	FY 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
LV Door Breach XM1167 Testing																												

DB Bid Sample

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) EW1 / 40mm Low Velocity Ammunition

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
40mm HEAB XM1166 Cooperative Research & Development Agreement (CRADA) Testing	3	2017	1	2018
40mm HEAB XM1166 Milestone B	4	2018	4	2018
40mm HEAB XM1166 Engineering Manufacturing Development	4	2018	4	2022
40mm HEAB XM1166 Preliminary Design Review	2	2019	2	2019
40mm HEAB XM1166 Design Engineering Test DET 1	3	2019	4	2019
40mm HEAB XM1166 Design Engineering Test DET 2	2	2020	3	2020
40mm HEAB XM1166 Design Engineering Test DET 3	1	2021	2	2021
40mm HEAB XM1166 Critical Design Review	3	2021	3	2021
40mm HEAB XM1166 Developmental Test & Evaluation	4	2021	1	2022
40mm HEAB XM1166 Milestone C	3	2022	3	2022
40mm HEAB XM1166 Low Rate Initial Production	3	2022	4	2023
LV Door Breach XM1167 Development	4	2018	4	2019
LV Door Breach XM1167 Test Hardware Builds	1	2019	3	2019
LV Door Breach XM1167 Testing	4	2019	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) FA6 / 30mm Lethality			
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
FA6: 30mm Lethality	-	13.344	13.834	22.897	-	22.897	15.860	9.797	8.000	3.000	0.000	86.732
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The 30mm Lethality project funds the development of a suite of 30x173mm caliber cartridges, which includes anti-personnel tactical and training cartridges and anti-materiel tactical and training cartridges, as well as Airburst Munition cartridges for Urgent Materiel Release (UMR) and Full Materiel Release (FMR). The objective is to enhance the operational effectiveness and lethality of the Stryker Infantry Carrier Vehicle (ICV), Next Generation Combat Vehicle (NGCV), and any Army Fighting Vehicles that are equipped with a 30x173mm weapon system. The tactical cartridges will provide an organic direct fire capability to support infantry at a greater range and will improve lethality when engaging dismounted infantry and light armored vehicles. The training cartridges will be ballistically matched to the tactical cartridges, allowing the Warfighter to train in a cost effective manner. The Airburst munitions will provide the Warfighter with increased lethality against troops in the open, counter defilade and anti-tank guided missiles (ATGM). This project will leverage earlier efforts in support of the Stryker Operational Needs Statement (ONS) for Increased Lethality for the 2nd Calvary Regiment (2CR), United States Army Europe (USAREUR) (HQDA ONS 15-20590). FY 2020 funding will support three Design Engineering Tests (DET) and a Design Verification Test (DVT) for the non-airburst 30x173mm suite of ammunition. FY 2020 will also support Milestone B and Engineering and Manufacturing Development (EMD) contract award for the 30x173mm Airburst munition.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: 30X173mm Non-Airburst Suite of Ammunition	5.808	3.380	17.360	-	17.360
Description: Qualify and field a suite of 30x173mm anti-materiel and anti-personnel tactical and training cartridges for use on Stryker Infantry Combat Vehicles (ICV) or other Army Future Fighting Vehicles.					
FY 2019 Plans: FY 2019 primary activities include completing the hardware build to support Design Engineering Testing (DET) of the suite of 30x173mm ammunition and support the hardware build required for one of the Design Verification Tests (DVT).					
FY 2020 Base Plans: FY 2020 primary activities include three Design Engineering Tests (DET) and a Design Verification Test (DVT) for the non-airburst 30x173mm suite of ammunition. FY 2020 will also support the hardware build required for the remaining three DVTs scheduled for FY 2021.					
FY 2019 to FY 2020 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase due to the ramp up of Design Engineering Testing (DET) and the hardware required to support Design Verification Testing (DVT).					
<p>Title: 30x173mm High Explosive Airburst - Tracer (HEAB-T)</p> <p>Description: Develop, qualify, and field a 30x173mm Airburst capable cartridge for use on Stryker Infantry Combat Vehicles (ICV), Next Generation Combat Vehicles (NGCV), or other Army Future Fighting Vehicles.</p> <p>FY 2019 Plans: FY 2019 primary activities include the continued development of the 30x173mm Airburst technology and the completion of software, fire control, and integration testing.</p> <p>FY 2020 Base Plans: FY 2020 primary activities include a Milestone B decision and awards up to two contractors to support Engineering, Manufacturing, and Development (EMD).</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease to do a decrease in technology development to be followed by an increase for EMD.</p>	6.525	9.830	5.537	-	5.537
<p>Title: 30x173mm Programmable Airburst Munitions (PABM) Urgent Materiel Release (UMR)</p> <p>Description: Qualify and field the 30x173mm MK310 Programmable Air Burst munition with Tracer (PABM-T) ammunition to support the increased lethality for the 2nd Calvary Stryker Regiment directed requirement.</p> <p>FY 2019 Plans: FY 2019 primary activities include the completion of the UMR of the Programmable Air Burst with Tracer (PABM-T) ammunition.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to successful completion of urgent materiel release (UMR).</p>	1.011	0.118	-	-	-
<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>	-	0.506	-	-	-
Accomplishments/Planned Programs Subtotals	13.344	13.834	22.897	-	22.897

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality

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>
• E07610: CTG, 30MM, Progrmabl Air Burst Mun, Mk310, Linked	-	1.765	0.000	14.546	14.546	14.565	15.509	15.497	15.000	0.000	76.882
• E07306: CTG, 30mm TP-T, MK239, Single	14.550	3.000	0.000	10.870	10.870	3.000	11.188	3.000	4.206	0.000	49.814
• E07406: CTG, 30mm Hi Expl Incendry-T(HEI-T), Mk238 Series	14.450	12.674	0.000	10.976	10.976	6.000	10.000	10.000	10.100	0.000	74.200
• E09191: CTG, 30mm TPDS- T, MK317 (SABOT Trng), Single	15.000	15.123	0.000	4.000	4.000	15.619	-	11.621	7.713	0.000	69.076
• E09292: CTG, 30mm APFSDS-T, MK258, Single	25.500	25.447	0.000	25.232	25.232	18.952	11.900	11.900	12.020	0.000	130.951

Remarks

D. Acquisition Strategy

A Request for Proposal (RFP) will be sent to industry soliciting responses to the requirements of Army Performance Specifications for the following items: 30x173mm anti-materiel tactical cartridge (XM1170), 30x173mm anti-materiel training cartridge (XM1172), 30x173mm anti-personnel tactical cartridge (XM1171), and 30x173mm anti-personnel training cartridge (XM1173). Contracts will be awarded to viable contractors for the development and qualification of each family of cartridges (anti-personnel family and anti-materiel family). Contractor designs will be subjected to Design Engineering Tests (DETs) and Design Verification Tests (DVTs). Based on technical performance, technical maturity, and cost, production contracts may be awarded for each family of cartridges. The objective is to qualify two production sources for each cartridge.

In support of the 30x173mm High Explosive Airburst - Tracer (HEAB-T) cartridge (XM1182), the Government anticipates awarding two contracts utilizing an Other Transaction Agreement (OTA) through Department of Defense (DoD) Ordnance Technology Consortium (DOTC) to support development and design engineering tests. The Government will down-select and award a single contract to complete Developmental Test and Evaluation (DT&E) in support of Milestone C.

E. Performance Metrics

N/A

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FA6 / 30mm Lethality							
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
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : NJ	-	0.320	Jan 2018	-		-		-		-	0.000	0.320	-
High Explosive Airburst (HEAB-T) Development Contract 1	C/CPFF	General Dynamics - Ordnance and Tactical Systems (GD-OTS) : Marion, IL	-	2.201	Feb 2018	3.449	Jan 2019	-		-		-	0.000	5.650	-
High Explosive Airburst (HEAB-T) Development Contract 2	C/CPFF	Northrop Grumman Information Systems (NGIS) : Plymouth, MN	-	2.201	Feb 2018	3.449	Jan 2019	-		-		-	0.000	5.650	-
High Explosive Airburst (HEAB-T) EMD Contract 1	TBD	TBD : TBD	-	-		-		2.250	May 2020	-		2.250	Continuing	Continuing	Continuing
High Explosive Airburst (HEAB-T) EMD Contract 2	TBD	TBD : TBD	-	-		-		2.250	May 2020	-		2.250	Continuing	Continuing	Continuing
Non-Airburst DET Hardware Contractor 1	C/CPFF	TBD : TBD	-	2.060	Jul 2018	0.675	Feb 2019	-		-		-	0.000	2.735	-
Non-Airburst DET Hardware Contractor 2	C/CPFF	TBD : TBD	-	2.060	Aug 2018	0.675	Feb 2019	-		-		-	0.000	2.735	-
Non-Airburst DVT Hardware Contractor 1	TBD	TBD : TBD	-	-		0.540	Jun 2019	7.200	Jan 2020	-		7.200	0.000	7.740	-
Non-Airburst DVT Hardware Contractor 2	TBD	TBD : TBD	-	-		0.540	Jun 2019	7.200	Jan 2020	-		7.200	0.000	7.740	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.506		-		-		-	0.000	0.506	-
Subtotal			-	8.842		9.834		18.900		-		18.900	Continuing	Continuing	N/A

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FA6 / 30mm Lethality							
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
Armament Research, Development, and Engineering Center (ARDEC)	MIPR	Picatinny Arsenal : NJ	-	2.509	Nov 2017	2.550	Nov 2019	2.600	Oct 2019	-		2.600	Continuing	Continuing	Continuing
Subtotal			-	2.509		2.550		2.600		-		2.600	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
Programmable Air Burst Munitions (PABM) Urgent Material Release (UMR) Qualification Testing	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	0.511	Jun 2018	-		-		-		-	0.000	0.511	-
Non-Airburst Design Engineering Tests (DET)	MIPR	Aberdeen Test Center (ATC) : Aberdeen Proving Ground, MD	-	-		-		1.050	Oct 2019	-		1.050	0.000	1.050	-
Non-Airburst Design Verification Tests (DVT)	MIPR	Aberdeen Test Center (ATC) : Aberdeen Proving Ground, MD	-	-		-		0.347	Jul 2020	-		0.347	Continuing	Continuing	Continuing
High Explosive Airburst (HEAB-T) Test Preparations	C/CPFF	Various : Various	-	1.482	Nov 2017	-		-		-		-	0.000	1.482	-
High Explosive Airburst (HEAB-T) Integration and Setter Testing	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		1.450	Jan 2019	-		-		-	0.000	1.450	-
Subtotal			-	1.993		1.450		1.397		-		1.397	Continuing	Continuing	N/A
Project Cost Totals			-	13.344		13.834		22.897		-		22.897	Continuing	Continuing	N/A

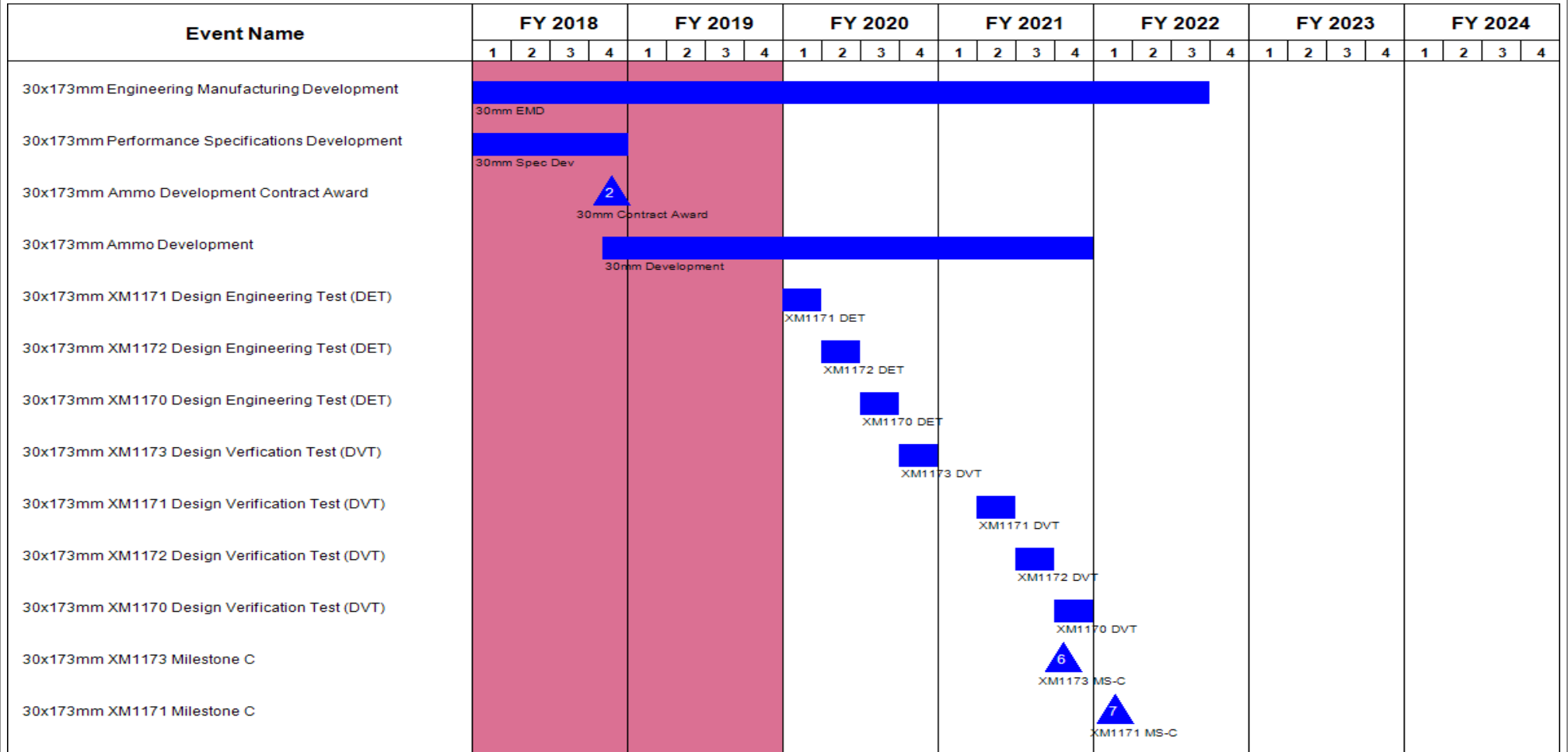
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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army							Date: March 2019			
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev			Project (Number/Name) FA6 / 30mm Lethality				
	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

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FA6 / <i>30mm Lethality</i>



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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FA6 / <i>30mm Lethality</i>

Event Name	FY 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
30x173mm XM1172 Milestone C																	9											
																	XM1172 MS-C											
30x173mm XM1170 Milestone C																	10											
																	XM1170 MS-C											
30mm HEAB-T Technology Maturation and Risk Reduction (TMRR)																												
30mm HEAB-T TMRR Contract Awards	1																											
	HEAB-T Awards																											
30mm HEAB-T TMRR Engineering Test 1																												
																	HEAB-T TMRR Engineering Test 1											
30mm HEAB-T TMRR Engineering Test 2																												
																	HEAB-T TMRR Engineering Test 2											
30mm HEAB-T Engineering & Manufacturing and Development (EMD)																												
30mm HEAB-T Milestone B																	4											
																	HEAB-T MS-B											
30mm HEAB-T Engineering & Manufacturing and Development (EMD) Contract Award																	5											
																	HEAB-T EMD Award											
30mm HEAB-T EMD Design Engineering Test (DET)																												
																	HEAB-T EMD DET											
30mm HEAB-T Developmental Test & Evaluation (DT&E) Downselect																	8											
																	HEAB-T DT&E Down Select											
30mm HEAB-T Developmental Test & Evaluation (DT&E)																												
																	HEAB-T DT&E											
30mm HEAB-T Milestone C																												
																	11											
	HEAB-T MS C																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FA6 / <i>30mm Lethality</i>

Event Name	FY 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 HEAB-T Live Fire Test and Evaluation (LFT&E)																																	HEAB-T				
30mm HEAB-T Initial Operational Test and Evaluation (IOT&E)																																					HEAB-T
Programmable Air Burst Munition UMR Safety Qualification Build																																					
Programmable Air Burst Munition UMR Safety Qualification Test																																					
Programmable Air Burst Munition Urgent Materiel Release (UMR)																									3												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) FA6 / <i>30mm Lethality</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
30x173mm Engineering Manufacturing Development	1	2018	3	2022
30x173mm Performance Specifications Development	1	2018	4	2018
30x173mm Ammo Development Contract Award	4	2018	4	2018
30x173mm Ammo Development	4	2018	4	2021
30x173mm XM1171 Design Engineering Test (DET)	1	2020	1	2020
30x173mm XM1172 Design Engineering Test (DET)	2	2020	2	2020
30x173mm XM1170 Design Engineering Test (DET)	3	2020	3	2020
30x173mm XM1173 Design Verification Test (DVT)	4	2020	4	2020
30x173mm XM1171 Design Verification Test (DVT)	2	2021	2	2021
30x173mm XM1172 Design Verification Test (DVT)	3	2021	3	2021
30x173mm XM1170 Design Verification Test (DVT)	4	2021	4	2021
30x173mm XM1173 Milestone C	4	2021	4	2021
30x173mm XM1171 Milestone C	1	2022	1	2022
30x173mm XM1172 Milestone C	2	2022	2	2022
30x173mm XM1170 Milestone C	3	2022	3	2022
30mm HEAB-T Technology Maturation and Risk Reduction (TMRR)	1	2018	2	2020
30mm HEAB-T TMRR Contract Awards	2	2018	2	2018
30mm HEAB-T TMRR Engineering Test 1	1	2019	2	2019
30mm HEAB-T TMRR Engineering Test 2	4	2019	4	2019
30mm HEAB-T Engineering & Manufacturing and Development (EMD)	2	2020	2	2024
30mm HEAB-T Milestone B	3	2020	3	2020
30mm HEAB-T Engineering & Manufacturing and Development (EMD) Contract Award	3	2020	3	2020

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FA6 / 30mm Lethality
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Events	Start		End	
	Quarter	Year	Quarter	Year
30mm HEAB-T EMD Design Engineering Test (DET)	2	2021	3	2021
30mm HEAB-T Developmental Test & Evaluation (DT&E) Downselect	1	2022	1	2022
30mm HEAB-T Developmental Test & Evaluation (DT&E)	4	2022	3	2023
30mm HEAB-T Milestone C	2	2024	2	2024
30mm HEAB-T Live Fire Test and Evaluation (LFT&E)	3	2024	4	2024
30mm HEAB-T Initial Operational Test and Evaluation (IOT&E)	3	2024	4	2024
Programmable Air Burst Munition UMR Safety Qualification Build	4	2017	3	2018
Programmable Air Burst Munition UMR Safety Qualification Test	4	2018	1	2019
Programmable Air Burst Munition Urgent Materiel Release (UMR)	2	2019	2	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons			
COST (\$ in Millions)	Prior Years	FY 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
FL4: <i>Small Caliber Ammo for Next Gen Squad Weapons</i>	-	0.000	0.000	22.880	-	22.880	30.630	28.750	25.000	11.750	0.000	119.010
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2021, PE 0604802A, Project FL4, Small Caliber Ammo for Next Gen Squad Weapons will be re-aligned to PE 0604601 Project EV9 prior to the PB 2021 submission. The effort is not a new start.

A. Mission Description and Budget Item Justification

The Small Caliber Ammo for Next Gen Squad Weapons project is a critical technology development in response to the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) for the ammunition required to support the rapid prototyping, development, and fielding of the Next Generation Squad Weapons (NGSW) under Section 804 Authority. The objective is to develop and Full Materiel Release (FMR) the new ammunition. The NGSW ammunition is split into two initial variants, the General Purpose (GP) and the Special Purpose (SP). FY 2020 funding supports continuing rapid prototyping/development of the GP projectile, building prototypes and maturing prototypes to provide to the weapon system contractors for performance evaluation, conducting a Critical Design Review (CDR), and conducting prototype testing. FY 2020 also supports continuing rapid prototyping for the SP projectile, conducting a Preliminary Design Review (PDR), conducting an Initial Product Review (IPR), and performing activities to increase prototype capacity to support planned weapon system testing. Follow-on NGSW ammunition types include: tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition. Development efforts on the follow-on NGSW ammunition variants are scheduled to begin in FY 2022. FY 2020 supports initial activities to evaluate potential solutions/prototypes and concepts to satisfy follow-on NGSW ammunition requirements.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Rapid Prototyping General Purpose (GP)	-	-	9.152	-	9.152
Description: Develop, demonstrate, and qualify new ammunition for the Next Generation Squad Weapon (NGSW) systems.					
FY 2020 Base Plans: FY 2020 efforts are focused on continuing rapid prototyping/development of the GP projectile, building prototypes and maturing prototypes to provide to the weapon system contractors for performance evaluation, conducting a Critical Design Review (CDR), and conducting prototype testing.					
FY 2019 to FY 2020 Increase/Decrease Statement:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The Project transitioned from Program Element (PE) 0604802A, Project EP5, Adv Armor-Piercing (ADVAP). Planned contract awards.					
Title: Rapid Prototyping Special Purpose (SP) Description: Develop, demonstrate, and qualify new ammunition to defeat hard targets for the Next Generation Squad Weapon (NGSW) systems. FY 2020 Base Plans: FY 2020 efforts are focused on continuing Rapid Prototyping for the Special Purpose projectile, conducting a Preliminary Design Review (PDR), conducting an Initial Product Review, and performing activities to increase prototype capacity to support planned weapon system. FY 2019 to FY 2020 Increase/Decrease Statement: The Project transitioned from Program Element (PE) 0604802A, Project EP5, Adv Armor-Piercing (ADVAP). Planned contract awards.	-	-	13.528	-	13.528
Title: Concept Evaluation of other Next Generation of Squad Weapons (NGSW) Ammunition Variants Description: Concept development/evaluation of follow-on variants/ammunition for the Next Generation of Squad Weapons (NGSW). FY 2020 Base Plans: Explore/evaluate ammunition prototypes and concepts of follow-on ammunition for the NGSW. Follow-on NGSW ammunition types include: tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition. FY 2019 to FY 2020 Increase/Decrease Statement: Begin exploring ammunition concepts/solutions to meet follow-on NGSW ammunition requirements.	-	-	0.200	-	0.200
Accomplishments/Planned Programs Subtotals	-	-	22.880	-	22.880

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>
• EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	3.755	6.821	-	6.821	-	-	-	-	0.000	10.576

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons
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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>
• EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	13.318	16.748	0.000	-	0.000	-	-	-	-	0.000	30.066

Remarks

Budget Activity 4 PE 0603639A, Project EC2-RDTE/Adv Armor-Piercing (ADVAP) for Small Cal Ammo: This funding line starts the rapid development/rapid prototyping work on the Special Purpose (SP) ammunition for the Next Generation Squad Weapon (NGSW) systems.

Budget Activity 5 PE 0604802A, Project EP5-RDTE/Adv Armor-Piercing (ADVAP) for Small Caliber Ammo: This funding line starts the rapid prototyping/development work on the General Purpose (GP) ammunition for the Next Generation Squad Weapon (NGSW) systems.

D. Acquisition Strategy

The Next Generation Squad Weapon (NGSW) ammunition program will utilize rapid prototyping acquisition strategy under Section 804 Authority to develop ammunition concepts/designs for the General Purpose (GP) variant and the Special Purpose (SP) variant. The project will utilize Government developed projectile designs that will be delivered to development contractors as Government Furnished Material (GFM). The Government will select up to three contractors for the weapon system development and down-select to a single contractor in FY 2021, prior to production contract award; with a planned Urgent Materiel Release (UMR) in FY 2022 and Full Materiel Release (FMR) in FY 2024. Follow-on development efforts for additional NGSW ammunition variants including tracer ammunition, blank ammunition, reduced range ammunition, and Close Combat Mission Capability Kit (CCMCK) ammunition will start in FY 2022.

E. Performance Metrics

N/A

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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 / 5				PE 0604802A / Weapons and Munitions - Eng Dev				FL4 / Small Caliber Ammo for Next Gen Squad Weapons							
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
Follow-on Ammo Prototypes/Concepts	MIPR	Armament Research Development and Engineering Center (ARDEC) : New Jersey	-	-		-		0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing
Projectile Development Contract	TBD	To Be Determined : To Be Determined	-	-		-		9.080	Jan 2020	-		9.080	Continuing	Continuing	Continuing
Subtotal			-	-		-		9.280		-		9.280	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
Development and Prototyping	MIPR	Armament Research Development and Engineering Center (ARDEC) : New Jersey	-	-		-		6.460	Oct 2019	-		6.460	Continuing	Continuing	Continuing
Projectile Development and Support	MIPR	Army Research Lab : Aberdeen, Maryland	-	-		-		3.140	Oct 2019	-		3.140	Continuing	Continuing	Continuing
Subtotal			-	-		-		9.600		-		9.600	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
Prototype Testing ARDEC	MIPR	Armament Research Development and Engineering Center (ARDEC) : New Jersey	-	-		-		0.900	Oct 2019	-		0.900	Continuing	Continuing	Continuing
Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	-	-		-		2.200	Oct 2019	-		2.200	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons							
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
U.S. Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	-	-		-		0.900	Oct 2019	-		0.900	Continuing	Continuing	Continuing
Subtotal			-	-		-		4.000		-		4.000	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			-	-		0.000		22.880		-		22.880	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

Event Name	FY 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
Rapid Prototyping Effort																												
Initial Product Review 1 (IPR 1) Special Purpose					1 IPR 1 SP																							
Preliminary Design Review General Purpose (PDR-GP)									2 PDR-GP																			
Initial Product Review 2 (IPR 2) Special Purpose									3 IPR 2 SP																			
Preliminary Design Review General Purpose (PDR-SP)													4 PDR-SP															
Critical Design Review General Purpose (CDR-GP)																	5 CDR-GP											
Prototype Test 1													PT1															
Initial Product Review 3 (IPR 3) Special Purpose																	6 IPR 3 SP											
Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4																	7 FMR BA04 to BA05 Transition											
Critical Design Review Special Purpose (CDR-SP)																	8 CDR-SP											
Prototype Test 2													PT2															
Urgent Materiel Release Special Purpose (UMR SP)																					9 UMR SP							
Urgent Materiel Release General Purpose (UMR GP)																									10 UMR GP			

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

Event Name	FY 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																				
Rapid Fielding																																																
Production Qualification Test Special Purpose (PQT SP)																																																
Full Materiel Release (FMR)																																																

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) FL4 / Small Caliber Ammo for Next Gen Squad Weapons

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Rapid Prototyping Effort	1	2019	2	2024
Initial Product Review 1 (IPR 1) Special Purpose	2	2019	2	2019
Preliminary Design Review General Purpose (PDR-GP)	3	2019	3	2019
Initial Product Review 2 (IPR 2) Special Purpose	4	2019	4	2019
Preliminary Design Review General Purpose (PDR-SP)	2	2020	2	2020
Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
Prototype Test 1	3	2020	4	2020
Initial Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4	2	2021	2	2021
Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
Prototype Test 2	2	2021	3	2021
Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
Rapid Fielding	4	2022	1	2026
Production Qualification Test Special Purpose (PQT SP)	1	2023	2	2023
Full Materiel Release (FMR)	2	2024	2	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) S36 / Precision Guidance Kit			
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
S36: Precision Guidance Kit	-	14.218	28.188	30.500	-	30.500	3.691	3.174	3.753	3.531	0.000	87.055
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Precision Guidance Kit (PGK) is a course correcting fuze that provides precision accuracy and efficiency for current and future 155mm High Explosive (HE) projectiles by eliminating a portion of the inherent errors associated with ballistic firing solutions which effectively reduces the number of projectiles required to execute fire missions. PGK utilizes a Global Positioning System (GPS) receiver and internal Guidance and Navigation Computer to accomplish its mission with point detonating and height of burst fuzing functions. The PGK M1156E1 effort will incorporate and qualify state of the art technologies to increase the functionality of PGK in GPS degraded environments as well as compatibility with the Army's new long range cannon (Extended Range Cannon Artillery (ERCA)) and projectiles which will be fielded during the PGK Life Cycle. PGK Anti-Jam (PGK-AJ) supports the National Defense Strategy, the Army Long Range Precision Fires (LRPF) Cross Functional Team (CFT), future 155mm projectiles and M777 Long Range Cannon (LRC) initiatives. FY 2020 funding supports the award of the Engineering and Manufacturing Development (EMD) contract initiating system design and prototype development for PGK-AJ.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Contractor Engineering and Manufacturing Development (EMD)	10.656	23.871	26.685	-	26.685
Description: Contractor Engineering and Manufacturing Development (EMD)					
FY 2019 Plans: Will continue to support Technology Maturation Risk Reduction activities via Department of Defense Ordnance Technology Consortium (DOTC) contracts with system and receiver developers leading to a Preliminary Design Review (PDR). This includes various support system test activities.					
FY 2020 Base Plans: Will support Engineering and Manufacturing Development (EMD) activities including prototype development, build and test activities as well as tactical guided flight testing in the threat environment.					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding increase due to continued transition into Engineering and Manufacturing Development (EMD).					
Title: Government and Engineering Support	3.006	2.534	2.815	-	2.815
Description: Engineering Support					
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Support of Technology Maturation and Risk Reduction (TMRR) development and test activities. Provide engineering and analysis for the system and GPS receiver TMRR development and test activities. FY 2020 Base Plans: Engineering support of development, build and test activities which will include prototype and tactical guided flight testing. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding increase supports engineering and testing initiatives.					
Title: Continue Development/Operational Testing Description: Development/Operational Test. FY 2019 Plans: Execute Precision Guided Kit (PGK) Anti-Jam (AJ) concept and subsystem maturation. Perform Preliminary Design Review. FY 2020 Base Plans: Engineering support of development, build and test activities which will include prototype and tactical guided flight testing. FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding increase required as an entry point to Prototype development and testing.	0.556	0.750	1.000	-	1.000
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	-	1.033	-	-	-
Accomplishments/Planned Programs Subtotals	14.218	28.188	30.500	-	30.500

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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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 2020</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>Total Cost</u>
			<u>Base</u>	<u>OCO</u>	<u>Total</u>					<u>Complete</u>	
• E99250: <i>FUZE, 155mm ARTY Precision Guidance Kit (PGK)</i>	144.410	217.933	0.000	164.176	164.176	186.350	79.114	72.595	76.105	Continuing	Continuing

Remarks

Procurement of Ammunition, Army (PAA) Funding

D. Acquisition Strategy

The Precision Guidance Kit (PGK) is a Global Positioning System (GPS) guidance kit with fuzing functions for 155mm High Explosive (HE) artillery projectiles. PGK provides near precision accuracy and effectiveness for 155mm HE projectiles. The PGK corrects the inherent errors associated with ballistic firing solutions and reduces the number of artillery projectiles required to execute the mission. The current PGK Increment has been qualified for the M795 and M549A1 HE projectiles. This increment of PGK entered Low Rate Initial Production (LRIP) at Milestone C in March 2013. Initial Operational Test and Evaluation (IOT&E) was completed 3Q FY 2015, Full Material Release (FMR) was approved 1Q FY 2016, Full Rate Production (FRP) decision and Initial Operational Capability (IOC) occurred 2Q FY 2016. On going PGK Anti-Jam (PGK-AJ) efforts are focused on addressing performance in a GPS degraded environment as well as compatibility with the Army's new long range 155mm cannon and projectile which are scheduled to be fielded in the same timeframe as the next increment of PGK. The strategy includes competitive DoD Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) concept development efforts with multiple contractors in FY 2017, followed by a DOTC Risk Reduction concept maturation phase in FY 2019. This will be followed by a competitive Federal Acquisition Regulation (FAR) based contractual Engineering & Manufacturing Development (EMD) effort beginning in FY 2020.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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Management Services (\$ in Millions)				FY 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	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	13.664	0.283	Oct 2017	0.060	Oct 2018	0.060	Oct 2019	-		0.060	0.000	14.067	14.067
Subtotal			13.664	0.283		0.060		0.060		-		0.060	0.000	14.067	N/A

Remarks
Program Management support includes PGK-AJ 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			
PGK Anti-Jam EMD Development Contract	C/CPAF	TBD : TBD	-	-		6.361	Nov 2019	26.685	Mar 2020	-		26.685	0.000	33.046	33.046
DOTC - PGK GPS Anti-Jam Development - GD-OTS	MIPR	DoD Ordnance Technology (DOTC) - General Dynamics Ordnance & Tactical Systems : Bothell, WA	2.017	5.399	Feb 2018	5.150	Jan 2019	-		-		-	0.000	12.566	7.167
DOTC - PGK GPS Anti-Jam Development - BAE	MIPR	DoD Ordnance Technology (DOTC) - BAE Systems / Rokar : Minneapolis, MN	2.017	5.257	Feb 2018	5.150	Jan 2019	-		-		-	0.000	12.424	7.167
DOTC - PGK GPS Anti-Jam Development - L3 IEC	MIPR	DOD Ordnance Consortium (DOTC) - L3 - IEC : Various	3.341	-		7.210	Apr 2019	-		-		-	0.000	10.551	10.551
PGK TD Contract	C/CPAF	Alliant Techsystems (ATK) : Plymouth, MN	5.279	-		-		-		-		-	0.000	5.279	5.279

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev				Project (Number/Name) S36 / Precision Guidance Kit							
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
PGK TD Contract	C/CPAF	BAE Systems : Minneapolis, MN	3.103	-		-		-		-		-	0.000	3.103	3.103
Soft Recovery Modules	MIPR	SubSystems Technology : Rosslyn, VA	0.116	-		-		-		-		-	0.000	0.116	0.116
PGK EMD & Phase 1-2 (Reliability Failure/Root Cause Analysis)	C/CPAF	Orbital-Alliant Techsystems (O- ATK) : Plymouth, MN	59.953	-		-		-		-		-	0.000	59.953	59.953
PGK EMD - Phase 3a to 5	C/FFP	Orbital-Alliant Techsystems (O- ATK) : Plymouth, MN	32.443	-		-		-		-		-	0.000	32.443	32.443
High Angle Software Configuration	C/CPFF	Raytheon : Ft Wayne, IN	0.105	-		-		-		-		-	0.000	0.105	0.105
Engineering & Technology Assessment. Low Cost Roll Control Solutions	C/CPFF	DoD Ordnance Technology Consortium (DOTC) - General Dynamics Ordnance & Tactical Systems : Bothell, WA	4.774	-		-		-		-		-	0.000	4.774	4.774
Engineering & Technology Assessment. Low Cost Course Correction solutions.	C/CPFF	BAE Systems/ Rokar : Minneapolis, MN	1.778	-		-		-		-		-	0.000	1.778	1.778
DOTC - PGK GPS Anti- Jam Development - Raytheon	MIPR	DoD Ordnance Technology Consortium (DOTC) - Raytheon : Ft Wayne, IN	3.296	-		-		-		-		-	0.000	3.296	3.296
DOTC - PGK GPS Anti- Jam Development - O-ATK	MIPR	DoD Ordnance Technology Consortium (DOTC) - Orbital-Alliant Techsystems (O- ATK) : Plymouth, MN	8.217	-		-		-		-		-	0.000	8.217	8.217

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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Product Development (\$ in Millions)				FY 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			
DOTC - PGK GPS Anti-Jam Development - Rockwell Collins	MIPR	DoD Ordnance Technology Consortium (DOTC) - Rockwell Collins : Cedar Rapids, IA	1.561	-		-		-		-		-	0.000	1.561	1.561
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.033		-		-		-	0.000	1.033	-
Subtotal			128.000	10.656		24.904		26.685		-		26.685	0.000	190.245	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			
Government Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	33.460	2.723	Oct 2017	2.474	Oct 2018	2.755	Oct 2019	-		2.755	0.000	41.412	41.412
Management Support	MIPR	Camber : Mt Arlington, NJ	2.041	-		-		-		-		-	0.000	2.041	2.041
Miscellaneous Support Contract	MIPR	MITRE Corporation : Fort Monmouth, NJ	0.600	-		-		-		-		-	0.000	0.600	0.600
Jammer Support	MIPR	Electronic Proving Ground (EPG) : Ft Huachuca, AZ	0.316	-		-		-		-		-	0.000	0.316	0.316
PGK Parallel Studies and Analysis Support	MIPR	Command and Control Directorate : Ft Monmouth, NJ	0.300	-		-		-		-		-	0.000	0.300	0.300
LNO Support - Ft. Sill	MIPR	US ARMY Field Artillery Center : Ft. Sill, OK	0.201	-		-		-		-		-	0.000	0.201	0.201
ATEC Support	MIPR	Army Test and Evaluation	0.041	-		-		-		-		-	0.000	0.041	0.041

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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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			
		Command (ATEC) : Aberdeen, MD													
Subtotal			36.959	2.723		2.474		2.755		-		2.755	0.000	44.911	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			
Development Testing for GPS Anti-Jam	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	0.590	0.556	Dec 2018	0.750	Feb 2019	1.000	Aug 2020	-		1.000	0.000	2.896	2.896
System Development Testing Increment 1	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	10.442	-		-		-		-		-	0.000	10.442	10.442
Other Development Testing	MIPR	Various : Various	1.769	-		-		-		-		-	0.000	1.769	1.769
Limited User Test	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	1.631	-		-		-		-		-	0.000	1.631	1.631
Initial Operational Test & Evaluation - Increment 1	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	1.000	-		-		-		-		-	0.000	1.000	1.000

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit
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Test and Evaluation (\$ in Millions)				FY 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			
Initial Operational Test & Evaluation - Troop Support	MIPR	Lab Test Center : Ft. Sill, OK	0.731	-		-		-		-		-	0.000	0.731	0.731
Component Air Gun/ Railgun Testing	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	0.337	-		-		-		-		-	0.000	0.337	0.337
Cold Region Testing	MIPR	Cold Region Test Center : Yuma, AZ	0.300	-		-		-		-		-	0.000	0.300	0.300
Airdrop Testing	MIPR	Army Test and Evaluation Command (ATEC) Yuma Proving Ground (YPG) : Yuma, AZ	0.200	-		-		-		-		-	0.000	0.200	0.200
Subtotal			17.000	0.556		0.750		1.000		-		1.000	0.000	19.306	N/A
Project Cost Totals			195.623	14.218		28.188		30.500		-		30.500	0.000	268.529	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / Weapons and Munitions - Eng Dev	Project (Number/Name) S36 / Precision Guidance Kit

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
PGK-AJ / Tech Maturation Risk Reduction					Tech Maturation Risk Reduction																							
PGK-AJ / Preliminary Design Review (PDR)									1 PDR																			
PGK-AJ / EMD Source Selection									EMD Source Selection																			
PGK-AJ / EMD Award									2 EMD Award																			
PGK-AJ / Prototype Development and Testing									Prototype Development and Testing																			
PGK-AJ / Critical Design Review (CDR)													3 CDR															
PGK-AJ / Qualification Testing													Qualification Testing															
Milestone C																					4 MS-C							
Initial Operation Test and Evaluation (IOT&E) -PGK-AJ																									IOT & E			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604802A / <i>Weapons and Munitions - Eng Dev</i>	Project (Number/Name) S36 / <i>Precision Guidance Kit</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PGK-AJ / Tech Maturation Risk Reduction	1	2019	4	2019
PGK-AJ / Preliminary Design Review (PDR)	4	2019	4	2019
PGK-AJ / EMD Source Selection	4	2019	1	2020
PGK-AJ / EMD Award	2	2020	2	2020
PGK-AJ / Prototype Development and Testing	2	2020	2	2021
PGK-AJ / Critical Design Review (CDR)	2	2021	2	2021
PGK-AJ / Qualification Testing	3	2021	2	2023
Milestone C	3	2023	3	2023
Initial Operation Test and Evaluation (IOT&E) -PGK-AJ	3	2024	4	2024

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019	
Appropriation/Budget Activity					R-1 Program Element (Number/Name)							
2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)					PE 0604804A / Logistics and Engineer Equipment - Eng 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	-	76.030	76.388	103.226	-	103.226	51.605	50.348	35.741	16.485	Continuing	Continuing
194: Engine Driven Gen Ed	-	6.513	1.801	8.395	-	8.395	15.485	14.475	14.163	7.810	0.000	68.642
EC9: Contingency Basing Infrastructure	-	3.789	3.057	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.846
EJ9: Maneuver Support Vessel - Light (MSV-L)	-	18.583	34.203	29.446	-	29.446	7.449	0.000	0.000	0.000	0.000	89.681
FG4: Ultra-Lightweight Camouflage Net System (ULCANS)	-	4.854	3.388	4.400	-	4.400	1.604	1.501	0.000	0.000	0.000	15.747
H01: Combat Engineer Eq Ed	-	3.734	2.742	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.476
H02: Tactical Bridging - Engineering Development	-	15.884	9.268	49.452	-	49.452	13.781	22.805	8.341	0.000	0.000	119.531
H14: Materials Handling Equipment - Ed	-	0.714	0.333	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
L39: Field Sustainment Support Ed	-	4.750	2.220	1.675	-	1.675	1.720	1.773	1.807	1.800	0.000	15.745
L41: Water And Petroleum Distribution - Ed	-	6.127	10.761	7.540	-	7.540	7.559	7.620	7.935	5.685	0.000	53.227
L43: ENGINEER SUPPORT EQUIPMENT - ED	-	3.644	0.341	1.242	-	1.242	2.904	0.200	0.000	0.000	0.000	8.331
L46: Maintenance Support Equipment	-	1.971	1.410	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.381
L47: Improved Environmental Control Units Ed	-	1.873	2.337	1.076	-	1.076	1.103	1.974	3.495	1.190	0.000	13.048
VR7: Combat Service Support Systems	-	3.594	4.527	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.121

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>
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A. Mission Description and Budget Item Justification

This Program Element (PE) provides system development and demonstration for various projects. This PE includes the development of water craft, military tactical bridging, material handling equipment, construction equipment, engineer support equipment, soldier support equipment (to include shelter systems, environmental control, field service equipment, camouflage systems and aerial delivery equipment), water purification equipment, petroleum distribution equipment, and mobile electric power.

The FY 2020 funding request was reduced by \$4.382 million to account for the availability of prior year execution balances.

<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	90.965	79.706	107.608	-	107.608
Current President's Budget	76.030	76.388	103.226	-	103.226
Total Adjustments	-14.935	-3.318	-4.382	-	-4.382
• Congressional General Reductions	-0.070	-0.093			
• Congressional Directed Reductions	-4.332	-3.225			
• Congressional Rescissions	-	-			
• Congressional Adds	2.000	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-9.169	-			
• SBIR/STTR Transfer	-3.364	-			
• Adjustments to Budget Years	-	-	-4.382	-	-4.382

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>			
COST (\$ in Millions)	Prior Years	FY 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
194: <i>Engine Driven Gen Ed</i>	-	6.513	1.801	8.395	-	8.395	15.485	14.475	14.163	7.810	0.000	68.642
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The FY 2019 decrease is due to the Large Advanced Mobile Power Sources EMD phase contract termination for convenience.

A. Mission Description and Budget Item Justification

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

This project supports the Tactical Electric Power (TEP) program (Generators and Associated Equip) which is established to develop a modernized, standard family of Mobile Electric Power (MEP) systems to include MEP Generating Sources (MEPGS), and MEP Distribution Systems (MEPDS), MEP Storage Systems (MEPSS) and MEP Management Systems (MEPMS) for all Services throughout the Department of Defense IAW DoDI 4120.11. Building on the device/component evaluations conducted in PE 0603804A project G11, this project supports the system development and demonstration of a series of innovative mobile electric power systems that are essential to the development and eventual fielding of modernized MEPGS and MEPDS. This project also ensures Army Expeditionary Forces are capable of rapid deployment through aerial delivery initiatives and reduces sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands in Network / Command, Control, Communications & Intelligence (C3I), lift, combat zone footprint, and costs for logistical support. FY 2020 funds will continue to develop the Power Distribution Illumination Systems Electrical (PDISE) Expansion which includes the Prime Power Connection Kit (PPCK), and Large Advanced Mobile Power Sources (LAMPS) Engineering and Manufacturing Development (EMD), which includes power generation and distribution developmental testing.

Funding supports modernization of the current TEP sources by investigating technology insertions that improve efficiency, reliability, maintainability, and interoperability in support of the Army Operating Concept and Multi-Domain Battle. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational energy concepts.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Power Distribution Illumination Systems Electrical (PDISE) expansion	0.756	1.801	3.945	-	3.945
Description: Prepare PDISE expansion with Prime Power Connection Kit developmental testing. Provides safe power distribution from the point of generation to the point of need - Network/C3I, Air & Missile Defense, Long Range Precision Fires, Command Post and Combat Support/Combat Service Support systems					
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>FY 2019 funds will continue to develop the Large Power Distribution Unit (PDU) and the Prime Power Connection Kit (PPCK) performance specification to include developmental testing.</p> <p>FY 2020 Base Plans: Continue PDISE expansion EMD Phase.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funding from FY 2019 to FY 2020 supports re-start of LAMPS EMD phase after original EMD contract was terminated for convenience.</p>					
<p>Title: Large Advanced Mobile Power Sources (LAMPS) Engineering & Manufacturing Development (EMD) Phase</p> <p>Description: Revise LAMPS performance specification and continue EMD Phase. LAMPS generators will increase readiness and operational reach while reducing noise and sustainment burdens. LAMPS replaces 100-200kW legacy generators in either a skid or trailer mounted configuration, while adding a microgrid capability and an ability to interface with newer technologies.</p> <p>FY 2020 Base Plans: Continue LAMPS EMD Phase.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Program remains in engineering phase and manufacturing development (EMD) phase. Operational requirements are being re-evaluated. Contract awarded in FY20 to develop 100-200kW power solution; plan to produce 100-200kW generator in FY23 (milestone C).</p>	5.757	-	4.450	-	4.450
Accomplishments/Planned Programs Subtotals	6.513	1.801	8.395	-	8.395

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
• G11: <i>Adv Elec Energy Con Ad</i>	4.982	6.331	3.338	-	3.338	3.201	3.405	3.201	3.328	0.000	27.786
• MA9800: <i>Generators And Associated Equip</i>	115.704	134.341	58.566	2.436	61.002	62.126	75.155	73.228	76.022	Continuing	Continuing

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) 194 / Engine Driven Gen Ed

D. Acquisition Strategy

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

Large Advanced Mobile Power Sources (LAMPS) Engineering & Manufacturing Development (EMD) Phase: The EMD phase will require the vendor to integrate components and fabricate prototypes, verify prototype performance through contractor testing, deliver production representative generator sets and conduct Instructor and Key Personnel Training (I&KPT) for Government testing. Major data deliverables will include the Technical Data Package (TDP), Integrated Product Support (IPS), test reports and cost data reporting. The Government will purchase the TDP from the vendor with the intent of using it in future competitive re-procurements for LAMPS. A Failure Mode, Effects and Criticality Analysis (FMECA), Level of Repair Analysis (LORA), Functional Configuration Audit (FCA) and a Physical Configuration Audit (PCA) will be completed to verify that the TDP accurately describes the qualified production sets.

E. Performance Metrics

N/A

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				194 / Engine Driven Gen Ed								
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	
PDISE Expansion	Various	PM E2S2 : Ft. Belvoir	1.275	-		1.801		0.750		-		0.750	Continuing	Continuing	Continuing	
Large Advanced Mobile Power Sources (LAMPS) (100-200kW)	Various	PM E2S2 Ft. Belvior : Ft. Belvior	1.132	0.369		-		0.500		-		0.500	0.000	2.001	-	
Subtotal			2.407	0.369		1.801		1.250		-		1.250	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	
PDISE Expansion	C/CPFF	TBD : TBD	1.750	0.756		-		1.745		-		1.745	Continuing	Continuing	Continuing	
Large Advanced Mobile Power Sources (LAMPS) (100-200kW)	C/FPIF	L-3 Communications, Westwood Corporation, Tulsa, OK : Various	36.224	3.117		-		3.000		-		3.000	Continuing	Continuing	Continuing	
Subtotal			37.974	3.873		-		4.745		-		4.745	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	
Large Advanced Mobile Power Sources (LAMPS) (100-200kW)	MIPR	CECOM LCMC : Aberdeen Proving Ground (APG), MD	4.617	0.771		-		0.450		-		0.450	Continuing	Continuing	Continuing	
PDISE Expansion	Various	Various : Various	-	-		-		0.500		-		0.500	0.000	0.500	-	
Subtotal			4.617	0.771		-		0.950		-		0.950	Continuing	Continuing	N/A	

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>
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Test and Evaluation (\$ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Large Advanced Mobile Power Sources (LAMPS) (100-200kW)	MIPR	Army Test & Evaluation Ctr (ATEC) : APG, MD	6.318	1.500		-		0.700		-		0.700	Continuing	Continuing	Continuing
PDISE Expansion	MIPR	Army Test & Evaluation Ctr (ATEC) : APG, MD	1.310	-		-		0.750		-		0.750	0.000	2.060	-
Subtotal			7.628	1.500		-		1.450		-		1.450	Continuing	Continuing	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
	52.626	6.513		1.801		8.395		-		8.395	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>

Event Name	FY 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																												
LAMPS (Large Advanced Mobile Power Sources)																																																								
EMD - LAMPS																																																								
DT/Log Demo/OT																																																								
MS C-LAMPS																													5																											
PDISE Expansion																																																								
Phase 1 (PPCK) ADM	1																																																							
PPCK EMD																																																								
PPCK Milestone C	3																																																							
Phase 2 Milestone B	2																																																							
Next Gen TEP EMD																																																								
Next Gen MSC	4																																																							
Milestone C- STEP	6																																																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) 194 / <i>Engine Driven Gen Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
LAMPS (Large Advanced Mobile Power Sources)	4	2020	4	2024
EMD - LAMPS	4	2019	2	2023
DT/Log Demo/OT	2	2022	2	2023
MS C-LAMPS	2	2023	2	2023
PDISE Expansion	3	2017	4	2024
Phase 1 (PPCK) ADM	2	2018	2	2018
PPCK EMD	1	2019	4	2020
PPCK Milestone C	4	2020	4	2020
Phase 2 Milestone B	3	2020	3	2020
Next Gen TEP EMD	1	2021	4	2022
Next Gen MSC	4	2022	4	2022
Milestone C- STEP	2	2024	2	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) EC9 / Contingency Basing Infrastructure			
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
EC9: Contingency Basing Infrastructure	-	3.789	3.057	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.846
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Note: Project EC9 efforts are complete in FY19.

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

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Toolset Development	0.738	0.551	-	-	-
Description: CBI employs Systems Engineers and System Architects to continue the maturation of tools by applying analytical rigor and a systems of systems methodology in toolset development. The toolset provides the backbone for the analysis support to the field allowing operational users to make informed decisions for the design of base camps. The Systems Database is a repository for Contingency Base (CB) information and is available as a single source of information to the CB community. Funding is provided for the following efforts in FY 2018 and 2019.					
FY 2019 Plans: Funding is planned to continue model based systems engineering tool maturation of multiple analytical tools, Base Camp Master Planning Tool, Contingency Basing Interface to the Warfighter (CBIWar), update systems data to the Joint Construction Management System (JCMS), and perform Design Charrettes in support of					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
finalizing the Core Set Development of the Armor Brigade Combat Team (ABCT) Base Camp and beginning the Stryker Brigade Combat Team (SBCT) Base Camp layout. FY 2019 to FY 2020 Increase/Decrease Statement: Army efforts complete in FY 2019, funding reallocated to support higher priorities.					
Title: Integrated Analysis and Design Description: CBI employs Systems Engineers, Operational Research System Analysts and collaborates with Sandia National Laboratories to provide the methodologies, modeling and analysis engines, and the analysis required to recommend and mature the optimized equipment sets that comprise a base camp. Optimized sets range from Platoon to Brigade sized camps in Armor, Infantry, Stryker, Medical, and Logistic camps that optimize the usage of fuel, water, waste and manpower. Funding is provided for the following efforts in FY 2018 and 2019. FY 2019 Plans: Funding is planned to support an Integrated Design Review in support of the Core Set Development of the Armor Brigade Combat Team (ABCT) Base Camp layout. Funding is also planned to begin the Core Set Development of the Stryker Brigade Combat Team Base Camp Layout. Additionally, providing analysis to the FY 2023 contingency basing infrastructure enhanced equipment set to support PD CBI's Annual Report which will inform Army Project Managers and other decision makers the resource implications of their respective product lines and provide investment recommendations for out-year funding. FY 2019 to FY 2020 Increase/Decrease Statement: Army efforts complete in FY 2019, funding reallocated to support higher priorities.	1.495	1.493	-	-	-
Title: Capabilities Implementation and Materiel Requirements Description: CBI employs System Integrators and Engineering Technicians to develop, update and refine system data set strategies of equipment using the developed optimized base camp designs. Funding is provided for the following efforts in FY 2018 and 2019. FY 2019 Plans:	0.673	0.686	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Funding is planned to continue supporting the development of the design of different sized contingency base camps, capability sets specifically focusing on expansion sets, and the planning to manage the base camp capability sets.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Army efforts complete in FY 2019, funding reallocated to support higher priorities.					
<i>Title:</i> Program Management					
<i>Description:</i> Programmatic support and oversight of cost schedule, performance, risk and operational activities in managing the product office. Funding is provided for the following efforts in FY 2018 and 2019.					
<i>FY 2019 Plans:</i> Oversight and management of integrated analysis and design, capabilities implementation and materiel requirements, and toolset development. Funding to support managing cost, schedule, performance, risk, personnel, and operational activities. Also oversight, analysis and management of operational energy related impacts and technology gaps. Funding will continue to support the review the Facilities Capability Development Document (CDD) which will include master planning capability of base camps.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Army efforts complete in FY 2019, funding reallocated to support higher priorities.					
Accomplishments/Planned Programs Subtotals	0.883	0.327	-	-	-
	3.789	3.057	-	-	-

C. Other Program Funding Summary (\$ in Millions) N/A
Remarks
D. Acquisition Strategy N/A
E. Performance Metrics N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</i>
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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	Various	PM E2S2 / PEO CS&CSS : Fort Belvoir, VA / Warren, MI	2.048	0.883		0.327		-		-		-	0.000	3.258	-
Subtotal			2.048	0.883		0.327		-		-		-	0.000	3.258	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			
Toolset Development	Various	Various : Various	2.293	0.738		0.551		-		-		-	0.000	3.582	-
Integrated Analysis and Design	Various	Various : Various	3.811	1.495		1.493		-		-		-	0.000	6.799	-
Capabilities Implementation and Materiel Requirements	Various	Various : Various	1.560	0.673		0.686		-		-		-	0.000	2.919	-
Subtotal			7.664	2.906		2.730		-		-		-	0.000	13.300	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			9.712	3.789	3.057	-	-	-	0.000	16.558	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</i>

Event Name	FY 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
Toolset Development	[Bar]				[Bar]																							
Integrated Analysis and Design	[Bar]				[Bar]																							
Initial Data Transition to JCMS, Initial Operational Capability (IOC)					1 IOC																							
Armor Brigade Combat Team Core, Expansion/Enhancement Sets (ABCT)	[Bar]																											
Striker Brigade Combat Team Core, Expansion/Enhancement Sets (SBCT)					[Bar]																							
Capabilities Implementation and Materiel Requirements	[Bar]				[Bar]																							
Program Management	[Bar]				[Bar]																							
Infantry Brigade Combat Team, Core, Expansion/Enhancement Sets (IBCT)	[Bar]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EC9 / <i>Contingency Basing Infrastructure</i>

Schedule Details

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) EJ9 / Maneuver Support Vessel -Light (MSV-L)			
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
EJ9: Maneuver Support Vessel - Light (MSV-L)	-	18.583	34.203	29.446	-	29.446	7.449	0.000	0.000	0.000	0.000	89.681
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Maneuver Support Vessel (Light) (MSV(L)) program element supports the Engineering and Manufacturing Development (EMD) phase of the program. The MSV(L) is a multifunctional waterborne mobility platform, which displaces the current Landing Craft Mechanized-8 (LCM-8). The LCM-8 does not have the speed, functional draft (shallow water capability), and maneuver capability to move today's Army; cannot transport an Abrams tank. The MSV(L) provides the ability to conduct lift operations of combat loaded personnel and equipment in austere anti-access/area denial (A2/AD) environments, with increased speed, payload, and maneuver capability in shallow coastal waters, rivers, in narrow inland waterways in support of dispersed force elements, austere environments and/or where mature ports and road networks are unavailable. This vessel's capability supports transporting multiple combat configured ready-to-fight payloads with crew (i.e. an Abrams tank; or two Strykers with bar armor; or four Joint Light Tactical Vehicles (JLTVs); or two 20 ft. or one 40 ft. ISO container (Intermodal container); or a Heavy Expandable Mobility Tactical Truck (HEMTT); or a Load Handling System (LHS), and trailer). The MSV(L) will incorporate new roll-through capability via stern access and bow ramps. The MSV(L) provides the capability to operate fully loaded at a speed of 18 knots in Beaufort Sea Scale 3 conditions, while being survivable (seaworthy) in Beaufort Sea Scale 7 conditions. The vessel's force protection attributes includes a subsurface surveillance device for obstacle detection and avoidance, protection from small arms fire, and two Common Remotely Operated Weapon Stations (CROWS II) for vessel defense, and the capacity to mitigate detection through reduction of thermal and acoustic signature. The MSV(L) provides increased capability that moves combat configured forces and supplies more efficiently than the LCM-8.

Army Watercraft funding supports initiatives to enhance the seaworthiness, safety, and survivability while increasing the lethality, tactical mobility, and operational capability of the Army Mariner. Vessel lethality/Escalation of Force measures have increasingly become an area of vital concern to the Combatant Commanders (CCDR) given the requirement to preserve "freedom of the seas" access in all areas of the world, particularly the littorals, to support maneuver operations in all Areas of Responsibility.

FY 2020 Funding supports modernization of the current Army Watercraft Fleet by investigating technology insertions including, but not limited to: condition based maintenance, vessel electronics, Victory Architecture, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts. Supports full scale prototype build.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Engineering and Manufacturing Development (EMD) Contract	13.462	28.195	24.203	-	24.203

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel -Light (MSV-L)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: The EMD phase of the contract includes system engineering and analysis to support execution of the Preliminary Design Review (PDR), Critical Design Review (CDR), Contract Systems Integration Laboratory (CSIL) fabrication, model basin testing, production of full-scale prototype vessel and required testing. In addition, deliverables include development of Integrated Product Support (IPS) analysis and products, as well as, development of Technical Data Package (TDP).</p> <p>FY 2019 Plans: FY 2019 will include building of the full scale prototype vessel, testing and evaluation activities, and initial logistics assessments.</p> <p>FY 2020 Base Plans: Activities include completion of the full scale prototype vessel, testing and evaluation activities, and development of logistics products.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Material for prototype was ordered in FY 2019 and vessel design was completed in FY 2019.</p>					
<p>Title: Government Test and Evaluation Support</p> <p>Description: Government test support.</p> <p>FY 2019 Plans: Contract Systems Integration Laboratory (CSIL) testing and evaluation activities.</p> <p>FY 2020 Base Plans: Testing evaluation activities to include various subsystems and initial contractor prototype extended acceptance trials.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: CSIL testing was completed in FY 2019. Testing activities for FY 2020 will be for various subsystems and initial contractor prototype extended acceptance trials.</p>	0.490	0.880	0.950	-	0.950
<p>Title: Government Furnished Equipment (GFE)</p> <p>Description: GFE for prototype vessel consists of Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR).</p> <p>FY 2019 Plans:</p>	0.021	0.125	0.125	-	0.125

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel -Light (MSV-L)</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
GFE is required to support the full size prototype vessel.					
FY 2020 Base Plans: GFE is required to support the full size prototype vessel and base station for testing.					
Title: Program Management / Systems Engineering					
Description: PM/Matrix Support includes PM and systems engineering oversight required to manage the program and provide contractor oversight. Salaries for support through the EMD phase.					
FY 2019 Plans: Funds will cover matrix salaries for program management and engineering support to include contract execution and contractor oversight.					
FY 2020 Base Plans: Funds will cover matrix salaries for program management, logistics, and engineering support to include contract execution and contractor oversight.					
FY 2019 to FY 2020 Increase/Decrease Statement: Additional support is need for the development of log products.					
Title: Program Management Support Contract					
Description: Program Management and Contract Support for MSV(L).					
FY 2019 Plans: Program Management Support to support MSV(L) for Cyber Security, Contract Data Requirement List (CDRL) management, IMS support, and program documentation.					
FY 2020 Base Plans: Program Management Support to support MSV(L) for Cyber Security, Contract Data Requirement List (CDRL) management, IMS support, C4ISR expertise, and Milestone C program documentation.					
FY 2019 to FY 2020 Increase/Decrease Statement: Support will be increased to include the areas of C4ISR expertise and Milestone C program documentation.					
Title: Naval Architecture Support					
	3.653	2.676	3.383	-	3.383
	0.655	1.074	0.785	-	0.785
	0.302	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel -Light (MSV-L)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Naval architecture support and travel expenses - now included in PM Systems engineering support.					
Title: 2019 SIBR/STTR Transfer	-	1.253	-	-	-
FY 2019 Plans: 2019 SIBR/STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: 2019 SIBR/STTR Transfer					
Accomplishments/Planned Programs Subtotals	18.583	34.203	29.446	-	29.446

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
• R03050: <i>Maneuver Support Vessel (Light) (MSV-L)</i>	-	-	14.185	-	14.185	76.657	73.014	91.816	128.236	0.000	383.908

Remarks

Significant Accomplishments:

- Successful Scale Model Testing completed in Sep 2018.
- Preliminary Design Review held May 2018.
- System Requirements Review held Feb 2018.
- 100 day stop work order issued due to GAO level protest: Contractor resumed work on 24 Jan 2018.
- MSV(L) Contract was awarded on 28 Sep 2017 to Vigor Works, LLC.
- On 22 Sep 2017, obtained MDA approval for Milestone B and entry into the EMD phase.

D. Acquisition Strategy

The MSV(L) will enter at MS B with an EMD Phase, followed by Low Rate Initial Production (LRIP) and Full Rate Production (FRP). The acquisition strategy is to have a full and open competition with a down select from paper designs to one contractor at MS B. The contract will award one 10 year contract to a single vendor comprised of EMD followed by the production and development phase. Model basin testing will occur after successful execution of PDR. This sequence of events mitigate risks prior to the authorization of building the full size prototype. The full size prototype will undergo testing which will inform the updated Joint Capabilities Integration Development System (JCIDS) requirements documentation. Following successful prototype testing, at Knowledge Point (KP) 6, the program will transition to the Other Procurement Army (OPA) funding, and initiate LRIP. Upon MS C approval, the Government will authorize the Production and Deployment phase.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel -Light (MSV-L)</i>

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) EJ9 / Maneuver Support Vessel -Light (MSV-L)
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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			
Engineering and Manufacturing Development (EMD)	C/FFP	Vigor Works, LLC : Clackamas, OR	9.126	13.462	Sep 2018	28.195	Nov 2018	24.000	Nov 2019	-		24.000	0.000	74.783	78.000
Government Furnished Equipment (GFE)	Reqn	Various : Various	2.272	0.021	Jul 2018	0.125	Jan 2019	0.125	Jan 2020	-		0.125	0.000	2.543	-
2019 SIBR/STTR Transfer	TBD	TBD : TBD	-	-		1.253		-		-		-	0.000	1.253	-
Subtotal			11.398	13.483		29.573		24.125		-		24.125	0.000	78.579	N/A

Remarks
Contract was awarded on 28 Sep 2017 to Vigor Works, LLC.

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			
Salaries for Matrix Personnel Army Watercraft, TARDEC, ILSC PSID and ACC-Wrn.	MIPR	Detroit Arsenal : Warren, MI 48397-5000	9.342	3.653	Oct 2017	2.676	Nov 2018	3.586	Nov 2019	-		3.586	Continuing	Continuing	-
Salaries/Travel for Naval Architecture Support	C/CPFF	Picatinny Arsenal, New Jersey 07806-5000 : Warren, MI 48397-5000	0.110	0.302		-		-		-		-	0.000	0.412	-
Salaries / Travel for Program Management Support	C/CPFF	Picatinny Arsenal, New Jersey 07806-5000 : Warren, MI 48397-5000	1.928	0.655	Oct 2017	1.074	Feb 2019	0.785	Feb 2020	-		0.785	Continuing	Continuing	-
Subtotal			11.380	4.610		3.750		4.371		-		4.371	Continuing	Continuing	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel -Light (MSV-L)</i>
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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 - Government	MIPR	ATEC: APG : APG, MD	-	0.490	Oct 2017	0.880	Nov 2018	0.950	Nov 2019	-		0.950	Continuing	Continuing	-
Subtotal			-	0.490		0.880		0.950		-		0.950	Continuing	Continuing	N/A

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

	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	22.778	18.583	34.203	29.446	-	29.446	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel -Light (MSV-L)</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
Salaries for Matrix Support																												
Knowledge Point 2 (KP2)	▲ 1																											
Preliminary Design Review (PDR)		▲ 2																										
Knowledge Point 3 (KP3)			▲ 3																									
Modeling and Simulation			▲ 4																									
Contractor System Integration Laboratory (CSIL)																												
Model Basin Testing				■																								
Knowledge Point 4 (KP4)				▲ 5																								
Critical Design Review (CDR)					▲ 6																							
Knowledge Point 5 (KP5)						▲ 7																						
Prototype Build							■																					
Prototype Test and Evaluation (includes Subsystem tests)								■																				
Knowledge Point 6 (KP6) - Transition to OPA Funding																											▲ 8	

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel -Light (MSV-L)</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
Milestone C													10															
Low Rate Initial Production (LRIP) Authorized													9															

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) EJ9 / <i>Maneuver Support Vessel -Light (MSV-L)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Salaries for Matrix Support	4	2016	4	2021
Knowledge Point 2 (KP2)	2	2018	2	2018
Preliminary Design Review (PDR)	3	2018	3	2018
Knowledge Point 3 (KP3)	4	2018	4	2018
Modeling and Simulation	4	2018	4	2018
Contractor System Integration Laboratory (CSIL)	4	2018	4	2021
Model Basin Testing	4	2018	1	2019
Knowledge Point 4 (KP4)	1	2019	1	2019
Critical Design Review (CDR)	2	2019	2	2019
Knowledge Point 5 (KP5)	2	2019	2	2019
Prototype Build	2	2019	3	2020
Prototype Test and Evaluation (includes Subsystem tests)	3	2019	3	2021
Knowledge Point 6 (KP6) - Transition to OPA Funding	1	2021	1	2021
Milestone C	4	2021	4	2021
Low Rate Initial Production (LRIP) Authorized	4	2021	4	2021

Note

As long as program funding remains in place, PD AWS will assess designated Knowledge Points to determine opportunities for program acceleration. KP6: Successful completion of Prototype Testing with Contractor - Transitioned to OPA funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>			
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
FG4: <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>	-	4.854	3.388	4.400	-	4.400	1.604	1.501	0.000	0.000	0.000	15.747
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

Title: Ultra-lightweight Camouflage Net System (ULCANS)

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

FY 2019 Plans:

FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
4.854	3.279	4.400	-	4.400

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete development, DT/OT and logistics requirements, and obtain Milestone C production decision for Light/Dark Woodland Increment I variants. Complete development and DT/OT for Snow/Alpine Increment I variants. FY 2020 Base Plans: Complete logistics requirements for Snow/Alpine ULCANS Increment I variants. Initiate development and DT/OT, logistics requirements for Desert/Urban ULCANS Increment I variants. FY 2019 to FY 2020 Increase/Decrease Statement: Initiate development for Desert/Urban ULCANS Increment I variants.					
Title: SBIR/STTR	-	0.109	-	-	-
FY 2019 Plans: SBIR/STTR					
FY 2019 to FY 2020 Increase/Decrease Statement: SBIR/STTR					
Accomplishments/Planned Programs Subtotals	4.854	3.388	4.400	-	4.400

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	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
• VR7: <i>Combat Service Support Systems</i>	3.594	4.527	0.000	-	0.000	-	-	-	-	0.000	8.121
• VR8: <i>Combat Service Support Systems - Ad</i>	3.334	3.218	0.000	-	0.000	-	-	-	-	0.000	6.552

Remarks

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

E. Performance Metrics
N/A

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				FG4 / Ultra-Lightweight Camouflage Net System (ULCANS)								
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	
ULCANS	Various	PMFSS : Natick, MA	1.000	0.872		0.877		1.040		-		1.040	0.000	3.789	-	
SBIR/STTR	TBD	PMFSS : Natick, MA	-	-		0.109		-		-		-	0.000	0.109	-	
Subtotal			1.000	0.872		0.986		1.040		-		1.040	0.000	3.898	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	
ULCANS Increment I Woodland Variant	C/FFP	PMFSS : Natick, MA	4.000	1.750		0.857		-		-		-	0.000	6.607	-	
ULCANS Increment I Arctic Variant	C/FFP	PMFSS : Natick, MA	4.000	1.632		0.857		0.900		-		0.900	0.000	7.389	-	
ULCANS Increment I Desert/Urban Increment	C/FFP	PMFSS : Natick, MA	-	-		-		1.840		-		1.840	0.000	1.840	-	
Subtotal			8.000	3.382		1.714		2.740		-		2.740	0.000	15.836	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	
ULCANS Increment I Woodland Variant	Various	Various : Various	2.300	0.300		0.325		-		-		-	0.000	2.925	-	
ULCANS Increment I Arctic Variant	Various	Various : Various	2.300	0.300		0.363		-		-		-	0.000	2.963	-	
ULCANS Increment I Desert/Urban Increment	Various	Various : Various	-	-		-		0.620		-		0.620	0.000	0.620	-	
Subtotal			4.600	0.600		0.688		0.620		-		0.620	0.000	6.508	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>						
	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	13.600	4.854		3.388		4.400		-		4.400	0.000	26.242	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>

Event Name	FY 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
Conduct contract source selection for development contract																												
Prepare documentation to support MS B decision for ULCANS Increment I Program																												
Obtain MS B decision for ULCANS Increment I Program																												
Award development contract and procure test items for all Increment I Variants																												
Build test items for ULCANS variants, conduct competitive down-select to winners																												
EMD testing for Woodland Variant																												
Complete logistics requirements to support MS C production decision for Woodland Variant																												
Obtain MS C production decision for Woodland Variant																												
Prepare documentation for development decision for Arctic/Alpine variant																												
Obtain development decision for Arctic/Alpine Variant																												
EMD testing for Arctic/Alpine Variant																												
Complete logistic requirement to support MS C decision for Arctic/Alpine Variant																												
Obtain production decision for Arctic/Alpine Variant																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>

Event Name	FY 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
Prepare documentation for tailored development decision for Desert/Urban Variant									■																			
Obtain development decision for Desert/Urban Variant													▲ 5															
EMD testing for Desert/Urban Variant																	■											
Complete logistics requirement to support MS C decision for Desert/Urban Variant																	■											
Obtain production decision for Desert/Urban Variant																					▲ 7							
EMD for Emerging Sensor Threat Requirements																					■							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) FG4 / <i>Ultra-Lightweight Camouflage Net System (ULCANS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Prepare development contract for ULCANS Increment I	1	2017	4	2017
Conduct contract source selection for development contract	4	2017	2	2018
Prepare documentation to support MS B decision for ULCANS Increment I	3	2017	2	2018
Obtain MS B decision for ULCANS Increment I Program	2	2018	2	2018
Award development contract and procure test items for all Increment I Variants	2	2018	2	2018
Build test items for ULCANS variants, conduct competitive down-select to vendor	3	2018	4	2018
EMD testing for Woodland Variant	1	2019	2	2019
Complete logistics requirements to support MS C production decision for Woodland	1	2019	3	2019
Obtain MS C production decision for Woodland Variant	3	2019	3	2019
Prepare documentation for development decision for Arctic/Alpine variant	2	2019	4	2019
Obtain development decision for Arctic/Alpine Variant	1	2020	1	2020
EMD testing for Arctic/Alpine Variant	1	2020	3	2020
Complete logistic requirement to support MS C decision for Arctic/Alpine Variant	1	2020	4	2020
Obtain production decision for Arctic/Alpine Variant	4	2020	4	2020
Prepare documentation for tailored development decision for Desert/Urban Variant	1	2020	3	2020
Obtain development decision for Desert/Urban Variant	3	2020	3	2020
EMD testing for Desert/Urban Variant	3	2020	1	2022
Complete logistics requirement to support MS C decision for Desert/Urban Variant	3	2020	3	2021
Obtain production decision for Desert/Urban Variant	3	2021	3	2021
EMD for Emerging Sensor Threat Requirements	1	2021	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>			
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
H01: <i>Combat Engineer Eq Ed</i>	-	3.734	2.742	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.476
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

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

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Mine Clearing Armor Protection (MCAP)	-	2.250	-	-	-
Description: Evaluate and integrate technologies to increase operator protection and safety during mine clearing missions. Mine Clearing Armor Protection (MCAP) Dozers were built on legacy D7G. These systems are being replaced by the D7R and will require additional equipment to allow for use in completing the MCAP mission. This includes providing greater operator protection as well as additional tools for conducting the mine clearing operation.					
FY 2019 Plans: Initiate analysis of alternatives (AOA) of solutions to increase the armor protection or remove the operator from the cab, and research of blade design to ensure the mine clearing capability is sufficient for meeting the requirement of the MCAP mission. Integrate mine clearing capabilities into Dozer vehicles. Complete analysis					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
of alternatives (AOA) of solutions to increase the armor protection or remove the operator from the cab, and research of blade design to ensure the mine clearing capability is sufficient for meeting the requirement of the MCAP mission. Integrate mine clearing capabilities into Dozer vehicles. FY 2019 to FY 2020 Increase/Decrease Statement: No funding programmed in FY 2020.					
Title: Weight Reduction in Transparent Armor (TA) Description: Investigate technologies that will reduce the weight in TA while maintaining current protection levels or technologies that will increase protection levels with no or minimal increase in weight.	0.300	-	-	-	-
Title: CEVT Description: These funds are for the development of the Commercial-Off-the-Shelf virtual training devices (simulators) with software modifications for military unique tasks. These will be used by the United States Army Engineer School (USAES) to train soldiers for the AIT program. The funds will also be used to purchase NRE's for the following variants: Dozer, Grader, Scraper, Loader, and HYEX. FY 2019 Plans: FY19 funds will be used to purchase the first NRE for each variant. FY 2019 to FY 2020 Increase/Decrease Statement: No Funds in FY20	3.434	0.104	-	-	-
Title: Telematics Description: Telematics will allow the operator and owners to monitor vehicle location, hours operated, fuel consumption, and other parameters impacting maintenance and sustainment, as well as the impact to the customers through operational costs This initiative will focus on evaluating the utility, feasibility, and maintainability of utilizing vehicle telematics devices in the US Army's fleet of Caterpillar T5 Dozers and JCB HMEE-I in the following CONUS locations: Fort Carson, Colorado and Joint Base Lewis-McChord, Washington. This will be accomplished by installing and activating the devices in ten T5 Dozers and ten HMEE-I vehicles, tracked on a daily basis, and reported on a bi-weekly basis. FY 2019 Plans: Identify the required commercial industry/COTS hardware components necessary for integration into the vehicles.	-	0.300	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Identify the necessary software applications and/or access required to interface with the data collected from the hardware. Initiate the process for obtaining an Interim Authority to Test (IATT) to identify any cybersecurity risks. Identify the locations for the pilot vehicles where the devices will be installed and where the military units will operate the vehicles. Conduct Technical Inspections on each vehicle and record this as the baseline configuration and condition. Integrate the Caterpillar and JCB hardware into the vehicles. Once the IATT is available, acquire baseline data. Track fuel burn, asset utilization, asset location, and any other available parameters IAW ISO 15143-3. If additional OEM-specific parameters are available, ensure they are tracked but also clearly labeled as OEM-specific/additional to ISO 15143-3. Provide bi-weekly reports, monthly reports and analysis. Track any cost reductions and operational readiness. At the conclusion of the data monitoring and analysis phase, the OEMs will remove the hardware installation and revert the vehicles back to their original baseline configurations.					
FY 2019 to FY 2020 Increase/Decrease Statement: No Funding in FY20					
Title: FY 2019 SBIR / STTR Transfer	-	0.088	-	-	-
FY 2019 Plans: SBIR / STTR					
FY 2019 to FY 2020 Increase/Decrease Statement: Adjusted for FY 2019 SBIR / STTR Transfer.					
Accomplishments/Planned Programs Subtotals	3.734	2.742	-	-	-

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
• R05901: <i>High Mobility Engineer Excavator (HMEE)</i>	75.831	71.748	27.188	3.000	30.188	19.381	11.199	-	-	Continuing	Continuing
• R03801: <i>GRADER, MTZD, HVY</i>	0.989	-	0.000	-	0.000	5.412	-	-	-	0.000	6.401
• X01500: <i>Hydraulic Excavator</i>	3.850	1.355	0.500	-	0.500	5.192	3.400	-	-	Continuing	Continuing

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>

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	
• M06100: <i>TRACTOR FULL TRACKED, MED T-9</i>	-	-	4.835	8.225	13.060	12.945	-	-	-	0.000	26.005
• R06701: <i>All Terrain Cranes</i>	8.935	13.031	23.936	-	23.936	55.947	81.703	77.344	7.272	Continuing	Continuing
• R02800: <i>SCRAPER, EARTHMOVING, 14-18 CU YD</i>	11.180	7.961	0.000	4.669	4.669	4.951	0.250	2.450	-	0.000	31.461
• R07001: <i>Enhanced Rapid Airfield Construction Capap</i>	2.563	8.480	0.000	-	0.000	-	-	-	-	0.000	11.043
• R07003: <i>ERACC Type II, Enhanced Earthmoving</i>	2.563	8.480	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• M05500: <i>Const Equip ESP</i>	19.032	33.760	34.790	3.870	38.660	25.119	0.544	3.000	3.000	Continuing	Continuing
• ML5350: <i>Items Less Than \$5.0M (Const Equip)</i>	6.899	6.103	4.381	0.350	4.731	-	1.410	1.410	1.424	0.000	21.977

Remarks

D. Acquisition Strategy

Conduct research, development, and investigations on future Construction Equipment (CE) and identify the path forward for programs of record (POR) to be transitioned for Program Executive Officer Program Management. Identify technical advancements that can improve safety, reliability, survivability, transportability, availability, maintainability and reduce the logistical footprints for current and future CE equipment.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>
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Management Services (\$ in Millions)				FY 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			
SBIR+STIR	TBD	TACOM : Warren, Michigan	0.167	-		-		-		-		-	0.000	0.167	-
Subtotal			0.167	-		-		-		-		-	0.000	0.167	N/A

Product Development (\$ in Millions)				FY 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 Pre-Award requirements, KPP, selection criteria development, Testing of systems	Various	TACOM & TARDEC : Warren, MI	1.675	-		-		-		-		-	0.000	1.675	-
Driver Assist	TBD	TBD : TBD	3.448	-		-		-		-		-	0.000	3.448	-
Design Armor Kits for Combat Engineer	Various	TARDEC : Warren, MI	5.995	-		-		-		-		-	0.000	5.995	-
CEVT	Various	PEO STRI : PEO, STRI, Orlando, FL	8.983	3.434	Feb 2019	0.104	Jul 2019	-		-		-	0.000	12.521	-
Hazard Clearance at Speed	TBD	TARDEC : Warren, Michigan	0.001	-		-		-		-		-	0.000	0.001	-
Forced Entry: (Airborne/ Air Assault) Study/ Development	C/FFP	TBD : TBD	9.288	-		-		-		-		-	0.000	9.288	-
Market Research	TBD	TARDEC : Warren, Michigan	0.189	-		-		-		-		-	0.000	0.189	-
Machine Diagnostics	MIPR	Various : Various	0.600	-		-		-		-		-	0.000	0.600	-
Technology Insertion/ System Improvement	TBD	TBD : TBD	0.462	-		-		-		-		-	0.000	0.462	-
Weight Reduction in Transparent Armor (TA)	C/TBD	TBD : TBD	-	0.300	Mar 2019	-		-		-		-	0.000	0.300	-
Telematics	C/TBD	TBD : TBD	-	-		0.300	Jul 2019	-		-		-	0.000	0.300	-

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				H01 / Combat Engineer Eq Ed							
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	-	-		0.088		-		-		-	0.000	0.088	-
Subtotal			30.641	3.734		0.492		-		-		-	0.000	34.867	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	TARDEC/TACOM : Warren, Michigan	2.241	-		-		-		-		-	0.000	2.241	-
Subtotal			2.241	-		-		-		-		-	0.000	2.241	N/A
Test and Evaluation (\$ in Millions)				FY 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
Operational Efficiency	MIPR	TARDEC, Warren, Michigan : TARDEC, Warren, Michigan	0.319	-		-		-		-		-	0.000	0.319	-
Operational Energy/Duty Cycle Monitoring	TBD	TBD : TBD	0.987	-		-		-		-		-	0.000	0.987	-
Non Nuclear Soil Density Set Testing	TBD	TARDEC : Warren, MI	0.050	-		-		-		-		-	0.000	0.050	-
Mine Clearing Armor Protection (MCAP)	TBD	TBD : TBD	-	-		2.250	Feb 2019	-		-		-	0.000	2.250	-
Subtotal			1.356	-		2.250		-		-		-	0.000	3.606	N/A
Project Cost Totals			34.405	3.734		2.742		-		-		-	0.000	40.881	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army							Date: March 2019			
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>			Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>				
	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

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>

Event Name	FY 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
Mine Clearing Armor Protection (MCAP)																												
Weight Reduction in Transparent Armor (TA)																												
CEVT																												
Telematics																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H01 / <i>Combat Engineer Eq Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Mine Clearing Armor Protection (MCAP)	2	2019	4	2019
Weight Reduction in Transparent Armor (TA)	2	2019	4	2019
CEVT	2	2019	4	2019
Telematics	4	2019	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>			
COST (\$ in Millions)	Prior Years	FY 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
H02: <i>Tactical Bridging - Engineering Development</i>	-	15.884	9.268	49.452	-	49.452	13.781	22.805	8.341	0.000	0.000	119.531
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports the engineering, prototyping and manufacturing development for products transitioning to procurement for Future Force Bridge Systems and support equipment. Funding supports development and testing of the Bridge Supplemental Set (BSS) and tests associated with the Low Rate Initial Production (LRIP) phase of the Line of Communication Bridge (LOCB). This project also funds efforts to upgrade and modernize the Bridging Product Management portfolio through the development of new systems such as the Structural Health Monitoring System, and the Family of Higher Military Load Classification Bridges (FoHMLC-B).

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Line of Communication Bridge (LOCB)	13.685	3.107	2.684	-	2.684
Description: Funding requested for development and testing of higher Military Load Classification (MLC) modular Line of Communication Bridging with the mobility to span fixed or float gaps spanning 50 to 300 meters wide. Actions include bridge structural strength analysis, performance assessments, and Production Qualification Testing (PQT) of the Line of Communication Bridge (LOCB) system.					
FY 2019 Plans: Funding supports operational, structural and pier strength testing for the Line of Communication Bridge (LOCB)					
FY 2020 Base Plans: Funding supports commercial bridge launch testing, First Article Testing (FAT) and Initial Operational Test and Evaluation (IOT&E) of the Line of Communication Bridge (LOCB) system.					
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreased from FY 2019 to FY 2020 due to lower FY 2020 requirements and scheduled completion of commercial component testing and bridge vehicle crossings testing.					
Title: Bridge Supplemental Set (BSS)	2.008	4.218	3.034	-	3.034
Description: Funding requested to develop a multi-functional, consolidated engineering set consisting of an anchorage system, access/egress traction improvement matting, power generation, tools, and a float bridge					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>protection device. The BSS is targeted for use with multiple tactical bridging systems to include the Improved Ribbon Bridge (IRB). It will also increase the capability of the Multi-Role Bridge Company (MRBC).</p> <p>FY 2019 Plans: FY 2019 RDTE will fund development efforts at Engineering Research and Development Center (ERDC) for the Analytical Hydrodynamics/Structural testing, anchorage, improvement matting and bridge protection device prototyping and testing.</p> <p>FY 2020 Base Plans: Funding supports remaining prototype development costs, Initial Operational Testing (IOT) and Logistics Demonstration events.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreased from FY 2019 to FY 2020 due to lower FY 2020 requirements and scheduled completion of BSS prototype hardware buy in FY 2019.</p>					
<p>Title: Family of Higher Military Load Capacity Bridges</p> <p>Description: Funding provided to develop the Family of Higher Military Load Classification Bridges (FoHMLC-B). FoHMLC-B will replace - Armored Vehicle Launched Bridge on the Joint Assault Bridge(JAB), the Dry Support Bridge sections and Improved Ribbon Bridge sections, components and/or systems to support the heavier weights of next generation combat vehicles.</p> <p>FY 2019 Plans: FY 2019 funds will support the Family of Higher MLC Bridges (FoHMLC-B) Engineering Research and Development Center (ERDC) Bridge Gap Analysis.</p> <p>FY 2020 Base Plans: Funding supports the Armored Vehicle Launched Bridge (AVLB), Improved Ribbon Bridge (IRB) and Dry Support Bridge (DSB) up-weight prototype development, bridge overload testing and test facility bridge crossing simulator upgrades to support prototype testing in FY 2021.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased from FY 2019 to FY 2020 to support multiple bridging platform prototype efforts as well as bridge overload and up-weight testing.</p>	0.191	1.500	43.734	-	43.734
<p>Title: FY 2019 SBIR / STTR Transfer</p>	-	0.443	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Adjusted for FY 2019 SBIR / STTR Transfer					
FY 2019 Plans: SBIR / STTR					
FY 2019 to FY 2020 Increase/Decrease Statement: Adjusted for FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	15.884	9.268	49.452	-	49.452

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
• G06520: BRIDGE SUPPLEMENTAL SET	-	-	17.966	-	17.966	32.527	44.028	-	-	0.000	94.521
• G82404: LINE OF COMMUNICATION BRIDGE LOCB	16.610	81.219	59.821	4.884	64.705	10.556	10.544	13.530	78.516	0.000	275.680

Remarks

D. Acquisition Strategy
The acquisition strategy is for Research Development Test & Evaluation efforts to support prototyping, testing and follow-on production efforts for future Bridging systems.

E. Performance Metrics
N/A

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				H02 / Tactical Bridging - Engineering Development							
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 and Program Management	MIPR	Various : Various	0.825	0.858	Oct 2017	1.431	Oct 2018	2.462	Oct 2019	-		2.462	Continuing	Continuing	Continuing
Subtotal			0.825	0.858		1.431		2.462		-		2.462	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
Line of Communication Bridge - Development	MIPR	Rock Island Arsenal (RIA) : Rock Island, IL	17.725	-		-		-		-		-	0.000	17.725	-
Line of Communication Bridge - Connector Redesign	MIPR	TARDEC : Warren, MI	0.500	-		-		-		-		-	0.000	0.500	-
Line of Communication Bridge - OTA Dry Gap Prototype Hardware	Various	Other Transactional Agreement - ACC NJ : NJ	-	5.146	Jul 2018	-		-		-		-	0.000	5.146	-
Line of Communication Bridge - OTA Wet Gap Prototype Hardware	Various	Other Transactional Agreement - ACC NJ : NJ	-	3.020	Jul 2018	-		-		-		-	0.000	3.020	-
Bridge Supplemental Set - Hardware Development	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	3.496	-		-		-		-		-	0.000	3.496	-
Bridge Supplemental Set - ERDC - Analytical Study	MIPR	U.S. Army Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	0.928	Mar 2018	0.211	Jan 2019	-		-		-	0.000	1.139	-
Bridge Supplemental Set - EMD Prototype Assets	MIPR	Aberdeen Proving Ground : Aberdeen, Maryland	-	-		1.800	Nov 2018	-		-		-	0.000	1.800	-
Family of High Military Load Capacity Bridges	MIPR	U.S. Army Engineer Research and	-	-		1.200	Jan 2019	-		-		-	0.000	1.200	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) H02 / Tactical Bridging - Engineering Development
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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
- ERDC Bridge Gap Analysis		Development Center (ERDC) : Vicksburg, MS													
Family of High Military Load Capacity Bridges - AVLB Test / Upgrade Study	MIPR	TARDEC : Warren, MI	-	-		0.100	Jan 2019	-		-		-	0.000	0.100	-
Family of High Military Load Capacity Bridges - DSB/IRB EMD Test Assets	TBD	TBD : TBD	-	-		-		4.000	Apr 2020	-		4.000	0.000	4.000	-
Family of High Military Load Capacity Bridges - IRB - Upweight Overload Modeling	TBD	TBD : TBD	-	-		-		1.900	Nov 2019	-		1.900	0.000	1.900	-
Family of High Military Load Capacity Bridges - AVLB Upweight OTA Award	TBD	TBD : TBD	-	-		-		33.100	Dec 2019	-		33.100	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	N/A : N/A	-	-		0.443	Jan 2019	-		-		-	0.000	0.443	-
Subtotal			21.721	9.094		3.754		39.000		-		39.000	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
Bridge Lab Spt	MIPR	TARDEC - Bridge Lab : Warren, MI	0.772	1.493	Oct 2017	0.783	Oct 2018	0.800	Oct 2019	-		0.800	Continuing	Continuing	Continuing
Test Facility SANG / ATEC Upgrades - HMLC	MIPR	TARDEC - Bridge Lab : Warren, MI	-	-		-		2.000	Oct 2019	-		2.000	0.000	2.000	-
Prototype/EMD Bridge Test Asset Transportation	TBD	TAC Code : TBD	-	-		-		0.440	Oct 2019	-		0.440	Continuing	Continuing	Continuing
Subtotal			0.772	1.493		0.783		3.240		-		3.240	Continuing	Continuing	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) H02 / Tactical Bridging - Engineering Development
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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			
Line of Communication Bridge - Durability Testing	MIPR	U.S. Army Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	0.794	Nov 2017	0.800	Jan 2019	-		-		-	0.000	1.594	-
Line of Communication Bridge - Commercial Component Testing	MIPR	U.S. Army Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	0.831	Nov 2017	0.650	Jan 2019	-		-		-	0.000	1.481	-
Line of Communication Bridge - Structural Strength Testing	MIPR	United States Army Materiel Systems Analysis Activity (AMSAA) : Aberdeen Proving Ground, MD	-	0.542	Nov 2017	0.650	Jan 2019	-		-		-	0.000	1.192	-
Line of Communication Bridge - UMR Launch and Wet Gap Testing	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD	-	1.525	Aug 2018	-		0.700	Nov 2019	-		0.700	0.000	2.225	-
Line of Communication Bridge - First Article Testing	TBD	TBD : TBD	-	-		-		0.750	Mar 2020	-		0.750	Continuing	Continuing	Continuing
Line of Communication Bridge - Bridge Vehicle Crossings Testing	MIPR	U.S. Army Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	0.747	May 2019	-		-		-		-	0.000	0.747	-
Bridge Supplemental Set - ERDC - Prototype Testing	MIPR	U.S. Army Engineer Research and Development Center (ERDC) : Vicksburg, MS	-	-		1.200	Nov 2018	-		-		-	0.000	1.200	-
Bridge Supplemental Set - IOT / Log Demo	MIPR	TBD : TBD	-	-		-		1.800	Jan 2020	-		1.800	0.000	1.800	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>

Event Name	FY 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																								
Line Of Communication Bridge POR/ONS																																																				
Line Of Communication Bridge UMR Live Launch Crossing																																	■																			
Line Of Communication Bridge Durability																																					■															
Line of Communication Bridge UMR Production																																					■															
Line Of Communication Bridge Milestone "C"																																									▲											
Line Of Communication Bridge PQT/OT																																									■											
Line of Communication COTS Manual Dev/Verification																																									■											
Line of Communication Bridge POR Production																																									■				■				■			
Line Of Communication Bridge FMR																																																	▲			
Bridge Supplemental Set																																																				
Bridge Supplemental Set Proposal Development					■																																															
Bridge Supplemental Set Milestone "B/C" Decision													▲																																							
BSS Prototype Development									■																																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>

Event Name	FY 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				
Bridge Supplemental Set Log Demo									■ BSS Log Demo																							
Bridge Supplemental Set Contract Award													▲ 4 BSS Contract Award																			
Bridge Supplemental Set Production																	■ BSS Production															
Bridge Supplemental Set IOTE																	■ BSS IOTE															
Bridge Supplemental Set TM Development																					■ BSS TM Development											
Bridge Supplemental Set FUE OPNET.FLMNET																									▲ 8 BSS FUE OPNET/FLMNET							
Family of High Military Load Capacity Bridging																																
Family of High Military Load Capacity Bridgi Capability Dev Document					■ FoHMLC CDD																											
Family of High Military Load Capacity Bridging AVLB Test II					■ FoHMLC AVLB Test II																											
Family of High Military Load Capacity Bridging Material Dev Decision					▲ 1 FoHMLC MDD																											
Family of High Military Load Capacity Bridging Milestone "B"													▲ 5 FoHMLC MSB																			
Family of High Military Load Capacity Bridging OTA Award									▲ 3 FoHMLC OTA Award																							
Family of High Military Load Capacity Bridging Prototype Developmnt AVLB/IRB/DSB													■ FoHMLC Prototype AVLB/IRB/DSB																			

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>

Event Name	FY 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																																																																																												
Family of High Military Load Capacity Bridging Log Development																	FoHMLC Log Dev																																																																																																							
Family of High Military Load Capacity Bridging Prototype Testing AVL/IRB/DSB																																	FoHMLC Prototype Testing AVL/IRB/DSB																																																																																							
Family of High Military Load Capacity Bridging Capabilities Production Doc																	7 FoHMLC CPD																																																																																																							
Family of High Military Load Capacity Bridging Milestone "C"																																																																	9 FoHMLC MSC																																																							
Family of High Military Load Capacity Bridging Low Rate Initial Production - AVL																																																																																					10 FoHMLC LRIP - AVL																																			
Family of High Military Load Capacity Bridging Full Rate Production - AVL																																																																																																									12 FoHMLC FRP - AVL															
Family of High Military Load Capacity Bridging Low Rate Initial Production - DSB																																																																																																																								
Family of High Military Load Capacity Bridging Low Rate Initial Production - IRB																	14 FoHMLC LRIP - IRB																																																																																																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Line Of Communication Bridge POR/ONS	2	2012	4	2021
Line Of Communication Bridge UMR Live Launch Crossing	1	2019	2	2019
Line Of Communication Bridge Durability	3	2019	1	2021
Line of Communication Bridge UMR Production	3	2019	2	2021
Line Of Communication Bridge Milestone "C"	1	2020	1	2020
Line Of Communication Bridge PQT/OT	2	2021	4	2022
Line of Communication COTS Manual Dev/Verification	2	2021	4	2022
Line of Communication Bridge POR Production	2	2021	4	2025
Line Of Communication Bridge FMR	4	2023	4	2023
Bridge Supplemental Set	2	2019	2	2019
Bridge Supplemental Set Proposal Development	2	2019	2	2019
Bridge Supplemental Set Milestone "B/C" Decision	1	2021	1	2021
BSS Prototype Development	3	2019	3	2020
Bridge Supplemental Set Log Demo	1	2020	2	2020
Bridge Supplemental Set Contract Award	2	2020	2	2020
Bridge Supplemental Set Production	3	2020	3	2023
Bridge Supplemental Set IOTE	3	2020	4	2020
Bridge Supplemental Set TM Development	2	2021	4	2022
Bridge Supplemental Set FUE OPNET.FLMNET	3	2022	3	2022
Family of High Military Load Capacity Bridging	1	2018	2	2022
Family of High Military Load Capacity Bridgi Capability Dev Document	4	2018	4	2019
Family of High Military Load Capacity Bridging AVLB Test II	2	2019	3	2019

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H02 / <i>Tactical Bridging - Engineering Development</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
Family of High Military Load Capacity Bridging Material Dev Decision	4	2019	4	2019
Family of High Military Load Capacity Bridging Milestone "B"	1	2021	1	2021
Family of High Military Load Capacity Bridging OTA Award	2	2020	2	2020
Family of High Military Load Capacity Bridging Prototype Developmnt AVLB/IRB/DSB	2	2020	3	2022
Family of High Military Load Capacity Bridging Log Development	4	2021	4	2023
Family of High Military Load Capacity Bridging Prototype Testing AVLB/IRB/DSB	4	2020	4	2023
Family of High Military Load Capacity Bridging Capabilities Production Doc	1	2022	1	2022
Family of High Military Load Capacity Bridging Milestone "C"	1	2023	1	2023
Family of High Military Load Capacity Bridging Low Rate Initial Production - AVL	1	2023	1	2023
Family of High Military Load Capacity Bridging Full Rate Production - AVLB	1	2024	1	2024
Family of High Military Load Capacity Bridging Low Rate Initial Production - DSB	1	2024	1	2024
Family of High Military Load Capacity Bridging Low Rate Initial Production - IRB	2	2024	2	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) H14 / <i>Materials Handling Equipment - Ed</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
H14: <i>Materials Handling Equipment - Ed</i>	-	0.714	0.333	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 engineering, manufacturing, and development of Material Handling Equipment (MHE) including the 5K Light Capability Rough Terrain Forklifts (LCRTF), Rough Terrain Container Handler (RTCH) equipment, All Terrain Lift Army System (ATLAS), and other cargo handling related items to enable Combat Service Support units to rapidly and efficiently move and deliver critical supplies worldwide to the Soldier. Efforts performed under this project include conducting market research, supporting operational requirements identification and validation, conducting trade studies, generating life cycle cost estimates, performing system engineering, developing performance specifications, conducting pre-production test and evaluation, and preparing program management and acquisition documents.

The RTCH a critical enabler of Army logistics support equipment that performs port opening operations, logistics movement, and unloading and loading of containers that handle break-bulk cargo at seaports, railheads, and airports. The RTCH represents a key enabler during Joint Logistics Over the Shore Operations (JLOTS) and lifts, moves, and stacks 20- and 40-foot ISO freight containers.

The ATLAS enables Terminal Services / Transfer Companies, Ammunition Companies, and Patriot Firing Battery Battalions with capabilities necessary to perform material handling functions up to 10,000lbs during beach, port, and air terminal operations; in material holding areas; and at marshalling yards. The ATLAS provides Commanders with multiple mission capabilities and reliable responsiveness to handle all supply classes supporting three levels of logistics - Strategic, Operational and Tactical.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: System Engineering/Program Management	0.714	0.333	-	-	-
Description: System Engineering and Program Management support for Material Handling Equipment.					
FY 2019 Plans: Provide funds for System Engineering and Program Management support for Material Handling Equipment operations.					
FY 2019 to FY 2020 Increase/Decrease Statement: No funding programmed for FY 2020.					
Accomplishments/Planned Programs Subtotals	0.714	0.333	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H14 / <i>Materials Handling Equipment - Ed</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 2020</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>
• G41002: <i>5K LIGHT CAPABILITY ROUGH TERRAIN (LCRT) FORKLIFT</i>	9.000	12.901	14.864	5.152	20.016	13.564	18.960	20.393	17.162	Continuing	Continuing
• MA4500: <i>Modification Of In-Svc Equipment (OPA-3)</i>	52.265	65.389	50.458	33.354	83.812	58.817	27.252	25.806	17.104	0.000	330.445

Remarks

D. Acquisition Strategy

Develop specifications for 5K Light Capability Rough Terrain Forklifts (LCRTF) improvements, and award contracts to produce test items for production verification testing. Testing LCRTF improvements to be performed using Army test facilities. Design lightweight armor solution for All Terrain Lift Army System (ATLAS) using U.S. Army TARDEC's Center for Ground Vehicle Development and Integration. Test armored ATLAS at Aberdeen Proving Ground, MD. Develop additional capabilities for existing systems such as the LCRFT, RTCH and ATLAS.

E. Performance Metrics

N/A

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				H14 / Materials Handling Equipment - Ed							
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
SBIR + STTR	TBD	TBD : TBD	0.032	-		-		-		-		-	0.000	0.032	-
Subtotal			0.032	-		-		-		-		-	0.000	0.032	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
MHE Training Aids	SS/FFP	Kalmar Rt : Cibolo, TX	2.555	-		-		-		-		-	0.000	2.555	-
RTCH Component Modernization	SS/Various	Various : Various	1.006	-		-		-		-		-	0.000	1.006	-
Lightweight Armor for ATLAS II	MIPR	TARDEC : Warren, MI	0.350	-		-		-		-		-	0.000	0.350	-
Sling Load Attachment for RTCH	C/FFP	Kalmar RT Center : Cibolo, TX	0.100	-		-		-		-		-	0.000	0.100	-
Platform Safety/Driver Assist	TBD	TBD : TBD	0.430	-		-		-		-		-	0.000	0.430	-
MHE System Improvement	SS/FFP	Automation Alley : Troy, MI	0.294	-		-		-		-		-	0.000	0.294	-
Subtotal			4.735	-		-		-		-		-	0.000	4.735	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 Improvements for LCRTF for Tactical Operations	MIPR	TARDEC : Warren, MI	0.055	-		-		-		-		-	0.000	0.055	-
Lightweight Armor for ATLAS II	MIPR	TARDEC : Warren, MI	0.110	-		-		-		-		-	0.000	0.110	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H14 / <i>Materials Handling Equipment - Ed</i>
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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			
System Engineering/ Program Management	MIPR	TARDEC : Warren, MI	0.200	0.714	Mar 2018	0.333	Mar 2019	-		-		-	Continuing	Continuing	-
Subtotal			0.365	0.714		0.333		-		-		-	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			
Lightweight Armor for ATLAS II	TBD	TBD : TBD	0.133	-		-		-		-		-	0.000	0.133	-
System Improvements for LCRTF for Tactical Operations	TBD	TBD : TBD	0.405	-		-		-		-		-	0.000	0.405	-
Investigate high speed towing for LCRTF	TBD	TBD : TBD	0.047	-		-		-		-		-	0.000	0.047	-
Testing of ATLAS II Wider Forklift	MIPR	Various : Various	0.023	-		-		-		-		-	0.000	0.023	-
Subtotal			0.608	-		-		-		-		-	0.000	0.608	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			5.740	0.714	0.333	-	-	-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H14 / <i>Materials Handling Equipment - Ed</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
System Engineering/Program Management																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) H14 / <i>Materials Handling Equipment - Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
System Engineering/Program Management	1	2018	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>			
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
L39: <i>Field Sustainment Support Ed</i>	-	4.750	2.220	1.675	-	1.675	1.720	1.773	1.807	1.800	0.000	15.745
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports the Engineering and Manufacturing Development (EMD) of critical capabilities for cargo aerial delivery for identified theater distribution and services capability gaps, improve unit sustainability, and increase combat effectiveness. Project supports the demonstration of engineering development models and Type Classification of cargo parachutes, airdrop containers and other aerial delivery equipment to improve safety, effectiveness, and efficiency of airborne operations. This project develops critical enablers that support the Army in executing future movement and maneuver operations and distributed sustainment support and the Army's Modular Force Capabilities by maintaining readiness through fielding and integrating new equipment. This project also ensures Army Expeditionary Forces are capable of rapid deployment by providing aerial delivery initiatives. This project also ensures Army Expeditionary Forces are capable of rapid deployment through aerial delivery initiatives and reduces sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands in lift, combat zone footprint, and costs for logistical support.

Funding supports modernization of current cargo aerial delivery systems by investigating technology insertions that increase accuracy, collision avoidance, in flight communications, and reliability. Funding also supports developing initial prototypes to enable refinement of operational requirements and early user feedback to support future sustainment and operational movement concepts.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Advanced Low Velocity Airdrop System (ALVADS) - Light and Heavy	2.026	-	-	-	-
Description: ALVADS - Light and Heavy are capable of airdrop operations at an altitude down to 750-ft Above Ground Level (AGL) for ALVADS-L and 975-ft AGL for ALVADS-H, while retaining the objective altitude of 500-ft AGL for both with increased aircraft survivability, and improved accuracy. Light-Gross rigged weight of 2,520-22,000 lbs and Heavy-Gross rigged weight of 22,001-42,000 lbs.					
Title: Extracted High and Low High Speed Container Delivery System (EHLSCDS)	1.273	0.248	-	-	-
Description: Provides a high speed (230 knot) low altitude (375 A AGL) capability for up to eight Container Delivery Systems (CDS) to enhance aircraft and aircrew safety while improving accuracy and reducing dispersion for receiving ground units.					
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete logistics deliverables. Obtain Milestone C decision and transition EHLSCDS into production. FY 2019 to FY 2020 Increase/Decrease Statement: Program completes in FY 19.					
Title: Joint Precision Airdrop System-2K Block 1 upgrade (JPADS-BLK1) Description: Supports increasing the technological and design maturity, testing, and integration of several key initiatives focused on: maintaining system accuracy and reliability in Global Positioning System (GPS) denied environments; collision avoidance; more precise position determination software; and improved Guidance Navigation and Control (GN&C) hardware. FY 2019 Plans: Complete system level testing and documentation updates to incorporate Engineering Change Proposal (ECP) changes into production. FY 2019 to FY 2020 Increase/Decrease Statement: Program complete in FY 2019, will transition validated Technical Data Package to Integrated Logistics Support Center for procurement and sustainment.	1.451	0.989	-	-	-
Title: Rapid Rigging and DeRigging Airdrop System (RRDAS) Description: Reduces rigging times while also providing the capability to rapidly de-rig loads on the drop zone. This will reduce the lead time to prepare Low Velocity Airdrop Load (LVADS) loads while also increasing the survivability of receiving ground forces by ensuring the airdrop loads (to include weapon systems, prime movers, trailers, etc.) are quickly de-rigged and made operational. FY 2019 Plans: Obtain Milestone B decision and award RRDAS prototype development contract. Fabricate RRDAS prototypes. FY 2020 Base Plans: Conduct Critical Design Review and initiate Developmental Testing FY 2019 to FY 2020 Increase/Decrease Statement: Increase to conduct Critical Design Review and initiate Developmental Testing.	-	0.912	1.675	-	1.675
Title: SBIR/STTR FY 2019 Plans:	-	0.071	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
SBIR/STTR					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> SBIR/STTR					
Accomplishments/Planned Programs Subtotals	4.750	2.220	1.675	-	1.675

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>
• K39: <i>Field Sustainment Support Ad</i>	2.332	2.308	0.000	-	0.000	-	-	-	-	0.000	4.640
• MA7806: <i>Precision Airdrop</i>	4.147	5.731	0.000	2.040	2.040	2.040	-	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy

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

E. Performance Metrics

N/A

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				L39 / Field Sustainment Support Ed							
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 Support	Various	PM FSS : Natick, MA	4.854	0.500		0.329		0.350		-		0.350	0.000	6.033	Continuing
SBIR+STTR	TBD	Various : Various	0.129	-		0.071		-		-		-	0.000	0.200	-
Subtotal			4.983	0.500		0.400		0.350		-		0.350	0.000	6.233	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
ALVADS-L&H	Various	Various : Various	16.160	0.992		-		-		-		-	0.000	17.152	Continuing
EHLSCDS	Various	Various : Various	0.450	-		0.150		-		-		-	0.000	0.600	-
JPADS	Various	Various : Various	-	1.465		0.250		-		-		-	0.000	1.715	-
RRDAS	Various	Various : Various	-	-		0.847		0.850		-		0.850	0.000	1.697	-
Subtotal			16.610	2.457		1.247		0.850		-		0.850	0.000	21.164	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
EHLSCDS	Various	Various : Various	0.050	0.374		-		-		-		-	0.000	0.424	-
ALVADS	Various	Various : Various	0.050	-		-		-		-		-	0.000	0.050	-
JPADS	Various	Various : Various	-	0.200		-		-		-		-	0.000	0.200	-
Subtotal			0.100	0.574		-		-		-		-	0.000	0.674	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>

Event Name	FY 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
Conduct Developmental Testing/Operational Testing DT/OT on A...	S-L&H																											
Milestone C ALVADS					▲ 1																							
Conduct OT for EHLSCDS																												
Complete Milestone C/TC STD deliverables on EHLSCDS																												
Conduct DV on SADE Rotary A/C Auto Hookup																												
Conduct DT on SADE HAUL-UP																												
Complete Milestone C/TC-STD EHLSCDS					▲ 2																							
JPADS Block I upgrade PQT and OT																												
Complete Milestone B on RRDAS					▲ 3																							
Develop and fabricate RRDAS prototypes																												
Conduct DT for Rapid Rigging De Rigging Airdrop System (RRDAS)																												
Conduct OT for RRDAS																												
Complete Milestone C for RRDAS																	▲ 4											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>

Event Name	FY 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												
Initiate Phase II RRDAS																																								
Conduct DT and OT for ALVADS DRAS capability																																								
Develop and Fabricate RRDAS - Phase II Prototypes																																								
Conduct DT and OT for RRDAS Phase II																																								
Complete MS C/TC STD deliverables on RRDAS Phase II																																								

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L39 / <i>Field Sustainment Support Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Complete Advanced Low Velocity Airdrop System L&H (ALVADS) DV Testing	4	2014	3	2015
Conduct Developmental Testing/Operational Testing DT/OT on ALVADS-L&H	1	2016	1	2018
Milestone C ALVADS	4	2018	4	2018
Conduct OT for EHLSCDS	1	2018	3	2018
Complete Milestone C/TC STD deliverables on EHLSCDS	4	2018	2	2019
Conduct DV on SADE Rotary A/C Auto Hookup	3	2018	4	2018
Conduct DT on SADE HAUL-UP	2	2018	4	2018
Complete Milestone C/TC-STD EHLSCDS	2	2019	2	2019
JPADS Block I upgrade PQT and OT	1	2018	3	2019
Conduct PQT for EHLSCDS	1	2017	2	2017
Complete Milestone B on RRDAS	2	2019	2	2019
Develop and fabricate RRDAS prototypes	3	2019	1	2020
Conduct DT for Rapid Rigging De Rigging Airdrop System (RRDAS)	2	2020	4	2020
Conduct OT for RRDAS	3	2020	1	2021
Complete Milestone C for RRDAS	4	2021	4	2021
Initiate Phase II RRDAS	1	2022	4	2024
Conduct DT and OT for ALVADS DRAS capability	3	2018	2	2019
Develop and Fabricate RRDAS - Phase II Prototypes	1	2022	4	2022
Conduct DT and OT for RRDAS Phase II	1	2023	2	2024
Complete MS C/TC STD deliverables on RRDAS Phase II	3	2024	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>			
COST (\$ in Millions)	Prior Years	FY 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
L41: <i>Water And Petroleum Distribution - Ed</i>	-	6.127	10.761	7.540	-	7.540	7.559	7.620	7.935	5.685	0.000	53.227
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project provides all services with ample supply of clean fuel and water, supporting all types of missions. The Army has the mission to supply fuel for all land-based forces, including the Marines and the Air Force, and for supplying bulk drinking water to Soldiers. These Engineering and Manufacturing Development programs enable the Army to improve maneuver sustainment operations to meet the demands of the all Army units and the Future Force. The mission includes receiving and transferring petroleum from trucks, ships, pipelines and permanent and temporary storage facilities; moving petroleum from storage to and within corps and division areas; fuel quality surveillance testing; and dispensing in support of tactical operations, including rapid refueling of aircraft. This project also supports development and analysis of technologies designed to increase survivability of petroleum and water systems that may operate or be transported in hostile environments. The mission covers water purification and waste water treatment, reutilization, storage, distribution, alternative water source acquisition, disposal, and quality control. These Research and Development (R&D) missions support the development and enhancement of rapidly deployed Petroleum and Water equipment which enables the Army to achieve its vision by providing a highly mobile and self-sustaining systems in hostile joint operations areas. New start programs include; Tactical Fuel Distribution System (TFDS), Bulk Fuel Distribution System (BFDS), Petroleum Expeditionary Analysis Kit (PEAK), Water Bison, and Water Storage and Distribution System (WSDS) 40,000 gallon and 100,000 gallon sets.

"Funding supports modernization of the current Petroleum and Water System fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Victory Architecture, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts".

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: 3K Tactical Water Purification System (TWPS).	0.521	1.057	1.760	-	1.760
Description: The 3,000 (3k) Gallons per Hour (GPH) Tactical Water Purification System (TWPS) replaces the legacy 3,000 (3k) GPH Reverse Osmosis Water Purification Unit (ROWPU), which is currently the largest water purification capability in the Army's inventory and is nearing the end of its useful life. The 3k TWPS shall be the sole bulk water capability supporting Echelons Above Brigade (EAB) and will be the primary water purification capability for laundry and shower facilities. Purifies up to 3,000 GPH from any water source, including 60,000 milligrams per liter, Total Dissolved Solids (TDS) salt water and CBRN contaminated sources. Consists of feed water pumps, hoses, media and cartridge filters, high pressure pump, reverse osmosis elements, 3,000 gallon water storage and distribution system, and control panel. Supports all tactical water missions, is Load Handling					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
System (LHS)/Palletized Load System (PLS) truck compatible via Container Handling Unit (CHU)/ Enhanced Container Handling Unit (E-CHU). FY 2019 Plans: Complete Milestone B and Level 2 Technical Data Package (TDP). Begin Other Transaction Authority (OTA) efforts by conducting Industry Day. FY 2020 Base Plans: Develop Performance Specification based on Industry Day. Develop Request for Prototype Proposal (RPP) and award Phase I OTA. FY 2019 to FY 2020 Increase/Decrease Statement: Awaiting Milestone B package approval.					
Title: Modular Tactical Retail Refueling System (MTRRS) Description: The Mobile Tactical Retail Refueling System (MTRRS) will replace the Tank Pump Unit (TPU) and Tank Unit Liquid Dispensing (TLUD) systems, which are nearing the end of its useful life. It provides filtered fuel to Echelons Above Brigade. It has a 1,050 gallon capacity fuel tank, 17 gallons per minute electric fuel motor/pump, a filter separator, and a flow meter. MTRRS is compatible with multiple transport platforms including cargo trucks, trailers, and LHS flat-racks. The system can be removed from the transport platform and operated on the ground. FY 2020 Base Plans: Support Costs. FY 2019 to FY 2020 Increase/Decrease Statement: Modular Tactical Retail Refueling System (MTRRS) in production.	3.460	-	0.086	-	0.086
Title: Water Bison Description: The Unit Water Trailer (Water Bison) is a replacement for the 400 gallon Water Buffalo. A second variant, the Water Bison Lite, is also required. The Water Bison consists of a baffled, 500 gallon capacity tank and the Water Bison Lite consists of a baffled, 250 gallon capacity tank. They provide the modular force an efficient method of transporting a full day supply (DOS) of bulk potable water. Both systems include freeze protection that are mounted on a trailer and include all hoses and fittings necessary to dispense water by	-	0.149	0.327	-	0.327

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>means of gravity flow. The Water Bison and Water Bison Lite will be used by units at all echelons. The Family of Medium Tactical Vehicles (FMTV) shall be capable of towing this system.</p> <p>FY 2019 Plans: Milestone B documentation.</p> <p>FY 2020 Base Plans: Prepare Other Transaction Authority (OTA) Request for Prototype Proposal (RPP) contract. Milestone B approval.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase - Capability Production Document (CPD) approved, awaiting Materiel Development Decision (MDD) approval.</p>					
<p>Title: Early Entry Fluid Distribution System (E2FDS).</p> <p>Description: The Early Entry Fluid Distribution System (E2FDS) is a new materiel system that enhances the Inland Petroleum Distribution System (IPDS) pipeline and rapidly establishes new or extends existing pipeline traces. It is a high throughput flexible conduit system for the transport of bulk petroleum or water across the battlefield. It is rapidly-emplaced and capable of a throughput of 850,000 gallons of fuel or 650,000 gallons of raw non-potable water, per a 20 hour operational day through a trace up to 50 miles long. The E2FDS requires little to no engineer support to emplace the conduit or pump stations. Pump stations are fully automated and centrally controlled.</p> <p>FY 2019 Plans: Test Readiness Review (TRR), test assets delivered, and conduct Developmental Testing (DT).</p> <p>FY 2020 Base Plans: Conduct Log Demo testing.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: E2FDS will be in production.</p>	0.015	3.470	1.600	-	1.600
<p>Title: Petroleum Expeditionary Analysis Kit (PEAK)</p> <p>Description: The Petroleum Expeditionary Analysis Kit (PEAK) replaces Aviation Fuels Contamination Test Kit (AFCTK) and provides fuel quality surveillance within all Brigade Combat Teams and Support Brigades. It is a stand-alone system that will rapidly verify petroleum products' suitability for use at point of consumption. The</p>	-	0.149	0.488	-	0.488

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>PEAK will evaluate all kerosene-based and diesel fuels used in ground systems and aircraft. It will provide the field with the capability to determine fuel type, grade, and additives.</p> <p>FY 2019 Plans: Developmental Testing. Achieve Milestone B.</p> <p>FY 2020 Base Plans: Award Other Transaction Authority (OTA) Request for Prototype Proposal (RPP). Milestone B approval. Conduct start of work meeting and preparation of asset delivery.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Capability Development Document (CDD) approved, awaiting Materiel Development Decision (MDD) approval.</p>					
<p>Title: Bulk Fuel Distribution System (BFDS)</p> <p>Description: The Bulk Fuel Distribution System (BFDS) provides theater bulk petroleum distribution to maximize throughput to support early entry, buildup, and onward movement of forces. The BFDS consists of a 7,500 gallon line haul tanker trailer, pulled primarily by the M915A3 or later version tractor. The BFDS provides bulk distribution between large fuel storage areas and will include a automated level gauge sensor for mission command reporting and providing asset and in-transit visibility. The BFDS is not capable of off-road or retail operations.</p> <p>FY 2019 Plans: Develop purchase description and Milestone C documentation. Continue Market Research activities.</p> <p>FY 2020 Base Plans: Award Other Transaction Authority (OTA) in support of ballistic requirement, conduct test and market research for production. Conduct start of work meeting and preparation of asset delivery.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Awaiting Material Development Decision (MDD) approval</p>	-	0.149	0.705	-	0.705
<p>Title: Petroleum Water Trace Tool (PAWTL)</p> <p>Description: Petroleum and Water Trace Locator (PAWTL) supports all Army petroleum and water pipeline systems. It is a geospatial based software application that allows planners to develop pipeline traces based on</p>	0.395	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
any mission scenario. The software identifies roadways and uses terrain elevation data to recommend pipeline routes and pump station placement.					
<p>Title: Tactical Fuel Distribution System (TFDS)</p> <p>Description: The Tactical Fuel Distribution System (TFDS) provides theater bulk petroleum distribution to maximize throughput in order to support early entry, buildup, and onward movement of forces. It replaces the M967 and M969 tanker trailers, which are nearing the end of its useful life. The TFDS consists of a 5,000 gallon line haul tanker trailer, pulled primarily by the M1088 tractor. It shall be capable of retail fuel distribution and able to travel on unimproved roads and provides support from the Theater Army to Echelons Above Brigade (EAB).</p> <p>FY 2019 Plans: Awaiting CPD approval. Support Materiel Development Decision (MDD) and market research.</p> <p>FY 2020 Base Plans: Continue Market Research. Milestone B document development, Request for Prototype Proposal (RPP) development.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Awaiting CPD approval support Army Requirements Oversight Counsel (AROC) .</p>	-	0.149	0.100	-	0.100
<p>Title: PM Support</p> <p>Description: Program Management (PM) Support is matrix support that includes PM travel expenses and systems engineering oversight required to manage Research, Development, Technology and Engineering (RDT&E) projects. Includes salaries and travel for the support of programs within this Project.</p> <p>FY 2019 Plans: Funds matrix support, travel, and general oversight efforts.</p> <p>FY 2020 Base Plans: Funds matrix support, travel, and general oversight efforts.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease as a result of 2 systems transitioning to production, therefore less systems engineering support is required.</p>	1.736	4.788	0.754	-	0.754
<p>Title: Load Handling System (LHS) - Compatible Water Tankrack System (HIPPO)</p>	-	0.850	1.720	-	1.720

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Load Handling System (LHS) - Compatible Water Tank Rack System (HIPPO) replaces the Forward Area Water Point Supply system (FAWPSS) and Semi-Trailer Mounted Fabric Tank (SMFT). It provides capability to receive, store, transport, and distribute bulk and unit retail water to the warfighter. The HIPPO consists of a 2,000 gallon potable water tank in a 20' ISO frame with integrated pump, engine, alternator, hose reel, freeze prevention, and fill stand. The HIPPO is critical for sustaining the soldier and accomplishing combat service support missions at all echelons. Legacy water distribution systems do not provide the mobility required to achieve unit distribution goals for the current and objective force.</p> <p>FY 2019 Plans: .No funding planned.</p> <p>FY 2020 Base Plans: Conduct prototype fly-off test.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: No FY19 funding. FY20 funds are required in support of fly off contract effort prior to the award of a production contract. Three contracts will be awarded for prototype development and FAT fly-off where the contractor prototypes will undergo testing. One will be selected for the production contract.</p>					
Accomplishments/Planned Programs Subtotals	6.127	10.761	7.540	-	7.540

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
• K41: <i>Water And Petroleum Distribution - Ad</i>	3.954	-	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• MA6000: <i>Distribution Systems, Petroleum & Water</i>	41.622	26.471	74.867	13.986	88.853	76.583	54.169	27.142	37.552	0.000	352.392
• R67500: <i>PETROLEUM QUALITY ANALYSIS SYSTEM</i>	6.903	-	0.000	-	0.000	-	-	-	-	0.000	6.903

Remarks

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

Develop engineering prototypes for the 3K Tactical Water Purification System (3K TWPS), Petroleum Tankers, Early Entry Fluid Distribution System (E2FDS) and Load Handling System (LHS) - Compatible Water Tank Rack System (HIPPO) select Non-Development Item (NDI) based on market surveys and proposals from industry. Conduct industry days and based on additional market research will award either competitive or sole source contracts. Conduct Integrated Product Team (IPT's) and develop acquisition strategies for Water Bison, Petroleum Expeditionary Analysis Kit (PEAK), Tactical Fuel Distribution System (TFDS), Small Unit Water Purifier (SUWP); Bulk Fuel Distribution System (BFDS) and Water Storage and Distribution System (WSDS) Black Water, Gray Water, Mobile Tactical Retail Refueling System (MTRRS). Conduct developmental and operational testing where applicable for 3K TWPS, Bison, E2FDS, Petroleum Tankers, MTRRS, Water Storage and Distribution Systems (WSDS), PEAK, SUWP, HIPPO. Conduct Source Selection Evaluation Boards (SSEBs) within the Petroleum and Water Systems portfolio. Develop documentation in support of Milestone Decisions. Will award Other Transactional Agreements (OTAs) or traditional Federal Acquisition Regulation (FAR) based contracts based on market research, industry capabilities and program risks.

E. Performance Metrics

N/A

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				L41 / Water And Petroleum Distribution - Ed							
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
PM Support	MIPR	TARDEC : Warren, MI	-	-		4.788	Dec 2018	0.754	Jan 2020	-		0.754	0.000	5.542	Continuing
Subtotal			-	-		4.788		0.754		-		0.754	0.000	5.542	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
Petroleum Expeditionary Analysis Kit (PEAK)	C/FFP	TACOM : Warren, MI	-	-		-		0.416	Jan 2020	-		0.416	0.000	0.416	-
3K Tactical Water Purification System (3K TWPS)	C/FFP	TACOM : Warren, MI	-	-		1.023	Jan 2019	1.279		-		1.279	0.000	2.302	-
Early Entry Fluid Distribution System (E2FDS)	C/FFP	DRS Systems : TBD	-	-		0.014	Feb 2019	-		-		-	0.000	0.014	-
Modular Tactical Retail Refueling System (MTRRS)	C/FFP	TACOM : Warren, MI	-	3.250	Oct 2018	-		0.086	Jun 2020	-		0.086	0.000	3.336	-
Petroleum Water Trace Tool (PAWTL)	MIPR	TARDEC : Warren, MI	-	0.015	Jan 2018	-		-		-		-	0.000	0.015	-
Subtotal			-	3.265		1.037		1.781		-		1.781	0.000	6.083	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
3K Tactical Water Purification System (3K TWPS)	MIPR	NAVSEA UARC Office : Washington, DC	0.470	-		0.395	Feb 2019	0.481	Feb 2020	-		0.481	Continuing	Continuing	Continuing
Water Bison	MIPR	Various : Warren, MI	-	0.045	Nov 2017	0.045	Mar 2019	0.327		-		0.327	0.000	0.417	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) L41 / Water And Petroleum Distribution - Ed
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Support (\$ in Millions)				FY 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			
Early Entry Fluid Distribution System (E2FDS)	MIPR	TARDEC : Warren, MI	6.482	1.701	Dec 2017	1.024	Jan 2019	-		-		-	0.000	9.207	Continuing
Mobile Tactical Retail Refueling System (MTRRS)	MIPR	TARDEC : Warren, MI	-	0.310	Dec 2017	0.500	Jan 2019	-		-		-	0.000	0.810	-
Bulk Fuel Distribution System (BFDS)	MIPR	TARDEC : Warren, MI	-	0.045	Oct 2018	0.045	Mar 2019	0.705	Jan 2020	-		0.705	0.000	0.795	-
Petroleum Expeditionary Analysis Kit (PEAK)	MIPR	TARDEC : Warren, MI	-	-		0.300	Feb 2019	0.072	Oct 2019	-		0.072	0.000	0.372	-
Petroleum Water Trace Tool (PAWTL)	MIPR	TARDEC : Warren, MI	-	0.360	Feb 2018	-		-		-		-	0.000	0.360	-
Tactical Fuel Distribution System (TFDS)	MIPR	TARDEC : Warren, MI	-	-		0.045	Feb 2019	0.100	Feb 2020	-		0.100	0.000	0.145	-
Subtotal			6.952	2.461		2.354		1.685		-		1.685	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			
Early Entry Fluid Distribution System (E2FDS)	MIPR	Aberdeen Proving Ground : APG, MD	-	0.401	Aug 2018	1.732	Jan 2019	1.600	Mar 2020	-		1.600	0.000	3.733	-
Load Handling System (LHS) Compatible Water Tank rack System (HIPPO)	MIPR	TBD : TBD	-	-		-		1.720	Jan 2020	-		1.720	0.000	1.720	-
3K Tactical Water	MIPR	APG : APG, MD	0.200	-		-		-		-		-	0.000	0.200	Continuing
Modular Tactical Retail Refueling System (MTRRS)	MIPR	Keweenaw Research Center (KRC) : Houghton, Mleew	0.317	-		0.850	Apr 2019	-		-		-	0.000	1.167	-
Subtotal			0.517	0.401		2.582		3.320		-		3.320	0.000	6.820	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>			
	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	7.469	6.127		10.761		7.540	-	7.540	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

Event Name	FY 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																								
Expeditionary Water Packaging System (EWPS)																																																				
3K Tactical Water Purification System (3K TWPS)																																																				
3K TWPS Milestone B																																	6 MS B																			
3K TWPS CDR																																	4 Industry Day				8 CDR															
3K TWPS Industry Day																																					15 OTA Phase I															
3K TWPS OTA Phase I RPP																																																				
Water Bison																																																				
Water Bison MDD									9 MDD																																											
Water Bison Milestone C																	27 MS B/C																																			
Water Bison Full Rate Production (FRP)																					29 FRP																															
Early Entry Fluid Distribution System (E2FDS)																																																				
E2FDS Preliminary Design Review (PDR)	1 PDR																																																			
E2FDS Critical Design Review (CDR)					2 CDR																																															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

Event Name	FY 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									
E2FDS Developmental Testing																																					
E2FDS Milestone C																	12 MS C																				
E2FDS Limited User Test (LUT)																																					
E2FDS Full Rate Production (FRP)																	14																				
Modular Tactical Retail Refueling System (MTRRS)																																					
MTRRS Milestone B													3 MS B/C																								
MTRRS Developmental Testing																																					
MTRRS Milestone C																					16 MS C																
MTRRS PQT																																					
MTRRS Full Materiel Release (FMR)																									22 FMR												
MTRRS Full Rate Production (FRP)													17																								
Army Fuels Automated Management System (AFAMS) Tank Gauging																																					
Pipeline Trace Tool																																					

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>
		Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

Event Name	FY 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
Pipeline Trace Tool E2FDS - Software Development																												
	Software Development																											
Bulk Fuel Distribution System (BFDS)																												
Bulk Fuel Distribution System Materiel Development Decision (MDD)									▲ 5 MDD																			
Petroleum Expeditionary Analysis Kit (PEAK)																												
	Petroleum Expeditionary Analysis Kit (PEAK)																											
PEAK Reqs. Refinement & Tech. Dev.																												
	Reqs. Refinement & Tech. Dev.																											
PEAK Materiel Development Decision (MDD)									▲ 10 MDD Approved																			
PEAK Mileston B													▲ 11 MS B															
PEAK Milestone C																	▲ 20 MS C											
PEAK Full Materiel Release (FMR)																					▲ 25 FMR							
Tactical Fuel Distribution System (TFDS)																												
Tactical Fuel Dist Sys (TFDS) Material Development Decision (MDD)									▲ 7 MDD																			
Tactical Fuel Dist Sys (TFDS) Milestone B																	▲ 21											
Tactical Fuel Dist Sys (TFDS) Milestone C																					▲ 26							

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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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
Tactical Fuel Dist Sys (TFDS) Operational Test (OT)																	28											
Tactical Fuel Dist Sys (TFDS) Full Rate Production (FRP)																	24											
Load Handling System (LHS) - Compatible Water Tankrack System (HIPPO)																												
HIPPO Contract Award																	15											
HIPPO Fly-off																	Prototype Test											
HIPPO Milestone C																	18											
HIPPO Production Award																	19											
HIPPO Full Rate Production (FRP)																	23											

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Expeditionary Water Packaging System (EWPS)	1	2018	1	2025
EWPS	1	2017	3	2017
3K Tactical Water Purification System (3K TWPS)	2	2016	2	2025
3K TWPS Milestone B	3	2019	3	2019
3K TWPS CDR	4	2019	4	2019
3K TWPS Industry Day	2	2019	2	2019
3K TWPS OTA Phase I RPP	1	2021	1	2021
Water Bison	1	2020	4	2024
Water Bison MDD	4	2019	4	2019
Water Bison Milestone C	2	2023	2	2023
Water Bison Full Rate Production (FRP)	4	2024	4	2024
Early Entry Fluid Distribution System (E2FDS)	1	2017	4	2020
E2FDS Preliminary Design Review (PDR)	1	2018	1	2018
E2FDS Critical Design Review (CDR)	3	2018	3	2018
E2FDS Developmental Testing	4	2019	4	2020
E2FDS Milestone C	3	2020	3	2020
E2FDS Limited User Test (LUT)	3	2021	2	2022
E2FDS Full Rate Production (FRP)	4	2020	4	2020
Modular Tactical Retail Refueling System (MTRRS)	1	2017	4	2022
MTRRS Milestone B	3	2018	3	2018
MTRRS Developmental Testing	3	2019	4	2019
MTRRS Milestone C	1	2021	1	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019	
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L41 / <i>Water And Petroleum Distribution - Ed</i>		

Events	Start		End	
	Quarter	Year	Quarter	Year
MTRRS PQT	3	2020	2	2021
MTRRS Full Materiel Release (FMR)	2	2022	2	2022
MTRRS Full Rate Production (FRP)	2	2021	2	2021
Army Fuels Automated Management System (AFAMS) Tank Gauging	1	2017	4	2018
Pipeline Trace Tool	4	2016	1	2020
Pipeline Trace Tool E2FDS - Software Development	4	2016	1	2020
Bulk Fuel Distribution System (BFDS)	1	2019	2	2023
Bulk Fuel Distribution System Materiel Development Decision (MDD)	3	2019	3	2019
Petroleum Expeditionary Analysis Kit (PEAK)	1	2020	4	2022
PEAK Reqts. Refinement & Tech. Dev.	1	2020	4	2020
PEAK Materiel Development Decision (MDD)	1	2020	1	2020
PEAK Mileston B	2	2020	2	2020
PEAK Milestone C	4	2021	4	2021
PEAK Full Materiel Release (FMR)	4	2022	4	2022
Tactical Fuel Distribution System (TFDS)	1	2022	1	2025
Tactical Fuel Dist Sys (TFDS) Material Development Decision (MDD)	3	2019	3	2019
Tactical Fuel Dist Sys (TFDS) Milestone B	1	2022	1	2022
Tactical Fuel Dist Sys (TFDS) Milestone C	1	2023	1	2023
Tactical Fuel Dist Sys (TFDS) Operational Test (OT)	4	2023	4	2023
Tactical Fuel Dist Sys (TFDS) Full Rate Production (FRP)	4	2022	4	2022
Load Handling System (LHS) - Compatible Water Tankrack System (HIPPO)	3	2020	4	2022
HIPPO Contract Award	3	2020	3	2020
HIPPO Fly-off	1	2021	2	2021
HIPPO Milestone C	3	2021	3	2021
HIPPO Production Award	3	2021	3	2021

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019	
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Events	Start		End	
	Quarter	Year	Quarter	Year
HIPPO Full Rate Production (FRP)	4	2022	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>					Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>		
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
L43: <i>ENGINEER SUPPORT EQUIPMENT - ED</i>	-	3.644	0.341	1.242	-	1.242	2.904	0.200	0.000	0.000	0.000	8.331
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This project supports development, demonstration, testing and evaluation within the Combat Engineer and Construction Support Equipment arena. These items include critical life support equipment such as diving, fire fighting, fire suppression, urban and dense urban operations, subterranean operations, breathable air compressors, and emergency and recovery sets along with engineer safety and special unit support equipment and photo support sets. The Combat Engineer and Construction equipment consists of the Surveying, Firefighting Individual Requirements Equipment Support (FIRES), Fire Protection Equipment Type I, II and III, Tactical Fire Fighting Truck Tools (TFTT), Family of Power Utility Kits (FoPUK), and Soldier Portable Kits, Lineman's Tool Kit, Concrete and Masonry, Electricians, Plumbers, Pipefitters, Family of Light Sets (FoLS), Airfield Damage Repair Kit (ADRK), Diving Equipment, Surface Swimmer Support Sets, Surface Supplied Diving Set, procurement of new Technical/Special Tools, Pioneer Support Set, and the Pioneer Land Clearing and Building Erection Set. Project will explore Additive Manufacturing for Engineer systems. Funding will support the procurement of market samples and testing for Soldier Portable Sets, Kits, and Outfits (SKO), Special Tools initiative, and critical life support equipment such as the Deep Sea Set, Underwater Construction Set, Photo Support Set, Diver Supplemental Issue Set, Closed Circuit Scuba Set, Supervisor Propulsion Emergency and Recovery SCUBA (SPEaRS), Divers' Supplemental Issue Set(DSIS), Vertical Skills Engineer Construction Kit (VSECK), and Family of Boats and Motors (FOBAM).

BUDGET ITEM JUSTIFICATION: These systems provide state-of-the-art deployable, combat engineer and construction equipment and critical life support along with engineer safety and special unit support equipment supporting the joint warfighter. These programs enhance combat and military operations minimize transportation requirements and reduce the logistical footprint by eliminating obsolete equipment and reducing the number of programs. Funding shall allow for development of dual use systems that support wartime use by Soldiers to include Special Forces and peacetime operations that include national disaster relief and homeland security operations. Much of this equipment has an inherent short Economic Useful Life (EUL). Investments used to revise, update and obtain equipment within this portfolio has resulted in increased readiness, safety, and effectiveness and reductions in footprint.

Funding supports modernization of the current Ordnance/Engineer equipment by investigating technology insertions due to but not limited to obsolescence and technology innovations. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Family of Power Utility Kits (FoPUK)	2.190	0.050	0.050	-	0.050

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Conduct Market Research, Develop, and Initiate procurement activities for Family of Power Utility Kits (FoPUK).</p> <p>FY 2019 Plans: TM Development, Validation, Log Demo, Verification, Engineer/QA/PM Support</p> <p>FY 2020 Base Plans: TM Development, Validation, Log Demo, Verification, Engineer/QA/PM Support</p>					
<p>Title: Supervisory Propulsion, Emergency and Recovery Set (SPEaRS)</p> <p>Description: Prepare documentation, conduct market research, procure production representative, and complete required testing.</p> <p>FY 2019 Plans: TM Development, Engineer/QA/PM Support</p> <p>FY 2020 Base Plans: TM Development, Engineer/QA/PM Support</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased from FY 2019 to FY 2020 for the completion of the testing effort.</p>	0.430	0.084	0.239	-	0.239
<p>Title: Engineering and Quality Assurance</p> <p>Description: Engineering and Quality Assurance of engineering SKOs</p> <p>FY 2019 Plans: Engineering and Quality Assurance of engineering SKOs</p> <p>FY 2020 Base Plans: Engineering and Quality Assurance of engineering SKOs</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased from FY 2019 to F 20Y20 because total project budget increased which will require additional support to complete the RDTE efforts.</p>	0.300	0.124	0.370	-	0.370
<p>Title: Airfield Damage Repair Kit (ADRK)</p>	0.150	0.015	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Conduct Market Research and Procure Market Samples for the ADRK.</p> <p>FY 2019 Plans: Engineer/QA/PM Support</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreased from FY 2019 to FY 2020 because the system will be ready to enter the Production phase of the lifecycle.</p>					
<p>Title: Program Management Support</p> <p>Description: Program support costs associated with emerging program development.</p> <p>FY 2019 Plans: Salary support in the product office for emerging programs.</p> <p>FY 2020 Base Plans: Salary support in the product office for emerging programs.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased from FY 2019 to FY 2020 because total project budget increased which will require additional support to complete the RDTE efforts.</p>	0.249	0.048	0.086	-	0.086
<p>Title: Special Tools</p> <p>Description: Develop Rapid Deployment Sets, Kits, and Outfits (SKOs) - Special Tool and support to Engineer combat and constructions sets along with diving and boats / motors equipment.</p> <p>FY 2019 Plans: Market Research for Special Tools, PRS Hardware, Test, Engineer/QA/PM Support</p> <p>FY 2020 Base Plans: Market Research for Special Tools, PRS Hardware, Test, Engineer/QA/PM Support</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased from FY 2019 to FY 2020 because total project budget increased which will require allow for additional RDTE efforts for Special Tools.</p>	0.325	0.020	0.074	-	0.074
<p>Title: Photo Support Set</p>	-	-	0.056	-	0.056

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: Photo Support Set FY 2020 Base Plans: TM Development, Validation, Log Demo, Verification, Engineer/QA/PM Support FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased from FY 2019 to FY 2020 because this is a new requirement to be funded in FY 2020.					
Title: Diver Supplemental Issue Set Description: Diver Supplemental Issue Set FY 2020 Base Plans: TM Development, Validation, Log Demo, Verification, Engineer/QA/PM Support FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased from FY 2019 to FY 2020 because this is an new requirement to be funded in FY 2020.	-	-	0.153	-	0.153
Title: Soldier Portable System FY 2020 Base Plans: TM Development, Validation, Log Demo, Verification, Engineer/QA/PM Support FY 2019 to FY 2020 Increase/Decrease Statement: Funding increased from FY 2019 to FY 2020 because this is a new requirement to be funded in FY 2020.	-	-	0.214	-	0.214
Accomplishments/Planned Programs Subtotals	3.644	0.341	1.242	-	1.242

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
• R70001: <i>Family Of Engr Combat and Construction Sets</i>	10.426	15.978	11.451	-	11.451	23.348	30.436	-	-	0.000	91.639
• R12001: <i>Family of Boats and Motors</i>	4.302	8.006	8.245	-	8.245	5.295	-	-	-	0.000	25.848

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>

D. Acquisition Strategy

Programs will progress from pre Milestone Decision Document (MDD) activities through market research, market samples, Description for Purchase, development, production representative systems and testing. Modernization and Optimization of existing tools and testing of market samples will progress from Engineering and Manufacturing Development (EMD) and transition into production. All efforts will support the two level maintenance concept utilizing commercial technologies and incorporating them into SKOs to support next generation weapon and support systems.

E. Performance Metrics

N/A

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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 / 5				PE 0604804A / Logistics and Engineer Equipment - Eng Dev				L43 / ENGINEER SUPPORT EQUIPMENT - ED							
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 Support	MIPR	PM SKOT : MI	0.159	0.249	Dec 2017	0.048	Dec 2018	0.087	Dec 2019	-		0.087	Continuing	Continuing	-
Subtotal			0.159	0.249		0.048		0.087		-		0.087	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
Conduct Market Research for Family of Power Utility Kits (FoPUK)	MIPR	TBD : TBD	0.540	1.300		0.040	Oct 2018	0.040	Oct 2019	-		0.040	Continuing	Continuing	-
Market Samples for Supervisory, Propulsion, Emergency and Recovery Set (SPEARS)	MIPR	TBD : TBD	0.263	-		0.040	Oct 2018	0.092	Oct 2019	-		0.092	Continuing	Continuing	-
Conduct Market Research for Urban Search and Rescue	MIPR	TBD : TBD	0.893	-		-		-		-		-	0.000	0.893	-
Airfield Damage Repair Kit (ADRK)	TBD	TBD : TBD	-	0.055		-		-		-		-	0.000	0.055	-
Special Tools hardware	TBD	TBD : TBD	-	0.100		0.005	Jan 2019	0.050	Jan 2020	-		0.050	0.000	0.155	-
Photo Support Set	TBD	TBD : TBD	-	-		-		0.012	Oct 2019	-		0.012	0.000	0.012	-
Soldier Portable System	TBD	TBD : TBD	-	-		-		0.168	Oct 2019	-		0.168	0.000	0.168	-
Diver Supplemental Issue Set	TBD	TBD : TBD	-	-		-		0.087	Oct 2019	-		0.087	0.000	0.087	-
Subtotal			1.696	1.455		0.085		0.449		-		0.449	Continuing	Continuing	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>
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Support (\$ in Millions)				FY 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			
Engineering and Quality Assurance - FoPuk	MIPR	ECBC/ARDEC : Rock Island, IL	-	0.590		0.010	Oct 2018	0.010	Oct 2019	-		0.010	Continuing	Continuing	-
Engineering and Quality Assurance (ES&SUS)	MIPR	ECBC/ARDEC : Rock Island, IL	0.110	-		-		-		-		-	Continuing	Continuing	-
Engineer and Quality Assurance Support - SPEARS	MIPR	ECBC/ARDEC : Rock Island, IL	0.087	0.080		0.045	Oct 2018	0.046	Oct 2019	-		0.046	Continuing	Continuing	-
Engineering and Quality Assurance - US&R	MIPR	ECBC/ARDEC : Rock Island, IL	0.300	-		-		-		-		-	Continuing	Continuing	-
General Engineer Support for Engineer Portfolio SKOs	MIPR	ECBC : Rock Island, IL	-	0.080		0.083	Oct 2018	0.185	Oct 2019	-		0.185	Continuing	Continuing	-
Packaging Support for Engineer Portfolio SKOs	MIPR	ECBC : Rock Island, IL	-	0.080		0.040	Oct 2018	0.185	Oct 2019	-		0.185	Continuing	Continuing	-
Technical Manual Support	MIPR	TACOM Publications : Warren, MI	-	0.140		-		-		-		-	Continuing	Continuing	-
Engineer and Quality Assurance Airfield Damage Repair Kit (ADRK)	MIPR	ECBC/ARDEC : Rock Island, IL	-	0.095		0.015	Oct 2018	-		-		-	Continuing	Continuing	-
Special Tools	TBD	TBD : TBD	-	0.225		0.015	Oct 2018	0.024	Oct 2019	-		0.024	Continuing	Continuing	-
Engineering and Quality Assurance Photo Support Set	TBD	TBD : TBD	-	-		-		0.019	Oct 2019	-		0.019	0.000	0.019	-
Engineering and Quality Assurance Soldier Portable System	TBD	TBD : TBD	-	-		-		0.046	Oct 2019	-		0.046	0.000	0.046	-
Engineering and Quality Assurance Diver Supplemental Issue Set	TBD	TBD : TBD	-	-		-		0.066	Oct 2019	-		0.066	0.000	0.066	-
Subtotal			0.497	1.290		0.208		0.581		-		0.581	Continuing	Continuing	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>
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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	Cost To Complete			
Family of Power Utility Kits Testing	MIPR	A TEC : Aberdeen	-	0.300		-		-		-		-	0.000	0.300	-	
SPEARS testing	MIPR	A TEC : Aberdeen	-	0.350		-		0.100	Oct 2019	-		0.100	0.000	0.450	-	
Photo Support Sets Testing	TBD	TBD : TBD	-	-		-		0.025	Oct 2019	-		0.025	0.000	0.025	-	
Subtotal			-	0.650		-		0.125		-		0.125	0.000	0.775	N/A	
Project Cost Totals			2.352	3.644		0.341		1.242		-		1.242	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>		Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>	

Event Name	FY 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, develop, build, test Family of Power Utility Kit	████████████████				████████████████				████████████████																			
Procure Test Articles and Test Soldier Portable Sets	████████████████				████████████████				████████████████				████████████████				████████████████											
Procurement of test articles and testing of Airfield Damage Repair Kit	████████████████				████████████████				████████████████																			
Procurement of test articles and testing of Special Tools	████████████████				████████████████				████████████████				████████████████				████████████████				████████████████							
Procurement of test articles and testing of Photo Support Set	████████████████				████████████████				████████████████				████████████████															
Procurement of test articles and testing of Diver Supplemental Issue Set	████████████████				████████████████				████████████████				████████████████															

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L43 / <i>ENGINEER SUPPORT EQUIPMENT - ED</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Market research, develop, build, test Family of Power Utility Kit	1	2017	4	2020
Procure Test Articles and Test Soldier Portable Sets	1	2018	4	2022
Procurement of test articles and testing of Airfield Damage Repair Kit	2	2018	4	2019
Procurement of test articles and testing of Special Tools	1	2018	4	2023
Procurement of test articles and testing of Photo Support Set	1	2020	4	2020
Procurement of test articles and testing of Diver Supplemental Issue Set	1	2021	4	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>				Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>			
COST (\$ in Millions)	Prior Years	FY 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
L46: <i>Maintenance Support Equipment</i>	-	1.971	1.410	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.381
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Mobile Maintenance Equipment provides state of the art, deployable, vehicle-mounted, Soldier portable and containerized shelter tool systems supporting the readiness of the Joint warfighter. These systems are equipped with industrial quality tools required for Two Level Maintenance that reduce common tool redundancy, provide tool standardization, minimize transportation requirements, reduce logistical footprint, and are backed by a Lifetime Warranty/Replacement Program which reduces sustainment costs. This is accomplished by employing a system of systems approach to maintenance acquisition. The System of Systems approach builds a maintenance capability upon each system, allowing a logical and natural approach to the Army's overall two level maintenance strategy. These inter-connected systems distributed throughout the Army at multiple levels and echelons provide a holistic repair capability in all scenarios and environments. These systems provide the Maintenance and Combat Commanders an unprecedented capability to repair wheeled, tracked, aviation, ground support and weapons systems on site at one location at one time. This approach to maintenance acquisition increases efficiencies and supports the current force while providing modular configurations designed to meet the specific needs of the Army maintainer in today's complex transforming environment.

BUDGET ITEM JUSTIFICATION: The need to develop and maintain a System of System maintenance approach is critical for maintaining readiness due to the growing complexity of today's military equipment, operational tempo, modularity, and current and evolving Tactics Techniques and Procedures (TTPs). The individual maintenance systems are comprehensive, interconnected and capable of solving and repairing any maintenance problems. The System of Systems approach does not advocate specific tools, methods or practices; instead it seeks to promote a streamlined comprehensive set of systems for solving maintenance challenges where the interactions of doctrine, technology, time and tactics techniques and procedures are the primary drivers. Funding for projects shall include test article procurement and testing of Soldier portable maintenance SKOs, load banks and refrigeration tool kit; investigation of new technologies for next generation mobile maintenance equipment shop sets including the Shop Equipment Welding (SEW) and Shop Equipment Contact Maintenance (SECM); development of additional Standard Automotive Tool Set (SATS) maintenance modules, Armament Repair Shop Set 2, Mobile Ammunition Processing Facility (MAPF), Special Tools initiatives, shelter mounted system development; packaging development; and technical support for emerging JCIDS materiel requirements documents. Additive Manufacturing upgrades to the Metal Working and Machining Shop Set (MWMSS) to include a 3-D printing and associated digital library capability. Modernization upgrades increase effectiveness while improving efficiency, reliability and maintainability while supporting emerging Army systems as well as using lower cost set components.

Funding supports modernization of the current Ordnance/Engineer equipment by investigating technology insertions due to but not limited to obsolescence and technology innovations. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Next Generation Shop Equipment, Welding (SEW)</p> <p>Description: Develop and Test new components of Shop Equipment, Welding</p> <p>FY 2019 Plans: Test, Technical Manual Development, Validation, Log Demo, Verification, Engineering, Quality Assurance, and Program Management.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decreased from FY 2019 to FY 2020 because the program will enter the production phase of the life cycle.</p>	0.565	0.340	-	-	-
<p>Title: Armament Repair Shop Set (ARSS) 2</p> <p>Description: ARSS Shelter Modernization</p> <p>FY 2019 Plans: Test, Technical Manual Development, Validation, Log Demo, Verification, Engineering, Quality Assurance, and Program Management.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustment in support of the Army's modernization priorities.</p>	0.537	0.645	-	-	-
<p>Title: Special Tools</p> <p>Description: Develop Rapid Deployment Sets, Kits, and Outfits (SKOs) - Special Tool and support to Combat and Tactical Vehicles.</p>	0.015	-	-	-	-
<p>Title: Refrigeration Tool Kit (RTK)</p> <p>Description: Develop RTK Individual and Base equipment, procure test articles and development of log products.</p>	0.153	-	-	-	-
<p>Title: MWMSS Additive Manufacturing</p> <p>Description: Develop Additive Manufacturing capability for Army systems, Limited User Experiment and Evaluation.</p> <p>FY 2019 Plans:</p>	-	0.050	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Market Research, Development and Test of 3-D printing/Additive Manufacturing/Digital Library. FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustment in support of the Army's modernization priorities.					
Title: The Fire Suppression Refill System (FSRS) Description: Development and Integration efforts for the FSRS.	0.327	-	-	-	-
Title: Next Generation Shop Equipment Contact Maintenance (SECM) Description: Modernization upgrades to the SECM, mounted onto a Joint Light Tactical Vehicle (JLTV) FY 2019 Plans: Market Research, Engineering, Quality Assurance, and Program Management. FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustment in support of the Army's modernization priorities.	-	0.330	-	-	-
Title: Program Management Support Description: Program support costs associated with emerging program development.	0.153	-	-	-	-
Title: Packaging Support Description: Full Packaging Program Support and Packaging Data Management	0.083	-	-	-	-
Title: Engineering and Quality Assurance Support Description: Engineering Support from the Edgewood Chemical Biological Center (ECBC) and Quality Assurance Support from Armament Research, Development and Engineering Center (ARDEC)	0.138	-	-	-	-
Title: FY 2019 SBIR / STTR Transfer FY 2019 Plans: SBIR/STTR FY 2019 to FY 2020 Increase/Decrease Statement: Adjusted for FY 2019 SBIR/STTR Transfer.	-	0.045	-	-	-
Accomplishments/Planned Programs Subtotals	1.971	1.410	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>

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

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	
• ML5345: <i>Items Less Than \$5.0M (Maint Eq)</i>	2.728	5.253	5.608	-	5.608	5.391	4.930	-	-	0.000	23.910
• G05301: <i>Mobile Maintenance Equipment Systems</i>	34.898	34.479	55.053	-	55.053	47.987	44.007	-	-	0.000	216.424

Remarks

D. Acquisition Strategy

Programs will progress from pre Milestone Decision Document (MDD) activities through market research, market samples, Description for Purchase, development, production representative systems and testing. Modernization and Optimization of existing tools and testing of market samples will progress from Engineering and Manufacturing Development (EMD) and transition into production. All efforts will support the two level maintenance concept utilizing commercial technologies and incorporating them into SKOs to support next generation weapon and support systems.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) L46 / Maintenance Support Equipment
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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 SKOT : Warren, MI	0.159	0.153		-		-		-		-	Continuing	Continuing	-
Subtotal			0.159	0.153		-		-		-		-	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			
Armament Repair Shop Set 2 design and development	MIPR	Tobyhanna Army Depot/TBD : Tobyhanna, PA	-	0.186		0.353	Mar 2019	-		-		-	Continuing	Continuing	-
Develop Rapid Deployment Sets, Kits, & Outfits - Special Tool Initiative.	MIPR	ECBC : Rock Island, IL	0.300	-		-		-		-		-	Continuing	Continuing	-
Refrigeration Tool Kit (RTK) Logistics Demonstration	MIPR	ECBC : Rock Island, IL	0.394	-		-		-		-		-	0.000	0.394	-
Modernization/Redesign efforts of Truck/Trailer transported shelters for next generation systems	MIPR	ECBC : Rock Island, IL	2.025	-		-		-		-		-	0.000	2.025	-
Procure Ground Based Special Tools in support of Tactical Vehicles	MIPR	PM SKOT : Harrison, MI	0.343	-		-		-		-		-	0.000	0.343	-
Next Generation Shop Equipment Welding (SEW) concept design and development	MIPR	ECBC : Rock Island, IL	2.493	-		-		-		-		-	0.000	2.493	-
Next Generation Shop Equipment Contact Maintenance Hardware	MIPR	ECBC : Rock Island, IL	-	-		0.135		-		-		-	0.000	0.135	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>
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Product Development (\$ in Millions)				FY 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	-	-		0.045		-		-		-	0.000	0.045	-
Subtotal			5.555	0.186		0.533		-		-		-	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			
Engineer and Quality Assurance in support of SKOs	MIPR	ECBC / ARDEC : (IL, MI)	1.425	0.138	Dec 2017	-		-		-		-	Continuing	Continuing	-
Packaging Support	MIPR	ARDEC : Rock Island, IL	0.148	0.083	Dec 2017	-		-		-		-	Continuing	Continuing	-
Next Generation Shop Equipment Welding (SEW) support	MIPR	ECBC / ARDEC / PM SKOT : (IL, MI)	-	0.250	Dec 2017	0.341	Dec 2018	-		-		-	Continuing	Continuing	-
Refrigeration Tool Kit (RTK) support	MIPR	ECBC / ARDEC / PM SKOT : (IL, MI)	-	0.153	Dec 2017	-		-		-		-	Continuing	Continuing	-
Armament Repair Shop Set 2 support	MIPR	ECBC / ARDEC / PM SKOT : (IL, MI)	-	0.101	Dec 2017	0.291	Dec 2018	-		-		-	Continuing	Continuing	-
Additive Manufacturing support	MIPR	ECBC : IL	-	-		0.050	Dec 2018	-		-		-	Continuing	Continuing	-
Fire Suppression Refill System (FSRS) support	MIPR	PM SKOT : MI	-	0.040	Dec 2017	-		-		-		-	Continuing	Continuing	-
Next Generation Shop Equipment Contact Maintenance support	MIPR	ECBC/PM SKOT : (IL, MI)	-	-		0.195	Dec 2018	-		-		-	Continuing	Continuing	-
Special Tools support	MIPR	ECBC : IL	-	0.015	Dec 2017	-		-		-		-	Continuing	Continuing	-
Subtotal			1.573	0.780		0.877		-		-		-	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L46 / <i>Maintenance Support Equipment</i>

Event Name	FY 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
Develop, Procure, and Test Special Tools for Tactical and Comb																												
Develop, Procure, and Test Refrigeration Tool Kit																												
Develop, Procure, and Test Armament Repair Shop Set 2 (ARSS																												
Develop, Procure, and Test Next Generation Shop, Equipment V																												
Develop, Procure, and Test Additive Manufacturing																												
Develop, Procure, and Test Next Generation Shop Equipment Contact Maintenance																												
Develop, Procure, and Test Fire Suppression Refill System																												

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

Events	Start		End	
	Quarter	Year	Quarter	Year
Develop, Procure, and Test Special Tools for Tactical and Combat Vehicles	1	2016	4	2019
Develop, Procure, and Test Refrigeration Tool Kit	1	2017	4	2019
Develop, Procure, and Test Armament Repair Shop Set 2 (ARSS)	1	2018	2	2020
Develop, Procure, and Test Next Generation Shop, Equipment Welding (SEW)	4	2016	3	2020
Develop, Procure, and Test Additive Manufacturing	3	2016	4	2019
Develop, Procure, and Test Next Generation Shop Equipment Contact Maintenance	1	2019	1	2020
Develop, Procure, and Test Fire Suppression Refill System	1	2016	4	2018

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) L47 / Improved Environmental Control Units Ed			
COST (\$ in Millions)	Prior Years	FY 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
L47: Improved Environmental Control Units Ed	-	1.873	2.337	1.076	-	1.076	1.103	1.974	3.495	1.190	0.000	13.048
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This line supports the Army Network Modernization Strategy Line of Effort #4, Command Post. Program develops/integrates IECUs supporting the new requirements coming from the Command Post Integrated Infrastructure (CPI2), Army Standard Family of Soft Walled Shelters (ASF-SWS) and Army Standard Family of Rigid Wall Shelters (ASF-RWS) Capabilities Development Documents (CDDs). In addition, supports the development/test of critical Chemical Biological Radiological and Nuclear (CBRN) modifications required to support the Chemically Protected Deployable Medical System.

The Improved Environmental Control Units (IECU) program will provide updates that support the new generation of Environmental Control Units (ECUs) that use environmentally approved refrigerants, with zero Ozone-Depleting Chemicals (ODCs) to replace the current Military Standard (MIL-STD) Family of ECUs. The IECUs will provide improved cooling, heating and dehumidification to Soldiers and critical equipment systems in combat, combat support, combat service support units, and combat support hospitals. The IECUs are required to replace currently fielded ECUs in order to comply with statutory and regulatory restrictions on the use of Class II ODCs (such as HCFC-22) and to improve the performance of military ECUs. They are form, fit, and function replacements to the current MIL-STD ECUs. Technical improvements over existing ECUs will yield significant fuel and weight savings, reduction in scheduled maintenance and increased reliability. The new family of IECUs will utilize a new refrigerant which complies with mandated Environmental Protection Agency (EPA) requirements. Funding supports the development of trailer-mounted systems, shelter system integration, as well as supporting the new ECU requirements coming from the Command Post Integrated Infrastructure (CPI2) Army Standard Family of Soft Walled Shelters (ASF-SWS) and Army Standard Family of Rigid Wall Shelters (ASF-RWS) Capabilities Development Documents (CDDs). In addition, the field has identified an emerging requirement for an integrated fuel-fired /cooling system. These variants will further standardize cooling units in the field, enable cooling of larger shelters and structures, offer increased mobility, and may be used to cool multiple tents with one unit. Funding also supports developing initial prototypes to enable refinement of operational requirement and early user feedback to support future sustainment and operational energy concepts.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Technology Development	0.375	0.950	0.400	-	0.400
Description: Concept development for 9/18/36/60K BTUH Improved Environmental Control Unit (IECU), multiple trailer-mounted variants, Rigid Walled variants and integrated heating/cooling systems.					
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L47 / <i>Improved Environmental Control Units Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Initiate development of next generation 60K IECU, build test items and develop Technical Data Package (TDP) to incorporate the latest technological advances to meet CB protection requirements.</p> <p>FY 2020 Base Plans: Conduct Physical Configuration Audit (PCA) to finalize 60K IECU Technical Data Package (TDP) to support follow-on production contract</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: To reallocate program funding to support required RDT&E development activities to support 60K IECU modification requirements</p>					
<p>Title: Government System Test and Evaluation</p> <p>Description: Testing of prototype performance for the trailer mounted and other variants of the IECUs and soft wall shelter ECUs.</p> <p>FY 2019 Plans: Conduct performance testing in environmental chambers to measure changes in output and power consumption on 9/18/36/60K BTUH IECUs with new variable capacity compressors and smart controls.</p> <p>FY 2020 Base Plans: Complete development testing of 60K IECU Block II prototypes to evaluate capabilities and performance.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: To reallocate program funding to support required RDT&E development activities to support 60K IECU modification requirements</p>	0.300	0.700	0.200	-	0.200
<p>Title: Other Contract and Government Agency</p> <p>Description: Support engineering, logistics, and testing efforts for multiple trailer-mounted variants, soft wall ECUs, and integrated heating/cooling units. Match and right-size current IECU family to the ASF-RWS and ASF-SWS variants and/or develop and test new variants to provide the most efficient system solution.</p> <p>FY 2019 Plans:</p>	0.898	0.307	0.276	-	0.276

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Conduct analysis and testing to match and right-size the current Family of IECUs to the ASF-RWS variants under development. Complete 60K IECU TDP conversion effort. Initiate build of 60K IECU (CB Protection) test items using baseline TDP.</p> <p>FY 2020 Base Plans: Complete build of 60K IECUs using baseline TDP, conduct limited performance testing and PCA. Concept development for IECU integration with RWS in support of CPI2 and ASF-RWS.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: To reallocate program funding to support required RDT&E development activities to support 60K IECU modification requirements</p>					
<p>Title: Government Program Management</p> <p>Description: Provide oversight and management of engineering, logistics, contracts, and testing efforts for the 9/18/36/60K IECU family and multiple trailer-mounted variants prepare for IECU variants to transition to production. Provide oversight and management of follow-on ECU variants.</p> <p>FY 2019 Plans: Oversee the design and integration of the variable capacity compressors and smart controls into the standard 9/18/36/60K BTUH IECUs in addition to testing. Manage continuing technology improvements to include the development of IECU prototypes that utilize advanced non-ozone depleting refrigerants. Coordinate with the ASF-RWS program of record to ensure proper integration of required ECUs.</p> <p>FY 2020 Base Plans: Provide oversight and management of engineering, logistics, contracts, and testing efforts for next generation IECU system development efforts.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: To reallocate program funding to support required RDT&E development activities to support 60K IECU modification requirements</p>	0.300	0.305	0.200	-	0.200
<p>Title: SBIR/STTR</p> <p>FY 2019 Plans: SBIR/STTR</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>	-	0.075	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
SBIR/STTR					
Accomplishments/Planned Programs Subtotals	1.873	2.337	1.076	-	1.076

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
• MF9303: <i>IMPROVED ENVIRONMENTAL CONTROL UNITS</i>	7.675	10.122	7.336	0.008	7.344	10.030	9.245	8.474	8.556	Continuing	Continuing

Remarks

D. Acquisition Strategy

Support technology insertions required to adapt IECUs to support future Integrated Command Post heating and cooling requirements in support of Force 2025 and the Command Post Integrated Infrastructure (CPI2) and chemically protected deployable medical system. Evaluate requirements versus existing IECU Fleet and developed/test initial prototypes of ECUs in support of ASF-SWS and ASF-RWS CDDs. This effort will support the development of Purchase Descriptions (PDs) and Technical Data Packages (TDPs) for eventual competitive procurement.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) L47 / Improved Environmental Control Units Ed
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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			
9,18 and 36K Improved Environmental Control Unit (IECU)	Various	PM E2S2 : various	1.174	0.160		0.105		-		-		-	0.000	1.439	Continuing
Trailer Variants	Various	PM E2S2 : various	0.575	0.058		-		-		-		-	0.000	0.633	Continuing
60K IECU	Various	PM E2S2 : various	0.141	0.160		0.200		0.198		-		0.198	0.000	0.699	-
Integrated heating/cooling units	Various	PM E2S2 : various	0.105	-		-		-		-		-	0.000	0.105	-
SBIR/STTR	Various	various : various	0.137	-		0.075		-		-		-	0.000	0.212	-
Subtotal			2.132	0.378		0.380		0.198		-		0.198	0.000	3.088	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			
9,18 and 36K Improved Environmental Control Unit (IECU)	C/CPFF	Mainstream Engineering : Vero Beach, FL	2.064	-		0.307		0.141		-		0.141	0.000	2.512	Continuing
Trailer Mounted variants	MIPR	CERDEC Night Vision Lab : Ft Belvoir, VA	0.525	0.211		-		-		-		-	0.000	0.736	-
60K IECU	C/CPFF	TBD : TBD	2.325	0.337		0.950		0.437		-		0.437	0.000	4.049	-
Integrated heating/cooling units	MIPR	CERDEC Night Vision Lab : Ft. Belvoir, VA	0.325	-		-		-		-		-	0.000	0.325	-
Subtotal			5.239	0.548		1.257		0.578		-		0.578	0.000	7.622	N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) L47 / Improved Environmental Control Units Ed
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Support (\$ in Millions)				FY 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			
9, 18 and 36K Improved Environmental Control Unit (IECU)	MIPR	CERDEC : Fort Belvoir, VA	2.117	-		-		-		-		-	0.000	2.117	-
60K IECU	Various	CERDEC : Fort Belvoir, VA	4.182	0.225		-		-		-		-	0.000	4.407	-
Trailer variants	MIPR	CERDEC : Fort Belvoir, VA	0.820	0.422		-		-		-		-	0.000	1.242	-
Integrated heating/cooling units	MIPR	CERDEC : Fort Belvoir, VA	0.321	-		-		-		-		-	0.000	0.321	-
Subtotal			7.440	0.647		-		-		-		-	0.000	8.087	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			
9,18 and 36K Improved Environmental Control Unit (IECU)	MIPR	A TEC : APG, MD	0.478	-		0.450		-		-		-	0.000	0.928	-
Trailer Variants	MIPR	A TEC : APG, MD	0.424	-		-		-		-		-	0.000	0.424	Continuing
60K IECU	MIPR	A TEC : APG, MD	0.325	0.300		0.250		0.300		-		0.300	0.000	1.175	-
Integrated heating/cooling units	MIPR	A TEC : APG, MD	0.200	-		-		-		-		-	0.000	0.200	-
Subtotal			1.427	0.300		0.700		0.300		-		0.300	0.000	2.727	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		16.238	1.873	2.337	1.076	-	1.076	0.000	21.524	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L47 / <i>Improved Environmental Control Units Ed</i>

Event Name	FY 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
Develop and Test of 60K IECU NBC Modification Kit	█																											
Concept development for IECU integration with RWS in support	█																											
60K IECU TDP Conversion Effort	█				█																							
Develop and Test Modified 60K IECU	█				█																							
Design and Testing for potential product improvements to IECU Family	█				█								█															
Concept Development for High Efficiency ECUs	█				█												█											

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) L47 / <i>Improved Environmental Control Units Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Develop and Test of 60K IECU NBC Modification Kit	1	2018	3	2018
Concept development for IECU integration with RWS in support of CPI2 and ASF-RWS	1	2018	4	2024
60K IECU TDP Conversion Effort	4	2018	4	2024
Develop and Test Modified 60K IECU	1	2019	4	2024
Design and Testing for potential product improvements to IECU Family	1	2021	4	2024
Concept Development for High Efficiency ECUs	1	2022	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev				Project (Number/Name) VR7 / Combat Service Support Systems			
COST (\$ in Millions)	Prior Years	FY 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
VR7: <i>Combat Service Support Systems</i>	-	3.594	4.527	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	8.121
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

VR7 efforts completed in FY 19.

A. Mission Description and Budget Item Justification

This project supports Engineering and Manufacturing Development (EMD) of critical soldier support and sustainment systems that provide more endurance and agility to combat operations enabling success of Army Expeditionary Forces in future multi-domain scenarios. Project includes highly mobile shelter systems (rigid and soft wall), expeditionary base camp subsystems, field service systems, mortuary affairs equipment, field heaters, and other combat service support equipment. These systems will fill identified theater capability gaps, improve safety, improve unit sustainability, improve resource and energy efficiency and increase combat effectiveness. This project supports Engineering and Manufacturing Development (EMD), Prototyping, and testing of critical tactical support systems that support mobile Joint Service command and control, medical, force projection and maintenance platforms. This project develops critical enablers that support the Army Campaign Plan and Army Modernization Strategy by maintaining readiness through fielding and integrating new equipment. This project also ensures Army Expeditionary Forces are capable of rapid deployment while reducing sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands in lift, combat zone footprint, and costs for logistical support.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Expeditionary Shelter Protection System (ESPS)	0.300	0.450	-	-	-
Description: ESPS is a lightweight, rapidly deployable and reusable ballistic protection system that can be integrated with commonly used military shelters in expeditionary and remote base camps and outposts where more robust forms of ballistic protection (i.e. sandbags, concrete barriers) are not readily available or logistically feasible.					
FY 2019 Plans: Complete logistics requirements/documentation and obtain Type Classification Standard pending Army decision on future production.					
FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustments to support the Army's modernization priorities.					
Title: Family of Space Heaters	-	0.150	-	-	-

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) VR7 / <i>Combat Service Support Systems</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: The family of Army Space Heaters support soldiers operating in basic, cold and extreme cold environments with a safe, portable, lightweight, multi-fueled, self-powered space heaters for use in tents and/or expeditionary shelters that do not require an external power source. These heaters provide the much needed capability of providing heated air effectively and efficiently while eliminating the shortcomings of the antiquated, dangerous and inefficient heaters they are replacing in the inventory.</p> <p>FY 2019 Plans: Conduct evaluations for potential product improvements to the existing Family of Space Heaters. Prepare and coordinate Engineering Change Proposals that incorporate improvements into heater performance specifications.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustments to support the Army's modernization priorities.</p>					
<p>Title: Resource and Energy Efficiency Enabling Solutions</p> <p>Description: Reduces the resource, operational energy and logistics footprint of critical soldier support and sustainment systems while maintaining or improving operational effectiveness. The goal is to significantly reduce fuel, water, and power requirements to sustain multi-domain operations in addition to reducing maintenance and spare parts requirements. Systems such as Command Posts, Expeditionary Operating Bases, and Combat Support Hospitals require a significant amount of logistics and sustainment support which cost valuable resources, require extra human effort (that means a risk in the form of Soldiers on the road), limit endurance, restrict agility, and increase vulnerability.</p> <p>FY 2019 Plans: Continue to integrate and evaluate resource and operational energy-saving solutions for Command Posts, Expeditionary Operating Bases, and Combat Support Hospitals. Complete testing on energy-efficient appliances, improved energy-efficient expeditionary lighting systems, and smart base non-intrusive monitoring. Collect data to inform and support development of logistics support and the Engineering Change Proposal to transition proven and validated capabilities into full-rate production and/or reset.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustments to support the Army's modernization priorities.</p>	0.199	0.200	-	-	-
<p>Title: Laundry and Shower Improvements</p>	0.898	0.850	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Provides an enhanced capability for field hygiene with improved hot and cold weather performance, better compatibility with current and future combat clothing, and increased reliability, maintainability and ease of operation.</p> <p>FY 2019 Plans: Conduct Developmental Testing on the Laundry Advanced System (LADS) modification kits.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustments to support the Army's modernization priorities.</p>					
<p>Title: Expeditionary Solid Waste Disposal (ESWDS)</p> <p>Description: Provides an integrated waste management (reduction, treatment or disposal process) add-on capability that can safely process 1,000 pounds (lbs) or more of mixed solid waste in a single day on site. Mixed solid waste produced on a single 150 person site must be properly managed through reduction, reuse, recycling, treatment, or disposal. Most of the waste is nonhazardous solid waste. Provides a substantial improvement over the current practice of burn pits that poses a health risk to Soldiers and/or backhaul which poses an additional logistics burden.</p>	1.250	-	-	-	-
<p>Title: Containerized Ice Making System (CIMS)</p> <p>Description: Develops an add-on ice making capability that automatically dispenses and seals 10 pound bags at a rate of a minimum of 3,600 pounds of ice per day. This capability is based upon current Army operational requirements for ice which is four pounds per Soldier per day. This capability enables support for up to 900 personnel. Current operations require external support to provide personnel with ice for cooling drinking water in extremely arid environments. This capability will reduce the sustainment risk and cost associated with transporting this commodity from external sources. The objective requirement enables stockage of ice to assist with surge operations.</p> <p>FY 2019 Plans: Complete logistics requirements, prepare documentation and obtain Type Classification Standard decision pending Army decision on future production.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustments to support the Army's modernization priorities.</p>	0.400	0.327	-	-	-
<p>Title: Army Standard Family of Rigid Wall Shelters (ASF-RWS)</p>	0.547	2.385	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: The ASF-RWS program will conduct formal development to incorporate the latest technologies into a fully supportable and modernized family. The intent is to eliminate the proliferation of non-standard shelters and their associated logistics burden, thereby reducing the lifecycle cost of RWS across the Services. The program will produce approved Technical Data Packages (TDPs) to support procurements by materiel developers and Program Managers (PMs) requiring RWS. Once developed and formally type-classified, ASF-RWS procurements are customer funded by PMs as a cost under their program(s). The ASF-RWS will consist of three variants: (1) Expandable/Non-Expandable; (2) Vehicle Mounted; and (3) Panelized/Collapsible with a focus on the following features and improvements: reduced cost, reduced weight, improved energy efficiency, improved corrosion resistance, and improved transportability.</p> <p>FY 2019 Plans: Continue design/development of Expandable/Non-Expandable Shelter variants and initiate DT. Initiate development of logistics requirements and program documentation to support Type Classification Standard and production decision in FY20.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding adjustments to support the Army's modernization priorities.</p> <p>Title: SBIR/STTR</p> <p>FY 2019 Plans: SBIR/STTR</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: SBIR/STTR</p>					
Accomplishments/Planned Programs Subtotals	3.594	4.527	-	-	-

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>
• VR8: <i>Combat Service Support Systems - Ad</i>	3.334	3.218	0.000	-	0.000	-	-	-	-	0.000	6.552

Remarks

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

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

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) VR7 / Combat Service Support Systems
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Management Services (\$ in Millions)				FY 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			
Project Management Support	Various	PM Force Sustainment Systems : Natick, MA	1.386	0.613		0.587	Nov 2018	-		-		-	0.000	2.586	-
CBI Support	Various	PD CBI : Warren, MI	3.747	-		-		-		-		-	0.000	3.747	-
SBIR+STTR	TBD	Various : Various	0.077	-		0.165		-		-		-	0.000	0.242	-
Subtotal			5.210	0.613		0.752		-		-		-	0.000	6.575	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			
Soldier Support Equipment	TBD	Various : Various	8.421	2.367		0.175	Nov 2018	-		-		-	0.000	10.963	-
Contingency Basing Infrastructure	Various	Various : Various	1.531	-		-		-		-		-	0.000	1.531	-
Laundry Improvements	Various	Various : Various	-	-		0.100	Nov 2018	-		-		-	0.000	0.100	-
Army Standard Family of Rigid Wall Shelters (ASF-RWS)	Various	Various : Various	-	-		1.750	Dec 2018	-		-		-	0.000	1.750	-
Subtotal			9.952	2.367		2.025		-		-		-	0.000	14.344	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			
Soldier Support Equipment	Various	Various : Various	7.728	0.614		0.475	Dec 2018	-		-		-	0.000	8.817	-
Contingency Basing Infrastructure	Various	Various : Various	1.206	-		-		-		-		-	0.000	1.206	-
Laundry Improvements	Various	Various : Various	-	-		0.695	Dec 2018	-		-		-	0.000	0.695	-
Army Standard Family of Rigid Wall Shelters (ASF-RWS)	Various	Various : Various	-	-		0.580	Mar 2019	-		-		-	0.000	0.580	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / Logistics and Engineer Equipment - Eng Dev	Project (Number/Name) VR7 / Combat Service Support Systems
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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			8.934	0.614		1.750		-		-		-	0.000	11.298	N/A
Project Cost Totals			24.096	3.594		4.527		-		-		-	0.000	32.217	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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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, evaluate, and transition modernized equipment into F	[Redacted]																											
Award Development Contract and procure ESPS prototypes for	[Redacted]																											
Conduct DT on ESPS	[Redacted]																											
Prepare for and execute Type Classification of ESPS	[Redacted]																											
Obtain TC-STD for ESPS	[Redacted]																											
Develop Laundry System Improvements	[Redacted]																											
Conduct DT/OT on Laundry System Improvements	[Redacted]																											
Conduct DT on ESWDS	[Redacted]																											
Conduct DT on CIMS	[Redacted]																											
Prepare for and Execute Type Classification of CIMS	[Redacted]																											
Award EMD contract and procure prototypes for ASF-RWS (Exp/Non-Exp)	[Redacted]																											
Conduct DT/OT on ASF-RWS (Exp/Non-Exp) variants	[Redacted]																											
Prepare for and obtain Milestone C / TC-STD decision for ASF-RWS (Exp/Non-Exp)	[Redacted]																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>		Project (Number/Name) VR7 / <i>Combat Service Support Systems</i>	

Event Name	FY 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	
Obtain Milestone C TC-STD decision for ASF-RWS Expandable/Non-Expandable Variant									2																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604804A / <i>Logistics and Engineer Equipment - Eng Dev</i>	Project (Number/Name) VR7 / <i>Combat Service Support Systems</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integrate, evaluate, and transition modernized equipment into FP & Command Posts	1	2016	4	2019
Award Development Contract and procure ESPS prototypes for testing	3	2016	2	2018
Conduct DT on ESPS	2	2018	1	2019
Prepare for and execute Type Classification of ESPS	4	2018	2	2019
Obtain TC-STD for ESPS	2	2019	2	2019
Develop Laundry System Improvements	2	2017	2	2019
Conduct DT/OT on Laundry System Improvements	3	2019	4	2019
Conduct DT on ESWDS	2	2018	4	2018
Conduct DT on CIMS	2	2018	4	2018
Prepare for and Execute Type Classification of CIMS	3	2019	4	2019
Award EMD contract and procure prototypes for ASF-RWS (Exp/Non-Exp)	4	2018	3	2019
Conduct DT/OT on ASF-RWS (Exp/Non-Exp) variants	3	2019	1	2020
Prepare for and obtain Milestone C / TC-STD decision for ASF-RWS (Exp/Non-Exp)	3	2019	2	2020
Obtain Milestone C TC-STD decision for ASF-RWS Expandable/Non-Expandable Variant	2	2020	2	2020
Conduct PQT and User Evaluation for IASH Type II	1	2016	3	2016
Complete evaluation, logistics requirement and TC-STD Decision document for IASH	4	2016	3	2017
Conduct evaluations and prepare for Milestone B for ULCANS	2	2016	2	2017

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>
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COST (\$ in Millions)	Prior Years	FY 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	-	9.559	15.950	12.595	-	12.595	8.622	22.390	22.722	19.648	0.000	111.486
593: <i>Joint Battle Command - Platform (JBC-P)</i>	-	9.559	15.950	12.595	-	12.595	8.622	22.390	22.722	19.648	0.000	111.486

A. Mission Description and Budget Item Justification

Joint Battle Command - Platform (JBC-P) supports the Army Network Modernization Strategy Line of Effort 1, Unified Network which includes: The development of a standards-based network architecture that unifies enterprise and deployed network capabilities and features a unified transport layer, network operations and other enabling functions that allows integration of disparate networks. The network provides resiliency through path diversity and dynamic routing to ensure tactical units can communicate in hostile environments. It fully incorporates cyber and electronic warfare capabilities that support the employment of the network as a weapon system.

JBC-P also supports the Army Network Modernization Strategy Line of Effort 2, Common Operating Environment by utilizing:

- Interoperable data, message, and waveforms
- Integration with Joint C4ISR and strike capabilities
- Sensors and applications that enable operations across domains

The Joint Battle Command - Platform program is the cornerstone of Joint Forces Command and Control (C2) Situational Awareness (SA) and communications. JBC-P includes a network which enables the movement of data and provides secure Blue Force Tracking (BFT) capability in Platforms and Command Posts, providing soldiers and commanders a map-based Common Operating Picture of the battlefield, as a result, reducing fratricide.

PdM JBC-P, under PM Mission Command (MC), is collaborating with the Communications-Electronics Research, Development and Engineering Center's (CERDEC) Space and Terrestrial Communications Directorate (S&TCD) on evolving the BFT network. Systems engineering studies/planning activities are underway to develop the evolution path of the BFT network, and the introduction of a Modular Open Systems Architecture (MOSA). In addition, there are two RDT&E contractual efforts underway for FY 2018 (assess the feasibility of reusing existing BFT-2 transceivers (hardware) and replacing it third party or government owned waveforms), and FY 2019 (assess the feasibility of introducing BFT network resiliency components to existing BFT network). The goal is for all the R&D & experimentation efforts mentioned above, to inform a BFT-3 full and open solicitation (RFP) to industry FY 2020.

JBC-P RDT&E resources are used to improve JBC-P hardware, network performance and add network resiliency while Mounted Computer Environment RDT&E is used to improve and add software applications.

To better understand how potential changes to the BFT network would affect overall operations, funding was increased in both FY 2017 and FY 2018 to assist PdM JBC-P to fully model the operational BFT network; S&TCD is working on developing a model of the current BFT-2 waveform to test in the BFT portion of their Network Test

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>
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Lab. This Test Lab provides the Government the ability to test proposed fixes, conduct regression testing of future Software and Firmware releases, and replicate any problems the system may experience without impacting the operational network.

FORSCOM users have identified a need for an expeditionary JBC-P capability to better connect the Lower Tactical Internet (LTI) to the BFT network when dismantled; there is an RDT&E contractual effort underway for FY 2019 to develop a reduced Size Weight and Power (SWaP) dismantled BFT transceiver. PdM JBC-P has partnered with CERDEC's Command, Power and Integration Directorate to develop this capability, along with new power solutions.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	9.910	15.970	12.595	-	12.595
Current President's Budget	9.559	15.950	12.595	-	12.595
Total Adjustments	-0.351	-0.020	0.000	-	0.000
• Congressional General Reductions	-0.007	-0.020			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.344	-			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>				Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>			
COST (\$ in Millions)	Prior Years	FY 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
593: <i>Joint Battle Command - Platform (JBC-P)</i>	-	9.559	15.950	12.595	-	12.595	8.622	22.390	22.722	19.648	0.000	111.486
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Joint Battle Command - Platform (JBC-P) supports the Army Network Modernization Strategy Line of Effort 1, Unified Network which includes: The development of a standards-based network architecture that unifies enterprise and deployed network capabilities and features a unified transport layer, network operations and other enabling functions that allows integration of disparate networks. The network provides resiliency through path diversity and dynamic routing to ensure tactical units can communicate in hostile environments. It fully incorporates cyber and electronic warfare capabilities that support the employment of the network as a weapon system.

JBC-P also supports the Army Network Modernization Strategy Line of Effort 2, Common Operating Environment by utilizing:

- Interoperable data, message, and waveforms
- Integration with Joint C4ISR and strike capabilities
- Sensors and applications that enable operations across domains

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JBC-P RDT&E resources are used to improve JBC-P hardware, network performance and add network resiliency while Mounted Computer Environment RDT&E is used to improve and add software applications.

To better understand how potential changes to the BFT network would affect overall operations, funding was increased in both FY 2017 and FY 2018 to assist PdM JBC-P to fully model the operational BFT network; S&TCD is working on developing a model of the current BFT-2 waveform to test in the BFT portion of their Network Test

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>
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Lab. This Test Lab provides the Government the ability to test proposed fixes, conduct regression testing of future Software and Firmware releases, and replicate any problems the system may experience without impacting the operational network.

FORSCOM users have identified a need for an expeditionary JBC-P capability to better connect the Lower Tactical Internet (LTI) to the BFT network when dismantled; there is an RDT&E contractual effort underway for FY 2019 to develop a reduced Size Weight and Power (SWaP) dismantled BFT transceiver. PdM JBC-P has partnered with CERDEC's Command, Power and Integration Directorate to develop this capability, along with new power solutions.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Software Development</p> <p>Description: Develop capabilities, product applications, platform interoperability, and system services across the JBC-P family of systems, to include the development of capabilities to meet Key Performance Parameters (KPPs), and other system attributes. Develop Multi-Level Security Domains for Network, Users, and Information.</p>	0.145	-	-	-	-
<p>Title: Software/Systems Engineering</p> <p>Description: Perform Software/Systems Engineering in support of the development of JBC-P capabilities, applications, and services, to include, but not limited to, conducting engineering studies, architecture development (both software and network), system analyses, technical readiness assessments, technical interchange meetings/events, and development of related reports and other deliverables.</p> <p>FY 2019 Plans: Continued system engineering efforts for JBC-P balance of CDD threshold requirements and support of the Mission Command product line. Conduct Systems Engineering, open systems architecture design, and Component Characterization & Validation for next generation BFT; to include the integration & interoperability of the BFT 2.0 Transceiver, Satellite Network Control Center (SNCC), Satellite Ground Station (SGS), and Waveform/Network Virtualization for the BFT 2 network.</p> <p>FY 2020 Base Plans: Development solicitation package for BFT 3 satellite ground station full and open competition.</p> <p>Continue to conduct Systems Engineering, open systems architecture design, and Component Characterization & Validation for next generation BFT; to include the integration & interoperability of the BFT 2.0 Transceiver, Satellite Network Control Center (SNCC), Satellite Ground Station (SGS), and Waveform/Network Virtualization for the BFT 2 network.</p>	5.582	13.927	11.095	-	11.095

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical. FY 2019 to FY 2020 Increase/Decrease Statement: BFT 3 HUB Systems Engineering development, studies, and open systems architecture design efforts are nearing completion, in preparation for BFT 3 HUB full and open competition.					
Title: Test, Evaluation and Integration Description: Plan and conduct system Integration test & experimentation events, in support of the JBC-P family of systems, to include Risk Reduction Events, vulnerability testing, and Army Interoperability Certification (AIC) testing. FY 2019 Plans: Will continue to conduct testing on enhancements to the BFT/JBC-P network, to include third party component (transceiver) characterization, and validation of the next generation BFT. Continue to develop a lab based operational risk reduction of the currently fielded BFT 1 & BFT 2 network, to Include the Satellite Network Control Center (SNCC), Satellite Ground Station (SGS), and Waveform Virtualization. FY 2020 Base Plans: Will continue to conduct testing enhancements to the BFT/JBC-P network, to include third party component (transceiver) characterization, validation of the BFT 3 satellite ground station components, and validation of the FY18 Rapid Innovation Funding (RIF) Resilient BFT deliverable. Continue to develop a lab based operational risk reduction of the currently fielded BFT 1 & BFT 2 network, to Include the Satellite Network Control Center (SNCC), Satellite Ground Station (SGS), and Waveform Virtualization. This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical. FY 2019 to FY 2020 Increase/Decrease Statement: Slight increase in validations and related costs.	2.508	0.413	0.500	-	0.500
Title: PM Support (Matrix & Contractor) Description: JBC-P matrix and contractor support, including technical, logistics, and business staff oversight. FY 2019 Plans:	1.324	1.026	1.000	-	1.000

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Will continue to provide technical, logistical, and business oversight for JBC-P architecture development and system engineering activities. Program Management includes funds execution, contract management, and logistical support for the BFT-3 (Previously BFT Network Evolving and eXtending Transport (NEXT)) integrated planning team (IPT) & consortium (industry & academia).</p> <p>FY 2020 Base Plans: Will continue to provide technical, logistical, and business oversight for JBC-P architecture development and system engineering activities. Program Management includes funds execution, contract management, and logistical support for the BFT-3 integrated planning team (IPT) & consortium (industry & academia). This effort's funding will be executed by Program Executive Office for Command, Control and Communications-Tactical</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Reducing CERDEC gov't engineering team, due to completion of major BFT-3 satellite ground station systems engineering development efforts; remaining engineering team will continue BFT-3 transceiver development efforts.</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>	-	0.584	-	-	-
Accomplishments/Planned Programs Subtotals	9.559	15.950	12.595	-	12.595

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>
• W61990: JOINT BATTLE COMMAND - PLATFORM (JBC-P)	342.649	401.991	265.667	25.568	291.235	246.166	183.106	160.856	154.461	0.000	1,780.464
Remarks	Procurement funding in FY 2016 through 2023 (Base funding) is designated for the procurement, fielding, and program management of JBC-P Family of Systems including JBC-P and JBC-P Log.										

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>

D. Acquisition Strategy

The JBC-P Capabilities Development Document in lieu of Capabilities Production Document (CDD ILO CPD) was Joint Requirements Oversight Council (JROC) approved March 2013. Completed Initial Operational Test & Evaluation (IOT&E) as part of Network Integration Evaluation (NIE) 13.2 in 3rd Quarter FY 2013. The IOT&E tested the JBC-P system software on existing FBCB2 hardware (non-dismountable vehicle systems) and future production-representative hardware. On completion of Army Interoperability Certification (AIC) and Joint Interoperability Test Certification (JITC), MDA authorized Full Rate Production (FRP) in 1st Quarter FY 2014. First unit equipped (FUE) was successfully conducted 3rd Quarter FY 2015.

Developmental efforts are being performed through intra-government collaboration. System engineering efforts are being performed by CERDEC's Space and Terrestrial Communications Directorate (S&TCD); Command, Power and Integration (CP&I) & the Intelligence and Information Warfare Directorate (I2WD). The goal is for all R&D & experimentation efforts to inform a BFT-3 full and open solicitation (RFP) to industry FY 2020. Hardware along with fielding, training and field support efforts are obtained through existing competitively awarded contracts.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / Command, Control, Communications Systems - Eng Dev	Project (Number/Name) 593 / Joint Battle Command - Platform (JBC-P)
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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			
JBC-P Software Development	Various	Multiple : Multiple	67.318	0.145		-		-		-		-	Continuing	Continuing	-
JBC-P Software/System Engineering	Various	Multiple (Government and industry) : Multiple	39.815	5.582		13.927		11.095		-		11.095	Continuing	Continuing	-
FY 2019 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.584		-		-		-	0.000	0.584	-
Subtotal			107.133	5.727		14.511		11.095		-		11.095	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			
PM Support (Matrix / SETA Contractor)	Sub Allot	PM JBC-P : Aberdeen Proving Ground (APG), MD	6.930	1.324		1.026		1.000		-		1.000	Continuing	Continuing	-
Subtotal			6.930	1.324		1.026		1.000		-		1.000	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			
Develop and Conduct Tests and Assessments	MIPR	Multiple : Multiple	26.393	2.508		0.413		0.500		-		0.500	Continuing	Continuing	-
Subtotal			26.393	2.508		0.413		0.500		-		0.500	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		140.456	9.559	15.950	12.595	-	12.595	Continuing	Continuing	N/A

Remarks





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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>

Event Name	FY 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
BFT 3 Systems Engineering Development & Consortium	RDECOM CERDEC Led with Industry Partners																											
Army Expeditionary Warfighter Experiment (AEWE)																												
AWA 18.1																												
CyberBlitz 18																												
NIE 18.2																												
AIC 1.6.0.6																												
JBC-P 1.6.0.7																												
Army Expeditionary Warfighter Experiment (AEWE) 2																												
BFT 3 Satellite Ground Station Developmental Testing (RDECOM CERDEC Lab based)																												
RFP for BFT 3 SATCOM Regional Gateway (HUB)																												
Joint Warfighter Assessment (JWA)																												
BFT 3 FY18 RIF Unit Experimentation																												
BFT 3 HUB Contract Award																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>

Event Name	FY 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												
BFT 3 Transceiver Developmental Testing (RDECOM CERDEC Lab based)																																								
RFP for BFT 3 Transceiver																													 DT FY21 - Internal Govt Lab testing to further inform FY20 BFT-3											
BFT 3 Transceiver Contract Award																																	 RFP for BFT 3 Transceiver							
BFT 3/Next Gen HW OT																																	 BFT 3 Transceiver Contract Award  Planned OT - FY23/24							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604805A / <i>Command, Control, Communications Systems - Eng Dev</i>	Project (Number/Name) 593 / <i>Joint Battle Command - Platform (JBC-P)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
BFT 3 Systems Engineering Development & Consurtium	2	2017	4	2021
Army Expeditionary Warfighter Experiment (AEWE)	2	2018	2	2018
AWA 18.1	3	2018	3	2018
CyberBlitz 18	4	2018	4	2018
NIE 18.2	4	2018	1	2019
AIC 1.6.0.6	2	2018	4	2018
JBC-P 1.6.0.7	4	2018	3	2019
Army Expeditionary Warfighter Experiment (AEWE) 2	2	2019	2	2019
BFT 3 Satellite Ground Station Developmental Testing (RDECOM CERDEC Lab based)	3	2019	3	2019
RFP for BFT 3 SATCOM Regional Gateway (HUB)	1	2020	1	2020
Joint Warfighter Assessment (JWA)	2	2020	3	2020
BFT 3 FY18 RIF Unit Experimentation	3	2020	3	2020
BFT 3 HUB Contract Award	1	2021	1	2021
BFT 3 Transceiver Developmental Testing (RDECOM CERDEC Lab based)	3	2022	3	2022
RFP for BFT 3 Transceiver	4	2022	4	2022
BFT 3 Transceiver Contract Award	3	2023	3	2023
BFT 3/Next Gen HW OT	3	2023	4	2023

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>
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COST (\$ in Millions)	Prior Years	FY 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	-	36.685	44.495	48.264	-	48.264	49.365	46.559	48.906	45.912	0.000	320.186
812: <i>Mil HIV Vac&Drug Dev</i>	-	1.135	1.178	1.201	-	1.201	1.230	1.067	6.069	6.265	0.000	18.145
832: <i>Field Medical Systems Engineering Development</i>	-	19.735	28.821	31.218	-	31.218	31.946	31.413	29.707	29.580	0.000	202.420
849: <i>Infec Dis Drug/Vacc Ed</i>	-	15.815	14.496	15.845	-	15.845	16.189	14.079	13.130	10.067	0.000	99.621

A. Mission Description and Budget Item Justification

This Program Element (PE) funds advanced development of medical materiel within the System Demonstration and Low Rate Initial Production portions of the acquisition life cycle using 6.5 (System Development and Demonstration) funding. It supports products successfully developed in the Systems Integration portion of the Systems Development and Demonstration phases through completion of the Milestone C Decision Review. Commercially-off-the-shelf (COTS) medical products are also tested and evaluated for military use, when available. This PE primarily includes pivotal (conclusive) human clinical trials necessary for licensure by the Food and Drug Administration (FDA).

Projects in this PE include the following:

Project 812 funds military relevant human immunodeficiency virus (HIV) medical countermeasures. These funds provide for engineering and manufacturing development of candidate vaccines and drugs to permit large-scale field testing. Development focused on military unique needs effecting manning, mobilization, and deployment. Products from this project will normally transition to Department of Defense (DoD) Health Programs or Other Procurement, Army (OPA) Funds.

Project 832 funds the engineering and manufacturing development of medical products for enhanced combat casualty care and follow-on care, including rehabilitation. Mature COTS medical products are also evaluated for military use. Consideration will also be given to reduce the medical sustainment footprint through smaller weight and cube volume, or equipment independence from supporting materiel. Products from this project will normally transition to OPA Funds.

Project 849 funds development of candidate medical countermeasures for military relevant infectious diseases. These products fall in four major areas: vaccines, drugs, diagnostic kits/devices, and insect control measures to limit exposure and disease transmission. FDA approval is a mandatory obligation for all military products placed into the hands of medical providers or service members for human use. Products from this project will normally transition to DoD Health Programs or OPA funds.

Project VS8 program receives products that transition from VS7 and funds effort to complete research and development for the medical evacuation (MEDEVAC) Mission Essential Packages (MEPs) to support 256 Medical Evacuation legacy helicopters. The Army's force design increased the number of air frames in the force from 12 to 15 aircraft for 37 MEDEVAC companies to better meet operational needs.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>
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These Projects are managed by United States (U.S.) Army Medical Materiel Development Activity (USAMMDA) and U.S. Army Medical Materiel Agency (USAMMA) of the U.S. Army Medical Research and Materiel Command.

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	39.238	44.542	48.665	-	48.665
Current President's Budget	36.685	44.495	48.264	-	48.264
Total Adjustments	-2.553	-0.047	-0.401	-	-0.401
• Congressional General Reductions	-0.028	-0.047			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.210	-			
• SBIR/STTR Transfer	-1.315	-			
• Adjustments to Budget Years	-	-	-0.401	-	-0.401

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 812 / <i>Mil HIV Vac&Drug Dev</i>
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COST (\$ in Millions)	Prior Years	FY 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
812: <i>Mil HIV Vac&Drug Dev</i>	-	1.135	1.178	1.201	-	1.201	1.230	1.067	6.069	6.265	0.000	18.145
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds militarily relevant human immunodeficiency virus (HIV) medical countermeasures. These funds provide for engineering and manufacturing development of candidate vaccines and drugs to permit large-scale field testing. Development is focused on militarily unique needs effecting manning, mobilization, and deployment.

The major contractor is The Henry M. Jackson Foundation for the Advancement of Military Medicine, Rockville, MD. Research efforts are coordinated with the National Institutes of Health.

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

	FY 2018	FY 2019	FY 2020
<p>Title: Military HIV Vaccine and Drug Development</p> <p>Description: This effort provides funds for engineering and manufacturing development of candidate vaccines and drugs to permit large-scale field testing of vaccines for medical countermeasures to HIV.</p> <p>FY 2019 Plans: Will continue support of the Global vaccine effectiveness testing effort. This activity is co-funded by the National Institute of Allergy and Infectious Disease (NIAID) and the Bill and Melinda Gates Foundation. This study is anticipated to take 3.5 years to complete.</p> <p>FY 2020 Plans: Continue support to Global Vaccine Candidate clinical trial sites based on a Cooperative Research and Development Agreement (CRADA) with a commercial partner.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The minor increase of funding in FY 2020 was due to the inflation factor.</p>	1.135	1.140	1.201
<p>Title: FY 2019 SBIR/ STTR Transfer</p> <p>Description: FY19 SBIR/STTR Transfer</p> <p>FY 2019 Plans: FY19 SBIR/STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>	-	0.038	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 812 / <i>Mil HIV Vac&Drug Dev</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
FY19 SBIR/STTR Transfer			
Accomplishments/Planned Programs Subtotals	1.135	1.178	1.201

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

N/A

Remarks

D. Acquisition Strategy

To support testing and evaluation of commercially developed vaccine candidates in government-managed trials.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Project (Number/Name) 812 / Mil HIV Vac&Drug Dev
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Management Services (\$ in Millions)				FY 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			
Medical Product Development Management Services Cost	Various	Various : Various	2.634	0.199		1.140		1.201		-		1.201	Continuing	Continuing	-
Subtotal			2.634	0.199		1.140		1.201		-		1.201	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			
Medical Product Development Cost	Various	Henry M. Jackson Foundation, : Various	33.545	0.422		-		-		-		-	Continuing	Continuing	Continuing
FY19 SBIR/ STTR Transfer	TBD	N/A : N/A	-	-		0.038		-		-		-	0.000	0.038	-
Subtotal			33.545	0.422		0.038		-		-		-	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			
Medical Product Development Support Cost	Various	Various : Various	2.038	0.375		-		-		-		-	Continuing	Continuing	-
Subtotal			2.038	0.375		-		-		-		-	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			
Medical Product Development T&E Cost	Various	Henry M. Jackson Foundation, : Various	27.971	0.139		-		-		-		-	Continuing	Continuing	Continuing
Subtotal			27.971	0.139		-		-		-		-	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>				Project (Number/Name) 812 / <i>Mil HIV Vac&Drug Dev</i>					
	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	66.188	1.135		1.178		1.201		-		1.201	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 812 / <i>Mil HIV Vac&Drug Dev</i>	

Event Name	FY 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				
Global HIV (Ad26/Ad26+gp140) Biologic Liscence Application (BLA) Submission/MS C																									■							
Global HIV (Ad26/Ad26+gp140) BLA Approval																													■			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 812 / <i>Mil HIV Vac&Drug Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Global HIV (Ad26/Ad26+gp140) Biologic Lisence Application (BLA) Submission/MS C	1	2024	1	2024
Global HIV (Ad26/Ad26+gp140) BLA Approval	4	2024	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev				Project (Number/Name) 832 / Field Medical Systems Engineering Development			
COST (\$ in Millions)	Prior Years	FY 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
832: Field Medical Systems Engineering Development	-	19.735	28.821	31.218	-	31.218	31.946	31.413	29.707	29.580	0.000	202.420
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds the engineering and manufacturing development of medical products for enhanced combat casualty care and follow-on care, including rehabilitation. Specifically funds pivotal (conclusive) human clinical trials or mechanical engineering evaluations for effectiveness of devices or biologics (products derived from living organisms) to fulfill unique military requirements. Consideration is also given to reducing the medical sustainment footprint through smaller weight and cube volume, or equipment independence from supporting materiel. This work is frequently completed through a laboratory/contractor team with the contractor obtaining the U.S. Food and Drug Administration (FDA) licensure for sale of the product.

Major contractors/intra-governmental agencies include: IGR Enterprises, Inc.; Army Medical Department Board Test Center; Se Qual Technologies, Inc.; Enginivity, Inc.; Ultrasound Diagnostician; HemCon Medical Technologies; Cerdak Ltd; Hemerus Medical, LLC; Fast Track Drugs & Biologics, LLC; Integrated Medical Systems, Inc.; the National Institutes of Health National Heart, Lung and Blood Institute (NHLBI); and the U.S. Army Aeromedical Research Laboratory, Walter Reed Army Institute of Research (WRAIR) and Institute of Surgical Research (ISR) for user evaluation. Other military agencies include Program Executive Office (PEO) Soldier, PEO Combat Support/Combat Service Support (CS & CSS), and Naval Undersea Warfare Center.

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

	FY 2018	FY 2019	FY 2020
Title: Field Medical Systems Engineering Development PM Medical Devices	2.309	2.644	2.100
Description: This effort funds the engineering and manufacturing development of medical products for enhanced combat casualty care managed by Program Manager (PM)-Medical Devices.			
FY 2019 Plans: Medical Equipment Sets COTS Modernization of Life Cycle Equipment: Will continue development and testing to ensure the most current and cost effective devices are being utilized. Equipment will be selected for modernization based on its own life cycle plan as part of a Sets, Kits and Outfits.			
FY 2020 Plans: Medical Equipment Sets COTS Modernization of Life Cycle Equipment: Will continue development and testing on a reduced number/fewer types of devices (compared to FY19) to ensure the most current and cost effective devices are being utilized. Equipment will be selected for modernization based on life cycle plan as part of a Sets, Kits and Outfits (SKO).			
FY 2019 to FY 2020 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Funding was adjusted in support of the Army's modernization priorities.				
<p>Title: Field Medical Systems Engineering Development PM Pharmaceuticals</p> <p>Description: Funding is provided for engineering and manufacturing development of medical products managed by PM Pharmaceuticals for enhanced combat casualty care and follow-on care, including rehabilitation.</p> <p>FY 2019 Plans: Cryopreserved Platelets: Will complete the Phase 2 safety and effectiveness study in patients with complex cardiac bypass and prepare for of Phase 3 (expanded safety, effectiveness and dosing) pivotal study. Will continue the manufacturing development and validation of Cryopreserved platelet batches.</p> <p>Freeze-Dried Plasma Program: Will continue the Phase 2 prospective clinical trial (safety and efficacy trial that follows patients over time to measure progress/outcomes).</p> <p>FY 2020 Plans: Cryopreserved Platelets: Continuing the new acquisition strategy that was developed and implemented in FY 2018 where a single commercial partner is utilized for the manufacturing development, clinical trials and regulatory processes thru licensure. Continue non-clinical in- Vitro characterization and Phase 2 Clinical Trial efficacy study.</p> <p>Freeze-Dried Plasma Program: Will complete the Phase 2 safety and effectiveness study and prepare for of Phase 3 (expanded safety, effectiveness and dosing) pivotal study.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding was adjusted in support of the Army's modernization priorities.</p>		12.601	13.687	8.217
<p>Title: Field Medical Systems Engineering Development PM Medical Support Systems</p> <p>Description: This effort funds the engineering and manufacturing development of medical products managed by PM Medical Support Systems for enhanced combat casualty care and follow-on care, including rehabilitation.</p> <p>FY 2019 Plans: Modernization of medical equipment sets: Will evaluate blood transport products and other commercial items for medical equipment sets.</p> <p>Airworthiness Testing: Will continue to conduct airworthiness testing, required by AR 70-62, for Medical Equipment Set and Mission Essential Package with products covering air and ground medical evacuation.</p>		1.199	1.515	4.559

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Medical Evacuation and Treatment Vehicles Medical Equipment Set and Mission Essential Package: Will continue to collaborate with Program Executive Office Ground Combat Systems (PEO GCS) for the implementation of the Medical Equipment Set and Mission Essential Package and user evaluations of the Armored Multipurpose Vehicle.</p> <p>Waste Treatment System for the CSH: Testing of waste Treatment System for the CSH.</p> <p>Soldier Optimization Decision Aids: Coordinate with PEO Soldier to transition the Environment Health Assessment and Risk Management (EHARM) tool.</p> <p>Remote Triage Sensor System: Testing the Remote Triage Sensor System.</p> <p>FY 2020 Plans: Modernization of medical equipment sets: Will continue to evaluate the Field Hospital waste water collection system, blood transport products, and other commercial items for medical equipment sets. Airworthiness Testing: Conduct airworthiness testing, required by AR 70-62, for Medical Equipment Set and Mission Essential Package with products covering air and ground medical evacuation. Medical Evac and Treatment Vehicles Medical Equipment Set and Mission Essential Package and CASEVAC: Collaborate with Program Executive Office Combat Support/Combat Service Support for implementation of the CASEVAC system for the Joint Light Tactical Vehicle (JLTV). Waste Treatment System for the CSH: Project was not initiated as planned in FY18. Soldier Optimization Decision Aids (SODA): Will transition the Cold Weather Ensemble Decision Aid and the Heat Strain Decision Aid to Program Executive Office Soldier. Will continue to refine the Environment Health Assessment and Risk Management (eHARM) tool for transition.</p> <p>Remote Triage Sensor System: Project was not initiated as planned in FY 2018. Semi-autonomous Casualty Evacuation (CASEVAC) Ground Platform (S-MET): Will collaborate with Program Executive Office Combat Support/Combat Service Support for implementation of the CASEVAC system for the S-MET platform</p> <p>Next Generation Uniform Repellent/Impregnation: Will conduct operational assessment and integration into PEO Soldier uniform procurement. Litter Transport Shock/Stressor Mitigation System (Formerly: Next Generation Immobilization System): Will assess system for augmentation and inclusion in medical unit assemblages containing litters.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The increase of funding in FY 2020 is due to the planned progression of medical products under development.</p>				
Title: Field Medical Systems Engineering Development -PM Neurotrauma & Psychological Health		3.626	10.029	16.342

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: This effort funds systems engineering development of medical products managed by Program Manager Neurotrauma & Psychological Health for enhanced combat casualty care and follow-on care, including rehabilitation.</p> <p>FY 2019 Plans: Laboratory Assay for TBI (formerly TBI Diagnostic Assay System) Increment II Point of Care Device: Will begin required validation studies.</p> <p>FY 2020 Plans: Laboratory Assay for Traumatic Brain Injury (TBI) (formerly TBI Diagnostic Assay System) Increment II Point of Care Device: Will conduct required validation studies for testing of a blood assay on the Point of Care Device to aid in the diagnosis of TBI. Will prepare for a submission of the assay for Food and Drug Administration Approval. Will start analysis of data validate how the assay predicts recovery from TBI.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding increases from FY 2019 to FY 2020 to cover the cost of a pivotal human clinical study for the whole blood assay on the point of care device.</p>			
<p>Title: FY 2019 SBIR/ STTR Transfer</p> <p>Description: FY19 SBIR/STTR Transfer</p> <p>FY 2019 Plans: FY19 SBIR/STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY19 SBIR/STTR Transfer</p>	-	0.946	-
Accomplishments/Planned Programs Subtotals	19.735	28.821	31.218

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

N/A

Remarks

D. Acquisition Strategy

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Project (Number/Name) 832 / Field Medical Systems Engineering Development

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Project (Number/Name) 832 / Field Medical Systems Engineering Development
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Management Services (\$ in Millions)				FY 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			
Medical Product Development Management Services Cost	Various	Various : Various	34.590	3.144		3.172		5.626		-		5.626	Continuing	Continuing	Continuing
Subtotal			34.590	3.144		3.172		5.626		-		5.626	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			
Freeze-dried Human Plasma	Various	HemCon Medical Technologies, Inc. : Tigard OR	32.783	-		-		-		-		-	Continuing	Continuing	Continuing
Hypertonic Saline Dextran	Various	National Institutes of Health, National Heart, Lung and Blood Institute (NHLBI) : Various	15.100	-		-		-		-		-	Continuing	Continuing	Continuing
Medical Product Development Cost	Various	Various : Various	6.270	2.306		2.165		-		-		-	Continuing	Continuing	Continuing
Extended Life Red Blood Cell Product	Various	Hemerus Medical, LLC. : Various	3.140	-		-		-		-		-	Continuing	Continuing	Continuing
Cryopreserved Platelets	Various	Clinical Research Management, Inc : Hinckley, OH	4.273	2.617		2.940		-		-		-	Continuing	Continuing	Continuing
Cryopreserved Platelets	Various	Multiple DoD activities and Dartmouth Hitchcock Med Ctr : North Potomac, MD	14.362	-		-		-		-		-	Continuing	Continuing	Continuing
Cryopreserved Platelets	Various	TBD : TBD	1.875	-		-		2.786		-		2.786	0.000	4.661	-
Intracellular Hemorrhage Treatment	TBD	TBD : TBD	0.600	-		-		-		-		-	0.000	0.600	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev	Project (Number/Name) 832 / Field Medical Systems Engineering Development
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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			
TBI Diagnostic Assay System - Increment II (benchtop/POC/ Bandits)	Various	Banyan BioMarkers, Inc : Alachua, FL	0.373	-		-		-		-		-	0.000	0.373	-
Noninvasive Neurodiagnostics	TBD	TBD : TBD	2.647	-		-		-		-		-	0.000	2.647	-
Impedance Threshold Device for the Treatment of Traumatic Brain Injury	TBD	Advance Circulatory Systems Inc. : Roseville, MN	4.387	-		-		-		-		-	0.000	4.387	-
Pre-Hospital Medical Informatics Transport (Ground Transport Telemedicine)	TBD	TBD : TBD	6.321	-		-		-		-		-	0.000	6.321	-
Advanced wound care	Various	TBD : TBD	1.230	-		-		-		-		-	0.000	1.230	-
Junction Noncompressible Hemorrhage	TBD	RevMedX Inc : Wilsonville OR	1.805	-		-		-		-		-	0.000	1.805	-
Laboratory Assay for Traumatic Brain Injury	C/Various	Abbott Laboratories : Chicago, IL	-	2.810		11.002		16.308		-		16.308	Continuing	Continuing	Continuing
FY19 SBIR/ STTR Transfer	TBD	N/A : N/A	-	-		0.946		-		-		-	0.000	0.946	-
Subtotal			95.166	7.733		17.053		19.094		-		19.094	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			
Regulatory Support	Various	Clinical Research Management, Inc., : Various	8.043	0.307		0.332		0.074		-		0.074	Continuing	Continuing	Continuing
Medical Product Development Support Cost	Various	Various : Various	10.209	1.520		-		-		-		-	Continuing	Continuing	Continuing
Medical Equipment Sets Development	Various	Various : Various	2.670	-		-		-		-		-	0.000	2.670	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>

Event Name	FY 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				
Cryopreserved Platelets (CPP) Phase 2 efficacy clinical studies	Phase 2																															
Cryopreserved Platelets (CPP) Phase III clinical studies												Phase 3																				
Cryopreserved Platelets (CPP) Milestone C																												4 MS-C				
Freeze-dried Plasma (FDP) Phase I safety clinical studies	Phase I																															
FDP Phase 2 efficacy clinical studies	Phase 2																															
FDP MS-C																																
Noninvasive Neuroassessment Device Development	Phase 2																															
Laboratory Assay for TBI Increment !! Point of Care Device Clinical Trial																																
Laboratory Assay for TBI Point of Care Device MS C Inc 1																																
Laboratory Assay for TBI Point of Care Device MS C Inc 2																																
Temporary Corneal Repair	Phase 2																															
Extracorporeal Life Support	Phase 2																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 832 / <i>Field Medical Systems Engineering Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Cryopreserved Platelets (CPP) Phase 2 efficacy clinical studies	3	2017	4	2020
Cryopreserved Platelets (CPP) Phase III clinical studies	4	2020	3	2023
Cryopreserved Platelets (CPP) Milestone C	4	2023	4	2023
Freeze-dried Plasma (FDP) Phase I safety clinical studies	3	2014	2	2018
FDP Phase 2 efficacy clinical studies	2	2016	2	2019
FDP MS-C	4	2020	4	2020
Noninvasive Neuroassessment Device Development	1	2017	1	2025
Laboratory Assay for TBI Increment !! Point of Care Device Clinical Trial	1	2020	4	2022
Laboratory Assay for TBI Point of Care Device MS C Inc 1	4	2020	4	2020
Laboratory Assay for TBI Point of Care Device MS C Inc 2	4	2022	4	2022
Temporary Corneal Repair	4	2016	1	2025
Extracorporeal Life Support	4	2016	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>				Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</i>			
COST (\$ in Millions)	Prior Years	FY 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
849: <i>Infec Dis Drug/Vacc Ed</i>	-	15.815	14.496	15.845	-	15.845	16.189	14.079	13.130	10.067	0.000	99.621
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project funds development of candidate medical countermeasures (MCM: e.g., vaccines, drugs, diagnostic kits/devices) for militarily relevant infectious diseases. This also funds methods to determine if insects are infected with pathogenic organisms thereby posing a risk to service members' and control insect exposure/prevent Warfighters from being bitten by those insects. It funds research that supports conclusive human clinical trials to demonstrate MCM effectiveness safety and related manufacturing tests. This work, which is jointly performed by military laboratories, civilian contracted pharmaceutical firms and foreign research partners, is directed toward the prevention of disease, early diagnosis, and speeding recovery once diagnosed. Medical products approved for human use must meet the U.S. Food and Drug Administration (FDA) approval before MCM can be used on Warfighters. Development priority is based upon four major factors: (1) the extent of the disease within the Combatant Commands' theater of operations, (2) the clinical severity of the disease, (3) the technical maturity of the proposed solution, and (4) the affordability of the solution (development, production, and sustainment). Malaria, dysentery, hepatitis, and Dengue diseases (a severe debilitating disease transmitted by mosquitoes), which are found in all Combatant Command areas and are at the top of the infectious diseases risks list.

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

	FY 2018	FY 2019	FY 2020
Title: Infectious Disease Drug and Vaccine Engineering Development	15.815	14.039	15.845
Description: Funding for research and development efforts for drugs and vaccines for infectious diseases that are top threats to deployed US forces. Funds research that supports conclusive human clinical trials to demonstrate effectiveness, safety and related manufacturing tests.			
FY 2019 Plans: Dengue Tetravalent Vaccine (DTV): Continue to fund Advance Development (AD) candidate vaccine as it enters third year of pivotal phase 3 clinical trial. Next Generation Malaria Prophylaxis: Will continue the retinal (eye) safety study (3 year study) started in FY 2017. Address any FDA post-marketing approval requirements. Topical Antileishmanial Cream (TLC, Paromomycin/Gentamicin): The planned submission of the Non-Disclosure Agreement (NDA) did not occur in FY 2017 due to additional testing requirements by the FDA to demonstrate therapeutic equivalence of pre- and post-manufacturing change drug product. The NDA package will be completed and submitted to the FDA for approval in FY 2019. The manufacturing process will be validated in preparation for commercial production of the drug product.			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Antimalarial Drug, Artesunate Intravenous: Will support the FDA's inquiries during the review process of the New Drug Application. Will complete required non-clinical study for FDA review.</p> <p>Dengue Vaccine Block II: Will continue the development, testing and selection of strains for the dengue human infection model (DHIM) to be used in the early evaluation of dengue vaccine candidates in advance of phase 2 and 3 trials.</p> <p>Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (Multiple)): The dengue and chikungunya assays will continue to be developed and evaluated. Clinical testing will be conducted for dengue and clinical sites identified for chikungunya.</p> <p>FY 2020 Plans: Dengue Tetravalent Vaccine (DTV): Will continue to fund support for Advance Development (AD) candidate vaccine as it enters third year of pivotal phase 3 clinical trial. Malaria Chemoprophylaxis ?Tafenoquine (formerly Next Generation Malaria Prophylaxis): Will continue the retinal (eye) safety study started in FY 2017. Address any FDA post-marketing approval requirements. Topical Antileishmanial Cream (TLC, Paromomycin/Gentamicin): Will conduct safety and therapeutic dose non clinical testing based on FDA guidance. Antimalarial Drug, Artesunate Intravenous: Will conduct required non-clinical study for FDA review. Dengue Vaccine Block II: Will continue the development, testing and selection of strains for the dengue human infection model (DHIM) to be used in the early evaluation of dengue vaccine candidates in advance of phase 2 and 3 trials under PE 0603807A, Project 808.</p> <p>Rapid Diagnostic and Detection Devices (Formerly Infectious Disease Diagnostics (Multiple)): The dengue and chikungunya assays will continue to be developed and evaluated. Clinical testing will be conducted for dengue and clinical sites identified for chikungunya.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The increase of funding in FY 2020 is due to the planned progression of multiple infectious disease medical products in development. Funding will support the FDA requirements for clinical trials for those products.</p>				
<p>Title: FY 2019 SBIR/STTR Transfer</p> <p>Description: FY19 SBIR/STTR Transfer</p> <p>FY 2019 Plans: FY19 SBIR/STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement:</p>		-	0.457	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
FY19 SBIR/STTR Transfer			
Accomplishments/Planned Programs Subtotals	15.815	14.496	15.845

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

N/A

Remarks

D. Acquisition Strategy

To support testing and evaluation of in-house and commercially developed products in government-managed trials to meet FDA requirements and Environmental Protection Agency registration.

E. Performance Metrics

N/A

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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 / 5				PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev				849 / Infec Dis Drug/Vacc Ed							
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
Medical Product Development Management Services Cost	Various	Various : Various	20.862	0.877		0.927		0.804		-		0.804	Continuing	Continuing	Continuing
Medical Product Development Management Services Cost	C/CPFF	General Dynamics Information Technology : Frederick MD	6.780	4.105		2.749		2.307		-		2.307	0.000	15.941	-
Subtotal			27.642	4.982		3.676		3.111		-		3.111	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
Medical Product Development Cost	Various	Various : Various	37.555	0.963		1.644		3.528		-		3.528	Continuing	Continuing	Continuing
Topical Antileishmanial Drug	TBD	TBD : TBD	2.400	-		-		2.414		-		2.414	0.000	4.814	-
Topical Antileishmanial Drug	C/TBD	Advantar Laboratories, INC : TBD	2.207	0.479		-		0.864		-		0.864	0.000	3.550	-
Dengue Tetravalent Vaccine	TBD	TBD : TBD	2.047	-		-		-		-		-	0.000	2.047	-
Hemorrhagic Fever W/ Renal Syndrome	C/TBD	TBD : TBD	1.000	-		-		-		-		-	0.000	1.000	-
FY19 SBIR/ STTR Transfer	TBD	N/A : N/A	-	-		0.457		-		-		-	0.000	0.457	-
Subtotal			45.209	1.442		2.101		6.806		-		6.806	Continuing	Continuing	N/A

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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 / 5				PE 0604807A / Medical Materiel/Medical Biological Defense Equipment - Eng Dev				849 / Infec Dis Drug/Vacc Ed							
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
Medical Product Development Support Cost	Various	Various : Various	19.380	-		0.157		-		-		-	Continuing	Continuing	Continuing
Medical Product Development Support Cost	PO	Clinical Research Management, In : Hinckley, OH	5.407	0.976		-		0.220		-		0.220	0.000	6.603	-
Subtotal			24.787	0.976		0.157		0.220		-		0.220	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
Medical Product Development T&E Cost	Various	Various : Various	46.360	4.960		0.805		-		-		-	Continuing	Continuing	Continuing
Dengue Tetravalent Vaccine	TBD	WRAIR/AFRIMS : Silver Spring MD	0.952	0.450		0.590		0.500		-		0.500	0.000	2.492	-
Dengue Tetravalent Vaccine	C/TBD	TBD : TBD	2.156	3.005		1.151		2.635		-		2.635	0.000	8.947	-
Product Development of Dengue Tetravalent Vaccine	Various	TBD : TBD	4.530	-		-		-		-		-	0.000	4.530	-
Next Generation Malaria Prophylaxis	C/Various	TBD : TBD	-	-		3.421		2.573		-		2.573	0.000	5.994	-
Dengue Vaccine block II	C/Various	TBD : TBD	-	-		2.595		-		-		-	0.000	2.595	-
Subtotal			53.998	8.415		8.562		5.708		-		5.708	Continuing	Continuing	N/A
Project Cost Totals			151.636	15.815		14.496		15.845		-		15.845	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</i>

Event Name	FY 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
Dengue Tetravalent Vaccine (DTV) Phase 3 Pivotal Clinical Trial	FY11-FY18																											
DTV Milestone C (MS-C) Engineering, Manufacturing and Development phase review																												
DTV Biologic Licensing Application (BLA) Submission																												
DTV BLA Approval																												
Malaria Prophylaxis (MS-C) Engineering, Manufacturing and Development phase																												
Paromomycin/Gentamicin TLC (MS-C) Engineering, Manufacturing and Development																												
Paromomycin/Gentamicin TLC New Drug Application (NDA)																												
Paromomycin/Gentamicin TLC FDA Approval																												
Paromomycin/Gentamicin TLC (Fielding / Delivery)																												
Leishmania Rapid Diagnostic Device (Fielding / Delivery)																												
Hemorrhagic Fever with Renal Syndrome Clinical Studies																												
Dengue Vaccine Block II Adult Indication Studies																												
Dengue Vaccine Block II OCONUS Clinical Trials																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604807A / <i>Medical Materiel/Medical Biological Defense Equipment - Eng Dev</i>	Project (Number/Name) 849 / <i>Infec Dis Drug/Vacc Ed</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Dengue Tetravalent Vaccine (DTV) Phase 3 Pivotal Clinical Trials	1	2011	2	2019
DTV Phase 2 Adult Traveler / Military Indication Studies	2	2012	1	2017
DTV Milestone C (MS-C) Engineering, Manufacturing and Development phase review	1	2022	1	2022
DTV Biologic Licensing Application (BLA) Submission	2	2020	2	2020
DTV BLA Approval	2	2021	2	2021
Malaria Prophylaxis (MS-C) Engineering, Manufacturing and Development phase	4	2018	4	2018
Paromomycin/Gentamicin TLC Phase 3 Safety and Effectiveness Clinical Trial	1	2016	1	2017
Paromomycin/Gentamicin TLC (MS-C) Engineering, Manufacturing and Development	4	2019	4	2019
Paromomycin/Gentamicin TLC New Drug Application (NDA)	3	2020	3	2021
Paromomycin/Gentamicin TLC FDA Approval	4	2021	4	2021
Paromomycin/Gentamicin TLC (Fielding / Delivery)	4	2021	4	2024
Leishmania Rapid Diagnostic Device (Fielding / Delivery)	1	2015	4	2020
Hemorrhagic Fever with Renal Syndrome Clinical Studies	1	2016	4	2020
Dengue Vaccine Block II Adult Indication Studies	1	2016	4	2020
Dengue Vaccine Block II OCONUS Clinical Trials	1	2016	4	2020

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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>
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COST (\$ in Millions)	Prior Years	FY 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	-	26.188	43.064	39.208	-	39.208	166.902	159.442	170.596	100.426	Continuing	Continuing
016: <i>Close Combat Capabilities ENG DEV</i>	-	8.387	9.860	21.298	-	21.298	11.127	1.397	2.096	2.400	0.000	56.565
415: <i>Mine Neutral/Detection</i>	-	12.537	33.204	17.910	-	17.910	0.727	0.645	5.000	4.630	0.000	74.653
434: <i>Anti-Personnel Landmine Alternatives (NSD)</i>	-	5.264	0.000	0.000	-	0.000	155.048	157.400	163.500	93.396	Continuing	Continuing

A. Mission Description and Budget Item Justification

This Program Element (PE) provides for the Engineering and Manufacturing Development (EMD) and demonstration of networked munitions, countermine systems, Explosive Ordnance Disposal (EOD) render safe, and counter improvised explosive device capabilities. This PE also implements the National Landmine Policy to develop alternatives to the non-self-destructing counter mobility anti-personnel landmine systems. The PE contributes to area access and area denial (A2/AD) to support unified land operations and improve soldier survivability.

Project 016, Close Combat Capabilities, covers three programs: Dismounted Lane Breaching System (DLBS); Next Generation Advanced Bomb Suit (NGABS); and Explosive Ordnance Disposal Render Safe (EOD RS). It provides for the Engineering and Manufacturing Development (EMD) and demonstration of capabilities needed for Explosive Ordnance Disposal (EOD) teams to render safe (RS) US and foreign ordnance and improvised explosive devices, enabling ground force commanders to retain freedom of maneuver and secure lines of communications, as well as the Next Generation Advanced Bomb Suit (NGABS). EOD RS equips EOD teams with low light visual augmentation system, electronic countermeasures, buried IED detection, dismounted X-ray imager, X-ray generator, trace explosive, Chemical, Biological, Radiological, and Nuclear (CBRN), and drug detection, unmanned aerial system, power management, gamma and neutron search and detection, and render safe initiation. NGABS mission is to enhance the tactical utility and applicability of this bomb suit concept by incorporating modularity/scalability and sensor technologies. NGABS will increase the Warfighter lethality and mobility by optimizing Soldier protection for EOD personnel, while effectively managing all life cycle aspects of Personal Protective Equipment (PPE). The NGABS will benefit the U.S. industrial base through the NGABS integrated Heads-Up Display (HUD) development which requires extensive collaboration across Protective Equipment and Sensor program offices, industry participants, Military Services and Governmental Agencies. In FY 2018, this project also included improvements to legacy dismounted lane breaching, specifically the Anti-Personnel Obstacle Breaching System (APOBS), and in so doing, provided a pathway to the next generation of dismounted lane breaching systems such as the Rapid Assault Lane Line Charge (RALLC) and the Dismounted Explosive Breaching System (DEBS). The efforts addressed capability gaps identified during combat operations and focused on weight reduction, improved scalability, collateral damage reduction, metallic content elimination, deployment accuracy improvement, and increased effectiveness against the current threat.

Project 415, Mine Neutralization/Detection provides for development of next generation standoff, detection, and neutralization capability programs such as Husky Mounted Detection System (HMDS), Route Clearance & Interrogation System (RCIS), Vehicle Optics Sensor System (VOSS), Standoff Robotic Explosive Hazard Detection System (SREHD), formerly known as the Autonomous Mine Detection System (AMDS), Route Clearance Vehicles (RCV) and Enablers, Multi-Function Video Display (MVD) and Add on Armor (AoA) kits. It also supports development of Explosive Hazard Pre-Detonation (EHP) capability to neutralize/detonate a broad

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>
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spectrum of improvised explosive hazards while on the move to support area access route clearance missions. Provides funding to the Tank Automotive Research Development Engineering Center (TARDEC) Software Engineering Center (SEC) to integrate enhancements and test Explosive Hazard Pre-Detonation (EHP) software releases incorporating support for MVD.

For RCIS Type I, FY 2020 funding supports engineering, logistics development, Full Up System Level prototype delivery and ATEC testing, including the digitized, drive by wire HMEE with the Semi-Autonomous Control (SAC) kit..

Project 434, Spider Increment 1A will build upon the existing M7 Spider system. The M7 Spider system is a hand-emplaced, remotely controlled (Man-In-The-Loop) system that provides highly responsive terrain-shaping and protection capabilities. M7 Spider replaces persistent anti-personnel landmines, is compliant with US National Landmine policy, and has been fielded to US forces in support of Operation Enduring Freedom and currently being fielded to Engineers and Brigade Combat Teams in the Active and Army National Guard components. Additional capabilities will be developed to enhance the Spider Remote Control Station and demonstrate the ability to employ legacy Government-Off-The-Shelf (GOTS) lethal and non-lethal anti-personnel (AP) munitions and counter mobility obstacles. Spider Increment 1A will utilize an open system architecture to facilitate future munition integration. FY 2020 funding resources the initiation of the Standoff Activated Volcano Obstacle (SAVO) program, which provide an interim Anti-Vehicle (AV) capability to address the Army's directed close tactical obstacle capability gap. SAVO supports a U.S. Army Europe (USAREUR) Operational Needs Statement (ONS) as well as a revision to the Multiple Delivery Mine System (Volcano) Joint Service Operational Requirement (JSOR). This capability will allow for the formation of pre-emplaced directed obstacles that can be initiated remotely via fielded wired or wireless initiation systems. If the emplaced obstacle is not initiated, SAVO can be recovered for future re-deployment. SAVO consists of a newly developed base from which the existing stock of National Landmine Policy compliant munitions (M87A1 Volcano canisters) can be launched. SAVO can be initiated through an interface with three fielded systems; the M7 Spider Networked Munition System, the MK152/M156 Remote Activation Munition Systems (RAMS), or the CD450-4J Blasting Machine. This Program Element (PE) proves for the engineering development of Terrain Shaping Obstacles. This PE develops alternatives to the Family of Scatterable Mines systems.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	34.684	50.817	49.099	-	49.099
Current President's Budget	26.188	43.064	39.208	-	39.208
Total Adjustments	-8.496	-7.753	-9.891	-	-9.891
• Congressional General Reductions	-0.021	-0.053			
• Congressional Directed Reductions	-8.800	-7.700			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	1.326	-			
• SBIR/STTR Transfer	-1.001	-			
• Adjustments to Budget Years	-	-	-9.891	-	-9.891

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	
Change Summary Explanation FY 2020 decrease of \$9.891 million is attributed to an increase in Project 016, Close Combat Capabilities and the addition of the Explosive Ordnance Disposal (EOD) Render Safe (RS) development, and a decrease in Project 434.		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev				Project (Number/Name) 016 / Close Combat Capabilities ENG DEV			
COST (\$ in Millions)	Prior Years	FY 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
016: Close Combat Capabilities ENG DEV	-	8.387	9.860	21.298	-	21.298	11.127	1.397	2.096	2.400	0.000	56.565
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 016, Close Combat Capabilities, covers three programs: Dismounted Lane Breaching System (DLBS); Next Generation Advanced Bomb Suit (NGABS); and Explosive Ordnance Disposal Render Safe (EOD RS). It provides for the Engineering and Manufacturing Development (EMD) and demonstration of capabilities needed for Explosive Ordnance Disposal (EOD) teams to render safe (RS) US and foreign ordnance and improvised explosive devices, enabling ground force commanders to retain freedom of maneuver and secure lines of communications, as well as the Next Generation Advanced Bomb Suit (NGABS). EOD RS equips EOD teams with low light visual augmentation system, electronic countermeasures, buried IED detection, dismounted X-ray imager, X-ray generator, trace explosive, Chemical, Biological, Radiological, and Nuclear (CBRN), and drug detection, unmanned aerial system, power management, gamma and neutron search and detection, and render safe initiation. NGABS mission is to enhance the tactical utility and applicability of this bomb suit concept by incorporating modularity/scalability and sensor technologies. NGABS will increase the Warfighter lethality and mobility by optimizing Soldier protection for EOD personnel, while effectively managing all life cycle aspects of Personal Protective Equipment (PPE).

In FY 2018, this project also included improvements to legacy dismounted lane breaching, specifically the Anti-Personnel Obstacle Breaching System (APOBS), and in so doing, provided a pathway to the next generation of dismounted lane breaching systems such as the Rapid Assault Lane Line Charge (RALLC) and the Dismounted Explosive Breaching System (DEBS). The efforts addressed capability gaps identified during combat operations and focused on weight reduction, improved scalability, collateral damage reduction, metallic content elimination, deployment accuracy improvement, and increased effectiveness against the current threat.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Dismounted Lane Breaching System	0.100	-	-	-	-
Description: Develops materiel solutions that address operational issues with APOBS related to its weight, lack of scalability, collateral damage, residual metallic debris, deployment accuracy, and effectiveness.					
Title: Next Generation Advanced Bomb Suit (NGABS)	8.287	9.434	13.766	-	13.766
Description: Funding line is new to Project Manager Soldier Protection and Individual Equipment (PM SPIE) in FY18. The objective of this effort is to increase the Warfighter lethality, modularity, and mobility, by optimizing Soldier protection for EOD personnel. The mission of this program is to enhance the tactical utility and applicability of this bomb suit concept by incorporating modularity/scalability and sensor technologies which					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV

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

was not the case in legacy designs. This new tailorable, full body protective system will provide a significantly increased capability at a reduced weight.

FY 2019 Plans:

Continue in the Engineering and Manufacturing Development phase of the Next Generation Advanced Bomb Suit (NGABS) with the objective of developing for the EOD Soldiers a full body protective ensemble that integrates the latest technological advances in ergonomic design and material science to improve survivability from fragmentation, blast, impact, thermal hazards, and small arms fire based primarily on the design concepts of the Soldier Protection System. Award a competitive contract for the development of an integrated Suit & Helmet (S&H) and Sensors and Display (S&D) 4th QTR FY19.

FY 2020 Base Plans:

In FY 2020, the NGABS team will continue to evaluate and develop system and subsystem technologies for the NGABS system to assist in the protection from emerging ballistic/blast threats, and sensor technologies.

FY 2019 to FY 2020 Increase/Decrease Statement:

Funding change in Next Generation Advanced Bomb Suit portfolio is due to anticipated requirement changes in FY19 and FY20.

Title: Explosive Ordnance Disposal (EOD) Render Safe (RS)

Description: Render Safe (RS) procedures require technicians to employ a wide variety of capabilities and explosives.

FY 2020 Base Plans:

Conduct evaluation, integration, and logistics demonstration of the following capabilities: low light visual augmentation, localized incident site protection, dismounted X-Ray processor/imager, trace explosive, CBRN and drug detection, unmanned aerial system, electric tools, gamma and neutron search and detection, final disposition, and render safe initiation.

FY 2019 to FY 2020 Increase/Decrease Statement:

Explosive Ordnance Disposal (EOD) Render Safe (RS) is a new start in FY 2020.

Title: FY 2019 SBIR / STTR Transfer

Description: FY 2019 SBIR / STTR Transfer.

FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
-	-	7.532	-	7.532
-	0.426	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
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	8.387	9.860	21.298	-	21.298

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
• R63610: Render Safe Sets kits Outfits	-	-	18.684	84.000	102.684	118.400	30.251	-	-	Continuing	Continuing

Remarks

D. Acquisition Strategy
 The DLBS acquisition strategy is for developing product improvements such as making the system lighter and more module to the Antipersonnel and Obstacle Breaching System. These improvements will then be incorporated into the technical data package for future procurements.

The Next Generation Advanced Bomb Suit (NGABS) Program is a single-step to full capability acquisition program utilizing full and open competition to ensure best value to the Army. Acquisition strategy for this program is a traditional development program that include an Engineering and Manufacturing Development phase ranging in duration from 24 to 48 months due to the level of design complexity and testing required. Milestone (MS) B / Material Development Decision (MDD) occurred in FY2018 and MS C is scheduled for FY 2020.

The Explosive Ordnance Disposal (EOD) Render Safe (RS) program strategy is to acquire commercial and government off-the-shelf systems using Defense Logistics Agency (DLA) contract vehicles and to assemble into a kit with a technical refresh of the kit every three years.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV
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Management Services (\$ in Millions)				FY 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			
Dismounted Lane Breaching System	MIPR	PM CCS : Picatinny Arsenal, NJ	0.100	-		-		-		-		-	0.000	0.100	-
NGABS	Allot	PM SPE : Fort Belvoir	-	0.901		0.943		1.000		-		1.000	0.000	2.844	Continuing
Explosive Ordnance Disposal (EOD) Render Safe (RS)	Allot	PM CCS : Picatinny Arsenal, NJ	-	-		-		0.500	Jan 2020	-		0.500	0.000	0.500	Continuing
Subtotal			0.100	0.901		0.943		1.500		-		1.500	0.000	3.444	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			
Dismounted Lane Breaching System - Preliminary Design Efforts	MIPR	ARDEC : Picatinny Arsenal, NJ	0.185	0.100		-		-		-		-	0.000	0.285	-
Dismounted Lane Breaching System - Rocket Design	MIPR	NSWC : Indian Head, MD	0.315	-		-		-		-		-	0.000	0.315	-
NGABS - Product Development	C/FFP	TBD : Various	-	5.675		7.191		3.250		-		3.250	0.000	16.116	Continuing
EOD RS	MIPR	Various : Various	-	-		-		3.700	Jan 2020	-		3.700	0.000	3.700	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.426		-		-		-	0.000	0.426	-
Subtotal			0.500	5.775		7.617		6.950		-		6.950	0.000	20.842	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			
Dismounted Lane Breaching System - Trade	MIPR	ARDEC : Picatinny Arsenal, NJ	0.859	-		-		-		-		-	Continuing	Continuing	-

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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 / 5				PE 0604808A / Landmine Warfare/Barrier - Eng Dev				016 / Close Combat Capabilities ENG DEV							
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
Studies, SOW and Test Plan Prep															
Dismounted Lane Breaching System - Configuration Management	MIPR	NSWC : Dahlgren, VA	0.106	-		-		-		-		-	0.000	0.106	-
NGABS Support Costs	MIPR	TBD : Various	-	1.711		-		1.000		-		1.000	0.000	2.711	Continuing
EOD RS	MIPR	ARDEC : Picatinny Arsenal, NJ	-	-		-		0.922	Jan 2020	-		0.922	0.000	0.922	Continuing
EOD RS	MIPR	CERDEC I2WD : Aberdeen Proving Ground (APG), MD	-	-		-		0.600	Jan 2020	-		0.600	0.000	0.600	-
Subtotal			0.965	1.711		-		2.522		-		2.522	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
Dismounted Lane Breaching System - Qualification Test	MIPR	Yuma Proving Ground : Yuma, AZ	0.322	-		-		-		-		-	0.000	0.322	-
NGABS Test & Evaluation	MIPR	TBD : Various	-	-		1.300		8.526		-		8.526	0.000	9.826	Continuing
EOD RS	MIPR	Various : Various	-	-		-		1.800	Jun 2020	-		1.800	0.000	1.800	Continuing
Subtotal			0.322	-		1.300		10.326		-		10.326	0.000	11.948	N/A
Project Cost Totals			1.887	8.387		9.860		21.298		-		21.298	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV

Event Name	FY 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
Dismounted Lane Breaching System (DLBS)																												
DLBS Preliminary Design Review (PDR)	1																											
DLBS Detailed Design Effort																												
DLBS User Assessment			3																									
DLBS Critical Design Review (CDR)				5																								
DLBS Qualification Hardware Build																												
Next Generation Advanced Bomb Suit (NGABS)																												
NGABS Materiel Development Decision (MDD)	2																											
NGABS Milestone (MS) B			4																									
NGABS Developmental Testing																												
NGABS MS C								8																				
Explosive Ordnance Disposal (EOD) Render Safe (RS)																												
EOD RS Materiel Development Decision (MDD)						6																						

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 016 / Close Combat Capabilities ENG DEV

Event Name	FY 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	
EOD RS Life Cycle Sustainment Plan (LCSP)																													
EOD RS Market Survey									7 ▲ EOD RS Market Survey																				
EOD RS GOTS/COTS Evaluations & Logistics Demonstrations																													
EOD RS Prototype Testing													■																
EOD RS Solution Down Selection													9 ▲ EOD RS Solution																
EOD RS Loadset Development													■																
EOD RS Milestone (MS) C													10 ▲ EOD RS MS C																
EOD RS Production																													
EOD RS Accepted for EOD Use (AEODU)													11 ▲ EOD RS AEODU																
EOD RS Type Classification (TC)																	12 ▲ EOD RS TC												
EOD RS Initial Operational Capability (IOC)																	13 ▲ EOD RS IOC												
EOD RS Full Material Release (FMR)																	14 ▲ EOD RS FMR												
EOD RS Full Operational Capability (FOC)																									15 ▲ EOD RS FOC				

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev		Project (Number/Name) 016 / Close Combat Capabilities ENG DEV	

Event Name	FY 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
EOD RS Technical Refresh																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 016 / <i>Close Combat Capabilities ENG DEV</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Dismounted Lane Breaching System (DLBS)	1	2016	1	2020
DLBS Preliminary Design Review (PDR)	1	2018	1	2018
DLBS Detailed Design Effort	1	2018	4	2018
DLBS User Assessment	3	2018	3	2018
DLBS Critical Design Review (CDR)	4	2018	4	2018
DLBS Qualification Hardware Build	4	2018	1	2019
Next Generation Advanced Bomb Suit (NGABS)	1	2017	4	2024
NGABS Materiel Development Decision (MDD)	2	2018	2	2018
NGABS Milestone (MS) B	3	2018	3	2018
NGABS Developmental Testing	1	2019	4	2020
NGABS MS C	3	2020	3	2020
Explosive Ordnance Disposal (EOD) Render Safe (RS)	1	2020	4	2024
EOD RS Materiel Development Decision (MDD)	1	2019	1	2019
EOD RS Life Cycle Sustainment Plan (LCSP)	2	2019	2	2020
EOD RS Market Survey	2	2019	2	2019
EOD RS GOTS/COTS Evaluations & Logistics Demonstrations	2	2020	4	2022
EOD RS Prototype Testing	3	2020	3	2020
EOD RS Solution Down Selection	3	2020	3	2020
EOD RS Loadset Development	4	2020	1	2021
EOD RS Milestone (MS) C	4	2020	4	2020
EOD RS Production	4	2020	2	2023
EOD RS Accepted for EOD Use (AEODU)	4	2020	4	2020

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 016 / <i>Close Combat Capabilities ENG DEV</i>

Events	Start		End	
	Quarter	Year	Quarter	Year
EOD RS Type Classification (TC)	2	2021	2	2021
EOD RS Initial Operational Capability (IOC)	2	2021	2	2021
EOD RS Full Material Release (FMR)	4	2021	4	2021
EOD RS Full Operational Capability (FOC)	4	2023	4	2023
EOD RS Technical Refresh	1	2024	4	2028

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>				Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>			
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
415: <i>Mine Neutral/Detection</i>	-	12.537	33.204	17.910	-	17.910	0.727	0.645	5.000	4.630	0.000	74.653
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This Project provides for Engineering Manufacturing and Development (EMD) for the next generation of capabilities to detect, identify and neutralize hybrid threats and explosive hazards such as Improvised Explosive Devices (IEDs) and landmines. These capabilities are a Family of Systems (FOS) encompassing handheld, vehicle mounted, small robotic mounted, aerial platform mounted and area access, and neutralization systems operating in manned, remotely controlled, semi-autonomous or fully autonomous modes. Continued development of this FOS is necessary to support Route Clearance Platoons located within both Engineer Companies and Brigade Engineering Battalion Brigade Combat Teams.

The Husky Mounted Detection System (HMDS) is a counter-explosive device capability that provides standoff detection and marking of metallic encased caches and metallic and low-metallic antitank landmines, unexploded ordnance, trigger mechanisms, and improvised explosive devices (IEDs) in support of route and area-clearance operations. HMDS is a mission equipment package mounted on the Husky route clearance vehicle. The program was restructured in September 2016 to align with emerging shallow buried Wire Detection (WD) capabilities integrated onto the HMDS Increment A1 configuration (includes Ground Penetrating Radar (GPR)). These changes are necessary to adapt to changing IED threats. WD Technology will be fully integrated through Engineering Change Proposals (ECPs) at the end of FY20. Prototypes developed under the concluded HMDS Increment A2 effort may be leveraged in development of future capabilities. Future capabilities may include detection of deep buried IEDs and caches, and semi-autonomous control of the Husky vehicle and HMDS from inside a follow-on vehicle.

Route Clearance & Interrogation System (RCIS) Type I consists of a semi-autonomous vehicle and includes designated control vehicles and Operator Control Units (OCUs) which provide a standoff capability to detect and neutralize the full spectrum of explosive hazards. Type I integrates a semi-autonomous kit onto a High Mobility Engineering Excavator (HMEE) for remote control from a Buffalo Mine Protected Clearance Vehicle (MPCV). RCIS Type I semi-autonomous kit will be integrated onto the HMEE and be capable of interrogating and classifying explosive hazards. An OCU will be integrated into a Buffalo MPCV for Type I. RCIS capabilities will be fielded to Route Clearance Squads and Engineer Platoons which includes Tele-operation, RADAR-based Follow-Me, LIDAR obstacle detection, onscreen predictive turning map, customizable camera views in order to achieve the RCIS mission.

For RCIS Type I, FY 2020 funding supports engineering, logistics development, Full Up System Level prototype delivery and ATEC testing, including the digitized, drive by wire HMEE with the Semi-Autonomous Control (SAC) kit. .

The Vehicle Optics Sensor System (VOSS) provides a telescoping, gyro-stabilized, high-resolution, triple sensor (daylight, night-vision, and thermal-imaging) surveillance system to optically detect from standoff distances, explosive hazards (IEDs and landmines) and their trigger sources. VOSS is mounted on the MMPV Type I for Explosive Ordnance Disposal (EOD) and MMPV Type II for Engineers. VOSS will not require RDT&E funding in FY2019 or beyond.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>
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The Multifunction Video Display (MVD) provides view/control capability of the enablers (Interrogation Arms, VOSS, Man Transportable Robotic System (MTRS), Drivers Vision Enhancement, Vehicle Situational Awareness Cameras) in the MMPV Type II to all Operators. New capabilities will be added into that display to view and control future Unmanned Ground Vehicle Systems (UGVs) programs Route Clearance & Integration System (RCIS) and Husky Mounted Detection System (HMDS), Explosive Hazard Pre-Detonation (EHP) Roller and view Unmanned Aerial Vehicles video feeds. Additional software will need to be developed to add these capabilities. In addition, a new capability to push the video feeds of all of the enablers (Interrogation Arms, VOSS, Man Transportable Robotic System, Drivers Vision Enhancement and Vehicle Situational Awareness Cameras) from various vehicles within a Route Clearance Patrol will be developed.

Force Protection Improvements/Add On Armor (AoA) to execute system level design cycle for Rocket Propelled Grenade (RPG) and explosive formed projectiles (EFP) AoA kits for Husky and Buffalo. Kits will be developed so that RPG and EFP protection can be installed at the same time. In order to do this lighter weight design solutions will be developed. Given the continued need for these AoA Kits, the schedule has been moved to the left.

Standoff Robotic Explosive Hazard Detection System (SREHD), formerly known as the Autonomous Mine Detection System (AMDS), provides increased survivability through mine and explosive hazards stand-off detection, marking and neutralization capability for the dismounted soldier. It provides area access and freedom of movement for the Commander. SREHD consists of payload modules to be mounted on man-portable unmanned ground vehicles. The payloads are for surface laid and buried threats to include mines and explosive hazards. This capability allows a soldier to remain in a protective posture while detecting and neutralizing a wide variety of hybrid and conventional explosive threats. SREHD conducted a successful Milestone (MS) C in April 2018 and initiated Low Rate Initial Production (LRIP) in June 2018. Due to the realignment of funds FY 2020-2024 to higher Army priorities, the proponent withdrew support to the Standoff Robotic Explosive Hazard Detection System (SREHD) after Low Rate Initial Production (LRIP) award. Research, Development, Test and Evaluation (RDTE) tasks will conclude in FY 2019 under FY 2018 PE 0654808A, Project 415, Landmine Warfare/Barrier - Eng Dev, once corrective action plans and trainer re-development are completed. The program will conclude in June 2020 under FY 2018 OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) and PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335 for system qualification and production and receipt of LRIP quantities for an orderly program closeout.

FY 2020 Base funding in the amount of \$17.910 million includes \$10.900 million to support the continued development of the Husky Mounted Detection System (HMDS); \$7.010 million to support development and testing of RCIS Type I.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: HMDS Program Management Support</p> <p>Description: Husky Mounted Detection System (HMDS) Program Management Support</p> <p>FY 2019 Plans: Will fund PMO Core and Matrix Support</p> <p>FY 2020 Base Plans:</p>	0.534	1.818	1.247	-	1.247

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>			
B. Accomplishments/Planned Programs (\$ in Millions)					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue execution and management of Engineering Change Proposal (ECP) for Wire Detection, Infrared Illumination and Information Assurance compliance in preparation for Modification Work Order (MWO)					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to magnitude of effort decreasing in the final year of executing the ECP and associated activities					
Title: HMDS GPR: Engineer Change Proposal (ECP) to add Wire Detection and Infrared Illumination					
Description: HMDS A1 Tactical GPR: Engineer Change Proposal (ECP) to add Wire Detection and Infrared Illumination					
FY 2019 Plans: Will continue with ongoing ECP efforts for Wire Detection, Infrared Illumination and Mission Computer Upgrade					
FY 2020 Base Plans: Will complete ongoing ECP efforts for Wire Detection, Infrared Illumination and Information Assurance compliance.					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to magnitude of effort decreasing in the final year of executing the ECP and associated activities					
Title: HMDS Testing and Test Support activities					
Description: HMDS Testing and Test Support activities					
FY 2019 Plans: Will continue Risk Reduction and ECP testing					
FY 2020 Base Plans: Will complete Risk Reduction and ECP testing					
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to magnitude of testing effort decreasing in the final year of executing the ECP and associated activities					
Title: HMDS A1 Auto-Height Improvements					
FY 2020 Base Plans:					
	5.840	15.223	1.889	-	1.889
	0.491	4.673	2.504	-	2.504
	-	-	2.702	-	2.702

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019			
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>				
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Complete auto-height development and produce prototypes to support testing						
FY 2019 to FY 2020 Increase/Decrease Statement: This portion of the ECP effort represents an increase from prior year and will be executed during FY20 only						
Title: HMDS Systems Training Product Development						
Description: Training product development to support Developmental test and limited user testing						
FY 2019 Plans: Develop training materials to support developmental and limited user testing.						
FY 2020 Base Plans: Complete development activities to support Modification Work Order (MWO)						
FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to training product development completion after testing is completed in FY2020						
		-	0.892	0.764	-	0.764
Title: HMDS Program and Logistics Support						
FY 2020 Base Plans: Development of final logistics products to support logistics demo and Modification Work Order (MWO)						
FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to development of logistics products in preparation of the Modification Work Order (MWO)						
		-	-	1.794	-	1.794
Title: RCIS Type I						
Description: Route Clearance & Interrogation System (RCIS) Type I provides standoff capability to detect and neutralize the full spectrum of explosive hazards.						
FY 2019 Plans: RCIS Type I: Execute Start of Work Meeting with both EMD contractors; complete Preliminary and Critical Design Reviews; Execute (2) user juries; perform contractor verification testing; build EMD prototypes for ATEC testing.						
FY 2020 Base Plans:						
		0.131	7.503	7.010	-	7.010

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
RCIS Type I: Continue the EMD phase - perform government safety testing with full up system level RCIS prototypes; perform cyber scans and analysis; continue logistics analysis; prep for MS C in FY21. FY 2019 to FY 2020 Increase/Decrease Statement: The system design portion of the Delta HMEE (digitization of the HMEE platform) will be completed in FY 2019.					
Title: VOSS Geo-Location Capability & Infrared Camera Replacement Description: Vehicle Optics Sensor System (VOSS) capability to determine location of explosive hazards and IR Camera Replacement	0.876	-	-	-	-
Title: Multifunction Video Display (MVD) Description: Multifunction Video Display (MVD). Digital display used to control and view RCV enablers FY 2019 Plans: Will continue Support for MVD SIL at Night Vision and Electronic Sensors Directorate (NVESD) for development of additional enabler (Interrogation Arm software development for control functionality). FY 2019 to FY 2020 Increase/Decrease Statement: No FY 2020 funding is required.	0.750	0.500	-	-	-
Title: RCV & Enabler Improvements Description: Develop the hardware used to improve POR RCVs. FY 2019 Plans: Will continue to: - Develop Interrogation Arm upgrades for the Buffalo Mine Protected Clearance Vehicle (MPCV). Demonstration of these upgrades will be performed. - Develop product upgrades to the Medium Mine Protected Vehicle (MMPV) Type II Interrogation Arm so it can be operated by the MVD. - Next Generation HMDS A2 to include Deep Buried Detection on the Husky and semi-autonomous control capability on the Husky and MMPV Type II - Explosive Hazard Pre-Detonation (EHP) hardware upgrades FY 2019 to FY 2020 Increase/Decrease Statement:	-	0.425	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2020 funding is not required.					
Title: Add on Armor (AoA) Description: Development AoA efforts for Route Clearance Vehicles (RCV) to include Rocket Propelled Grenade (RPG) and Explosive Formed Projectiles (EFP) for Husky and Buffalo.	0.033	-	-	-	-
Title: Standoff Robotic Explosive Hazard Detection (SREHD) (Formerly AMDS) Description: Standoff Robotic Explosive Hazard Detection (SREHD) (AMDS) FY 2019 Plans: Program closeout FY 2019 to FY 2020 Increase/Decrease Statement: SREHD will conduct program closeout in FY 2019.	3.882	0.811	-	-	-
Title: FY 2019 SBIR / STTR Transfer FY 2019 Plans: SBIR/STTR tax FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer	-	1.359	-	-	-
Accomplishments/Planned Programs Subtotals	12.537	33.204	17.910	-	17.910

C. Other Program Funding Summary (\$ in Millions)	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
• R64001: HUSKY MOUNTED DETECTION SYSTEM (HMDS)	16.695	35.834	83.082	34.253	117.335	152.437	67.879	-	-	0.000	390.180
• R68102: GRND STANDOFF MINE DETECTN SYSM (GSTAMIDS)BLK 1	27.442	42.001	37.025	4.500	41.525	28.617	13.568	-	-	0.000	153.153
• DA0924: Modification Of In Svc Equip	146.587	256.642	58.946	28.000	86.946	49.250	46.050	-	-	0.000	585.475

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection

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
• R68260: AREA MINE DETECTION SYSTEM (AMDS)	10.571	5.797	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• 606: Cntrmn/Barrier Adv Dev	3.187	2.964	0.000	-	0.000	-	-	-	-	0.000	6.151
• M80400: Robotic Combat Support System (RCSS)	4.516	8.879	2.000	3.300	5.300	6.850	16.476	-	-	0.000	42.021
• E50510: DEMO KIT, BLASTING: Munition Array Charge, XM335	1.586	2.350	0.000	-	0.000	-	-	-	-	0.000	3.936
• R64003: HMDS - DEEP BURIED DETECTION	-	-	29.382	-	29.382	94.984	55.750	-	-	0.000	180.116

Remarks

D. Acquisition Strategy

The Husky Mounted Detection System (HMDS) program is pursuing an acquisition approach that delivers capability increments - Increment A, Configuration 1 (A1) to the Warfighter by leveraging the Quick Reaction Capability (QRC) Ground Penetrating Radar (GPR) currently deployed in support of Operation Enduring Freedom (OEF) and Operation Inherent Resolve (OIR). In FY2020, the program will complete execution of an Engineering Change Proposals (ECP) to add a wire detection capability to address evolving threat, and Infrared illumination to enable nighttime operation, improve operational availability of the HMDS during inclement weather and address obsolescence and Cyber Security deficiencies.

The Route Clearance & Interrogation System (RCIS) program executes an Engineering Manufacturing and Development (EMD) phase for Type I systems with an OEM contract award for Delta High Mobility Engineering Excavator (HMEE) support and a contract award in 4QFY2018 to one EMD contractor for the Semi-Autonomous Control (SAC) Kit. The SAC Kit was awarded based on a source selection from full and open competition. The SAC EMD contract awardee will execute Preliminary Design Review (PDR), design, integration, and build phase of seven Semi-Autonomous Capability (SAC) kits, integrated onto six vehicles, with one kit available for engineering and System Integration Lab (SIL) evaluations. These assets enable the Government to execute a full Pre-Production Qualification Test (PPQT) and to evaluate against Capability Production Document (CPD) and performance specification requirements. Production and Technical Data Package (TDP) procurement options on the EMD contract take advantage of competition to assist in cost reduction. The RCIS Type I program Lifecycle Cost Estimate (LCCE), and associated budget request, was updated based on costs associated with modifying the base HMEE platform to accept the SAC kit, changes in the acquisition strategy and alignment of development and test activities in support of a production decision. To support EMD, ALUGS is funding Reset/Recap of four Buffalo Mine Protected Clearance Vehicle (MPCV) test assets at Letterkenny Army Depot. These will be provided to the SAC contractor for Operator Control Unit (OCU) integration.

The Vehicle Optics Sensor System (VOSS) program has no planned activities in FY 2019 or beyond.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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<p>Spiral development of software upgrades to MVD will be procured in FY 2018 and FY 2019. Additional funding will be required to support the remote visualization capability in the FREHD CDD.</p> <p>The Standoff Robotic Explosive Hazard Detection System (SREHD) (formerly known as AMDS) is currently in the Low Rate Initial Production (LRIP) phase to provide standoff detection, marking, and neutralization of explosive hazards (e.g., landmines, improvised explosive devices (IED), booby-traps (explosive), and unexploded ordnance (UXO)) in complex and urban terrain, including confined areas and subterranean environments (e.g., buildings, bunkers, tunnels, etc.). Transition to Low Rate Initial Production (LRIP) occurred 30 April 2018 under PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335, for the neutralization capability, as well under OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) for the detection and marking capabilities. Due to the realignment of funds FY 2020-2024 to higher Army priorities, the proponent withdrew support to the Standoff Robotic Explosive Hazard Detection System (SREHD) after Low Rate Initial Production (LRIP) award. Subsequently, the Milestone Decision Authority (MDA) directed that FY 2019 funding will not be executed for this program. Due to timing, funding is still reflected in FY 2019. Research, Development, Test and Evaluation (RDTE) tasks will conclude in FY 2019 under FY 2018 PE 0654808A, Project 415, Landmine Warfare/Barrier - Eng Dev, once corrective action plans and trainer re-development are completed. The program will conclude in June 2020 under FY 2018 OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) and PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335 for system qualification and production and receipt of LRIP quantities for an orderly program closeout.</p> <p>E. Performance Metrics N/A</p>		

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection
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Management Services (\$ in Millions)				FY 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
HMDS System Engineering & Program Management	MIPR	PM Terrestrial Sensors : Fort Belvoir, VA	1.280	0.470		1.818	Jan 2019	1.247	Mar 2020	-		1.247	Continuing	Continuing	Continuing
Program Management - RCIS Type I	MIPR	PM FP : Warren, MI	4.189	0.024		0.769	Oct 2018	0.650	Oct 2019	-		0.650	Continuing	Continuing	-
Program Management - MTRS Inc II	MIPR	PM FP : Warren, MI	3.726	-		-		-		-		-	0.000	3.726	-
VOSS Geo-location and new Infrared Camera	MIPR	PM Ground Sensors : Ft. Belvoir, VA	0.491	0.143		-		-		-		-	0.000	0.634	-
SREHD (Formerly AMDS) Program Management	Allot	JPEO A&A, PM CCS : Picatinny Arsenal, NJ	3.726	0.142	Oct 2017	-		-		-		-	0.000	3.868	-
SREHD (Formerly AMDS) Program Closeout	Allot	JPEO A&A, PM CCS : Picatinny Arsenal, NJ	-	-		0.811	Dec 2018	-		-		-	0.000	0.811	-
Subtotal			13.412	0.779		3.398		1.897		-		1.897	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
HMDS A1 Dev of Engineering Change Proposal w/ Wire Detect and InfraRed	SS/FFP	Chemring Sensors & Electronic Systems (CSES) : Dulles, VA	2.597	5.840		15.223	Jan 2019	1.889	Nov 2019	-		1.889	Continuing	Continuing	Continuing
HMDS Auto-height improvements	C/CPFF	TBD : TBD	-	-		-		2.702	Nov 2019	-		2.702	Continuing	Continuing	Continuing
HMDS Systems Training Product Development	MIPR	CECOM : Various	-	-		0.892	Nov 2018	0.764	Nov 2019	-		0.764	Continuing	Continuing	Continuing
RCIS Type I	SS/FFP	J C Bamford : Pooler, GA	9.233	-		1.810	Nov 2018	1.610	Oct 2019	-		1.610	0.000	12.653	Continuing

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection
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Product Development (\$ in Millions)				FY 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			
RCIS Type I test assets	MIPR	Letterkenny Army Depot : Letterkenny, PA	2.252	-		-		-		-		-	0.000	2.252	-
RCIS Type I SAC	C/CPIF	QinetiQ : Waltham, MA	-	-		3.700	Nov 2018	3.450	Oct 2019	-		3.450	Continuing	Continuing	-
MTRS Inc II	C/FFP	PM FP, PdM UGV : Warren, MI	2.566	-		-		-		-		-	0.000	2.566	-
VOSS Geo-location and Infrared Camera	C/CPFF	Various : Ft. Belvoir, VA	3.347	0.295		-		-		-		-	0.000	3.642	-
Multi-Function Video Display	MIPR	NVESD : Fort Belvoir, VA	3.722	0.250		0.500	Oct 2018	-		-		-	3.047	7.519	3.047
RCV & Enablers Improvements - EHP Upgrades	C/CPFF	KRC : Houghton, MI	1.233	-		-		-		-		-	0.000	1.233	-
Buffalo MPCV Interrogation Arm Improvements	C/CPFF	KRC : Houghton, MI	-	-		0.425	Nov 2018	-		-		-	0.000	0.425	-
SREHD (Formerly AMDS) EMD and Trainer Re-development	C/CPIF	Carnegie Robotics LLC : Pittsburgh, PA	29.830	1.059	Jan 2018	-		-		-		-	0.000	30.889	-
SREHD (Formerly AMDS) RAMS Type B Integration with Trainer	MIPR	ARL : Adelphi, MD	-	0.300	Mar 2018	-		-		-		-	0.000	0.300	-
FY 2019 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.359	Oct 2018	-		-		-	0.000	1.359	-
Subtotal			54.780	7.744		23.909		10.415		-		10.415	Continuing	Continuing	N/A

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

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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
HMDS - Program and Logistics Support	MIPR	Various : Various	-	-		-		1.794	Nov 2019	-		1.794	Continuing	Continuing	Continuing
RCIS Type I	MIPR	TARDEC, TACOM : Warren, MI	7.518	0.070		0.764	Oct 2018	0.400	Oct 2019	-		0.400	Continuing	Continuing	-
Robotics Interoperability	MIPR	PM FP, PdM ALUGS : Warren, MI	3.960	-		-		-		-		-	0.000	3.960	-
MTRS Inc II	Various	PM FP, PdM UGV : Warren, MI	10.146	-		-		-		-		-	0.000	10.146	-
VOSS Geo-location and Infrared Camera	MIPR	Various : Various	2.720	0.379		-		-		-		-	0.000	3.099	-
Multi-function Video Display	C/CPFF	NVESD/CERDEC : Fort Belvoir, VA	3.297	0.500		-		-		-		-	0.000	3.797	-
Add on Armor (AoA) Husky RPG Kit	MIPR	TARDEC : Warren, MI	0.283	0.033	Jul 2018	-		-		-		-	0.000	0.316	-
AoA Husky AoA Kit	MIPR	TARDEC : Warren, MI	0.091	-		-		-		-		-	0.000	0.091	-
Development of Buffalo EFP AoA Kit	MIPR	TARDEC : Warren, MI	0.400	-		-		-		-		-	0.000	0.400	-
SREHD (Formerly AMDS)	MIPR	Various : Various	11.395	2.281	Jan 2018	-		-		-		-	0.000	13.676	-
Subtotal			39.810	3.263		0.764		2.194		-		2.194	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
HMDS ATEC Testing	MIPR	ATEC : Alexandria, VA	4.486	0.559		3.781	Mar 2019	2.003	Nov 2019	-		2.003	Continuing	Continuing	Continuing
HMDS Test Support	MIPR	CECOM : Various	-	-		0.892	Nov 2018	0.501	Nov 2019	-		0.501	Continuing	Continuing	Continuing
RCIS Type I	MIPR	ATEC : Aberdeen, MD	1.739	0.033	Jul 2018	0.460	Nov 2018	0.900	Oct 2019	-		0.900	0.000	3.132	-

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

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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			
MTRS Inc II	MIPR	TARDEC, Various : Warren, MI	1.131	-		-		-		-		-	0.000	1.131	-
VOSS Geo-location and new Infrared Camera	MIPR	ATEC : Alexandria, VA	4.813	0.059		-		-		-		-	Continuing	Continuing	Continuing
Multi-Function Video Display	WR	KRC : Houghton, MI	1.100	-		-		-		-		-	0.000	1.100	-
RCV & Enabler Improvements ?MMPV Type II Interrogation Arm.	MIPR	TARDEC : Warren, MI	0.367	-		-		-		-		-	0.000	0.367	-
Add on Armor (AoA) Husky RPG	MIPR	ATEC : Aberdeen, MD	0.100	-		-		-		-		-	0.000	0.100	-
Add on Armor Buffalo EFP and RPG	MIPR	ATEC : Aberdeen, MD	0.300	-		-		-		-		-	0.000	0.300	-
Add-on Armor	MIPR	ARL : Adelphi, MD	0.100	-		-		-		-		-	0.000	0.100	-
SREHD (Formerly AMDS)	MIPR	OTC : Ft. Hood, TX	4.341	-		-		-		-		-	0.000	4.341	-
SREHD (Formerly AMDS)	MIPR	ARL : Adelphi, MD	-	0.100	Jun 2018	-		-		-		-	0.000	0.100	-
Subtotal			18.477	0.751		5.133		3.404		-		3.404	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	126.479	12.537	33.204	17.910	-	17.910	Continuing	Continuing	N/A

Remarks
 Due to the realignment of funds FY 2020-2024 to higher Army priorities, the proponent withdrew support to the Standoff Robotic Explosive Hazard Detection System (SREHD) after Low Rate Initial Production (LRIP) award. Subsequently, the Milestone Decision Authority (MDA) directed that FY 2019 funding will not be executed for this program. Due to timing, funding is still reflected in FY 2019. Research, Development, Test and Evaluation (RDTE) tasks will conclude in FY 2019 under FY 2018 PE 0654808A, Project 415, Landmine Warfare/Barrier - Eng Dev, once corrective action plans and trainer re-development are completed. The program will conclude in June 2020 under FY 2018 OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) and PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335 for system qualification and production and receipt of LRIP quantities for an orderly program closeout.

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection

Event Name	FY 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	
HMDS																													
HMDS Increment A1-TC/MR					4 A1 TC/MR																								
HMDS Increment A1-FUE	1 A1 FUE																												
HMDS Increment A1-IOC					7 A1 IOC																								
HMDS Increment A1 Award ECP for WD									[Redacted]																				
HMDS Risk Reduction/ECP									[Redacted]																				
HMDS Increment A1 w/WD FUE													11 HMDS ECP w/WD FUE																
HMDS Testing									[Redacted]																				
RCIS Type I																													
RCIS Type I MS B					6 MS B																								
RCIS Type I EMD SAC Contract									[Redacted]																				
RCIS Type I EMD Delta HMEE contract									[Redacted]				[Redacted]																
RCIS Type I Testing													[Redacted]																

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection

Event Name	FY 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
RCIS Type I CDR					8 CDR																							
RCIS Type I TRR					10 TRR																							
RCIS Type I MS C													12 MS C															
RCIS Type I Low Rate Initial Production (LRIP)													LRIP															
RCIS Type I Full Rate Production (FRP)																					FRP							
RCIS Type I Fielding																					RCIS Type I fielding							
MVD																												
MVD Operational Testing																												
MVD Production																					14 MVD Production Cut-In							
MVD Production Cut-In																					Production Cut-In							
MVD Future Incremental Capability Upgrades/ Spiral Software Development																												
RCV & Enablers																												
Interrogation Arm Upgrade Demonstrator MMPV Type II	Prototype Development																											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
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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
Interrogation Arm Upgrade Demonstrator MMPV Type II Cut-in																	13 ▲											
RPG Defeat Add on Armor Husky LRIP																												
RPG Defeat Add on Armor Husky FRP																	9 ▲											
EFP Defeat Add on Armor Prototype Development (Buffalo)																												
Standoff Robotic Explosive Hazard Detection System (SREHD) (Formerly AMDS)																												
SREHD Regression Testing	■																											
SREHD Milestone C					2 ▲																							
SREHD Trainer Re-development Contract Modification					3 ▲																							
SREHD Low Rate Initial Production (LRIP) Award					5 ▲																							
SREHD Trainer Re-development					■																							
SREHD Corrective Action Period (CAP)					■																							
SREHD FAT Build									■																			
SREHD Product Verification Test (PVT)													■															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 415 / Mine Neutral/Detection	

Event Name	FY 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
SREHD First Article Test (FAT)									■																			
									FAT																			
SREHD LRIP Build									■																			
SREHD LRIP Deliveries									■																			
									LRIP Build																			
									LRIP Deliveries																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
HMDS	1	2016	1	2023
HMDS Increment A1-TC/MR	3	2018	3	2018
HMDS Increment A1-FUE	3	2018	3	2018
HMDS Increment A1-IOC	3	2019	3	2019
HMDS Increment A1 Award ECP for WD	3	2018	4	2020
HMDS Risk Reduction/ECP	2	2017	1	2021
HMDS Increment A1 w/WD FUE	4	2020	4	2020
HMDS Testing	2	2018	1	2021
RCIS Type I	1	2015	4	2022
RCIS Type I MS B	4	2018	4	2018
RCIS Type I EMD SAC Contract	4	2018	3	2021
RCIS Type I EMD Delta HMEE contract	2	2019	4	2022
RCIS Type I Testing	1	2020	1	2021
RCIS Type I CDR	3	2019	3	2019
RCIS Type I TRR	1	2020	1	2020
RCIS Type I MS C	3	2021	3	2021
RCIS Type I Low Rate Initial Production (LRIP)	3	2021	3	2023
RCIS Type I Full Rate Production (FRP)	3	2023	4	2027
RCIS Type I Fielding	2	2024	3	2028
MVD	1	2016	4	2022
MVD Operational Testing	4	2017	1	2018
MVD Production	1	2023	1	2023

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
MVD Production Cut-In	1	2018	1	2023
MVD Future Incremental Capability Upgrades/ Spiral Software Development	1	2017	4	2019
RCV & Enablers	1	2016	4	2022
Interrogation Arm Upgrade Demonstrator MMPV Type II	2	2017	2	2018
Interrogation Arm Upgrade Demonstrator MMPV Type II Cut-In	4	2022	4	2022
EHP Debris Blower Camera Upgrade	2	2016	3	2016
Add on Armor (AoA)	2	2015	2	2015
TEST - RPG Defeat Add on Armor Husky LRIP	2	2017	2	2017
RPG Defeat Add on Armor Husky LRIP	2	2019	4	2019
TEST -RPG Defeat Add on Armor Husky LRIP	3	2017	3	2017
RPG Defeat Add on Armor Husky FRP	4	2019	4	2019
TEST - RPG Defeat Add on Armor Husky FRP	4	2017	4	2017
EHP Roller Development	1	2016	2	2017
EFP Defeat Add on Armor Prototype Development (Buffalo)	2	2019	4	2019
TEST - EFP Defeat Add on Armor Prototype Development (Buffalo)	1	2017	2	2017
TEST - EFP Defeat & RPG Add on Armor Testing (Buffalo)	4	2017	4	2017
Standoff Robotic Explosive Hazard Detection System (SREHD) (Formerly AMDS)	1	2018	4	2022
SREHD Regression Testing	1	2018	2	2018
SREHD Milestone C	3	2018	3	2018
SREHD Trainer Re-development Contract Modification	3	2018	3	2018
SREHD Low Rate Initial Production (LRIP) Award	3	2018	3	2018
SREHD Trainer Re-development	3	2018	3	2019
SREHD Corrective Action Period (CAP)	4	2018	2	2019
SREHD FAT Build	2	2019	3	2019
SREHD Product Verification Test (PVT)	3	2019	4	2019

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 415 / <i>Mine Neutral/Detection</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
SREHD First Article Test (FAT)	4	2019	4	2019
SREHD LRIP Build	4	2019	3	2020
SREHD LRIP Deliveries	4	2019	3	2020

Note

Due to the realignment of funds FY 2020-2024 to higher Army priorities, the proponent withdrew support to the Standoff Robotic Explosive Hazard Detection System (SREHD) after Low Rate Initial Production (LRIP) award. Subsequently, the Milestone Decision Authority (MDA) directed that FY 2019 funding will not be executed for this program. Due to timing, funding is still reflected in FY 2019. Research, Development, Test and Evaluation (RDTE) tasks will conclude in FY 2019 under FY 2018 PE 0654808A, Project 415, Landmine Warfare/Barrier - Eng Dev, once corrective action plans and trainer re-development are completed. The program will conclude in June 2020 under FY 2018 OPA R68260 / AREA MINE DETECTION SYSTEM (AMDS) and PAA E50510 / DEMO KIT, BLASTING: Munition Array Charge, XM335 for system qualification and production and receipt of LRIP quantities for an orderly program closeout.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 434 / Anti-Personnel Landmine Alternatives (NSD)
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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
434: Anti-Personnel Landmine Alternatives (NSD)	-	5.264	0.000	0.000	-	0.000	155.048	157.400	163.500	93.396	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Spider Increment 1A will build upon the existing M7 Spider system. The M7 Spider system is a hand-emplaced, remotely controlled (Man-In-The-Loop) system that provides highly responsive terrain-shaping and protection capabilities. M7 Spider replaces persistent anti-personnel landmines, is compliant with US National Landmine policy, and has been fielded to US forces in support of Operation Enduring Freedom and currently being fielded to Engineers within Brigade Combat Teams in the Active and Army National Guard components. Additional capabilities will be developed to enhance the Spider Remote Control Station and demonstrate the ability to employ legacy Government-Off-The-Shelf (GOTS) lethal and non-lethal anti-personnel (AP) munitions and counter mobility obstacles. Spider Increment 1A will utilize an open system architecture to facilitate future munition integration.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Spider Engineering Support Description: Perform engineering support.	0.713	-	-	-	-
Title: Spider Test and Evaluation Description: Provide support to Contractor/Government test activities.	2.898	-	-	-	-
Title: Spider Management Services Description: Program Management and support of Spider Increment 1A.	1.653	-	-	-	-
Accomplishments/Planned Programs Subtotals					
	5.264	-	-	-	-

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
• B55501: SPIDER APLA Remote Control Unit	0.996	-	0.000	-	0.000	-	-	-	-	0.000	0.996
• B54020: Spider Family of Networked Munitions Incr	4.500	13.345	10.930	-	10.930	13.982	8.648	7.515	4.024	0.000	62.944

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 434 / <i>Anti-Personnel Landmine Alternatives (NSD)</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>
• EK7: <i>Area Denial Capability Development</i>	66.050	42.234	79.932	-	79.932	-	-	-	-	0.000	188.216

Remarks

Project EK7 is for the concept exploration and refinement of Terrain Shaping Obstacles.

D. Acquisition Strategy

The Spider Engineering Manufacturing Development (EMD) contract was a competitively awarded Cost Plus Incentive Fee EMD contract with a one year Firm-Fixed Price (FFP) Low Rate Initial Production (LRIP) option. A Government Level 3 Technical Data Package (TDP) will be delivered as part of the EMD contract. The modified TDP at the end of LRIP will be the basis of a Full Rate Production (FFP) contract.

SAVO will consider using a Middle Tier of Acquisition for Rapid Prototyping and Fielding acquisition approach in accordance with Section 804 of the 2016 NDAA along with other acquisition strategy options. Development will utilize an Other Transaction Authority contract.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 434 / Anti-Personnel Landmine Alternatives (NSD)
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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			
Spider - Program Management	Various	PM-CCS, : Picatinny Arsenal, NJ	4.029	0.325		-		-		-		-	0.000	4.354	-
SBIR/STTR, FFRDC and Section 3001/3004 ATB Adjustments	Various	PM CCS, : Picatinny Arsenal, NJ	3.686	-		-		-		-		-	0.000	3.686	-
Subtotal			7.715	0.325		-		-		-		-	0.000	8.040	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			
Spider Non-Lethal Launcher (FY12)	SS/CPIF	Alliant Techsystems Operations, LLC : Plymouth, MN	0.667	-		-		-		-		-	0.000	0.667	-
Spider Inc 1A (FY13-16)	C/CPIF	Northrop Grumman Systems Corporation : Carson, CA	29.819	-		-		-		-		-	0.000	29.819	-
Rifleman Radio Systems	Reqn	General Dynamics, C4 Systems : Scottsdale, AZ	0.057	-		-		-		-		-	0.000	0.057	-
Subtotal			30.543	-		-		-		-		-	0.000	30.543	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			
Spider - ARDEC Eng support	MIPR	ARDEC, : Picatinny Arsenal, NJ	15.101	0.683		-		-		-		-	0.000	15.784	-
Contractor Engineering Support	C/FFP	TBD : TBD	-	0.030		-		-		-		-	0.000	0.030	-
Subtotal			15.101	0.713		-		-		-		-	0.000	15.814	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / Landmine Warfare/Barrier - Eng Dev	Project (Number/Name) 434 / Anti-Personnel Landmine Alternatives (NSD)

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
Interactive Electronic Training Manual (IETM) Validation (2)			■ IETM																									
Force Development Test (FDT)		■ FDT																										
Initial Operational Test (IOT)				■ IOT																								

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604808A / <i>Landmine Warfare/Barrier - Eng Dev</i>	Project (Number/Name) 434 / <i>Anti-Personnel Landmine Alternatives (NSD)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
SPIDER Networked Munitions Increment 1A	1	2004	1	2005
Request For Proposal (RFP)	1	2013	1	2013
Source Selection	2	2013	4	2013
Spider Increment 1A Development	4	2013	4	2017
Contractor DT	3	2014	4	2015
Government DT	3	2015	3	2017
Limited User Test (LUT)	2	2016	3	2016
MS C Documentation	2	2016	3	2017
Interactive Electronic Training Manual (IETM) Validation (2)	3	2018	3	2018
Force Development Test (FDT)	3	2018	3	2018
Initial Operational Test (IOT)	4	2018	1	2019

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

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software
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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	-	157.852	169.607	140.637	-	140.637	143.727	110.032	104.286	92.288	Continuing	Continuing
323: Common Hardware Systems	-	5.033	4.873	5.481	-	5.481	5.003	4.099	4.210	5.003	Continuing	Continuing
334: Common Software	-	0.808	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.808
C29: Centralized Technical Support Facility (CTSF)	-	4.843	8.809	8.637	-	8.637	7.088	6.754	7.105	7.139	Continuing	Continuing
C34: Army Tac C2 Sys Eng	-	7.457	7.998	9.483	-	9.483	9.716	9.985	11.706	12.085	Continuing	Continuing
EJ4: COMMAND POST COMPUTING ENVIRONMENT (CPCE)	-	59.370	39.975	30.969	-	30.969	31.600	26.500	27.900	27.800	Continuing	Continuing
EJ5: MOUNTED COMPUTING ENVIRONMENT (MCE)	-	16.271	19.166	12.664	-	12.664	18.600	7.496	8.211	6.376	Continuing	Continuing
EJ6: TACTICAL ENHANCEMENT	-	25.000	17.851	1.853	-	1.853	2.868	0.000	0.000	0.000	0.000	47.572
EK9: TACTICAL NETWORK OPERATIONS AND MANAGEMENT	-	4.655	8.004	3.649	-	3.649	3.378	3.150	3.428	3.934	Continuing	Continuing
EQ8: Mobile/Handheld Computing Environment (M/HHCE)	-	11.402	9.477	4.857	-	4.857	5.160	4.469	4.102	6.121	Continuing	Continuing
ER9: Expeditionary Army Command Post	-	9.601	34.642	35.505	-	35.505	33.493	23.246	20.107	10.007	Continuing	Continuing
EW3: Unit Task Reorganization (UTR) Development	-	13.412	18.812	27.539	-	27.539	26.821	24.333	17.517	13.823	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Army Tactical Command and Control Hardware & Software funding line supports the Army's Network Modernization Strategy Lines of Efforts LOE 1 - Unified Network; LOE 1 - Network Enabling Functions; LOE 2 - Common Operating Environment; LOE - Interoperability, LOE 4 - Command posts. Further detail provided in R2A.

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	
<p>Project 323, the Common Hardware Systems (CHS) program supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 Network Enabling Functions. CHS is a designated Army Strategic Source that acquires and sustains highly flexible, cost effective, and simplified non developmental C4ISR solutions that integrates the latest and emerging commercial technology onto the Converged Mission Command Network.</p> <p>CHS provides technical support, environmental and survivability testing, system design, end of life/configuration management, and strengthens cyber security/supply chain risk management across Army tactical programs to ensure interoperability and integration of hardware throughout the computing infrastructure. CHS continuously analyzes and tracks hardware from cradle-to-grave, from emerging technology until end-of-life. CHS conducts hardware evaluations that facilitate and simplify the selection of common hardware solutions across numerous Army programs and agencies including: Mission Command; Tactical Network; Tactical Radios; Distributed Common Ground Station Army; Aviation Systems; Counter Rocket, Artillery, Mortar; Communication Electronics Command; Communications Electronics Research, Development, and Engineering Command, among others. CHS rapidly procures common hardware configurations across the Integrated Tactical Network (ITN), Common Operating Environment (COE), the sustainment community, and tactical programs that enables the continuous modernization in support of all four Network Modernization Lines of Effort and future Network CFT experimentation. CHS logistical services include worldwide 72 hour turnaround repair through strategically located support centers for tactical military units, tailorable supply chain and cybersecurity measures, manages customizable warranty, maintenance and failure rate reporting, and technical support services to support specific Army program requirements. CHS supports better buying power initiatives by creating efficiencies through economies of scale, price breaks, streamlined processes, reduced cycle times, and centralized contracting.</p> <p>Project 334, the Common Software (CS) program, is the suite of systems through which the Army develops, integrates and tests common software products and/or components used for communication between Army Mission Command Systems and Joint and coalition Command and Control (C2) applications. The CS project provides state-of-the-art software technologies and functionality that is used by numerous Mission Command (MC) and joint systems to eliminate the need for service independent development and duplication of effort. The CS project also manages and performs technology demonstrations of emerging technologies for future use by Army C2 systems. The CS program is a cornerstone in the Army's COE modernization efforts. There is no FY20 RDTE funding since Common SW will be transitioning into sustainment in FY19.</p> <p>Project C29, the Central Technical Support Facility (CTSF), is the Army's single strategic facility responsible for executing Army Interoperability Certification (AIC) system of system verification/validation checkout, testing, and configuration management for the Army's LandWarNet Baseline. The Centralized Technical Support Facility (CTSF) funding line supports the Army's Network Modernization Strategy Line of Effort LOE 1B Network Enabling Functions.</p> <p>Project C34 supports the Army's Network Modernization Strategy LOE 1, Unified Network. The Army Tac C2 Sys Eng project funds the PEO Command, Control, Communications-Tactical (PEO C3T) Technical Management Division (TMD), which effectively manages the System-of-Systems engineering, Enterprise and Integration efforts for the continuing evolution of the network within the PEO C3T portfolio of technology across the capability enhancement packages to deliver efficient and effective cross-domain technical solutions.</p> <p>Project EJ4, the Command Post Computing Environment (CPCE), is one of the computing environments under the Common Operating Environment (COE) initiative, a major Army Network Modernization Strategy Line of Effort of the Network Cross-Functional Team (N-CFT). CPCE provides a common software infrastructure framework (common interface, data, and services) upon which future Warfighter capabilities can be built. CPCE development efforts initially target Command and Control (C2)</p>		

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	
<p>and Situational Awareness (SA) capability development at tactical echelons that span from Army Service Component Commands (ASCC) to Battalion level. The CPCE will be the central computing environment developed to support command posts and combat operations, and will be interoperable with Mounted and Mobile/Handheld systems.</p> <p>Project EJ5, the Mounted Computing Environment (MCE), is one of the six computing environments (CEs) formalized by the AAE under the Common Operating Environment (COE) initiative. MCE standardizes end-user environments and enables streamlined deployment of new warfighting applications while leveraging existing hardware under the Joint Battle Command - Platform program. Requirements for the MCE are established in the AROC approved COE Information Systems Initial Capability Document (IS ICD) and the draft Mounted Computing Environment Requirements Definition Package (RDP 1). FY20 funding provides the means to continue to manage and develop MCE in concert with the Army's future COE strategy.</p> <p>Project EJ6, Tactical Enhancement supports the evaluation and testing requirements for Terrestrial Transmission (TRILOS) and Troposcatter Transmission (TROPO) capabilities procured and fielded under the Signal Modernization (SIGMOD) funding line, B00010. TRILOS and TROPO will provide redundancy communications in a Satellite denied environment by providing improved Line of Sight and beyond line of sight radio systems. In addition this funding will support development of Network Centric Waveform-Resilient (NCW-R). NCW-R is a critical, near-term set of modifications to the current WIN-T SATCOM waveform that will provide limited protection against our adversaries' ability to jam tactical SATCOM Command and control communications on Wideband Global SATCOM (WGS) satellites. NCW-R will provide anti-jam capability and resiliency to WIN-T Program of Record satellite terminals in contested environments. The NCW-R waveform software will operate on WIN-T satellite modems. NCW-R will provide a bridging capability until the next generation protected satellite constellation is launched by the Air Force (projected FY28/29). The current anti-jam protection is limited to two SMART-T terminals per BCT, division and Corps HQs, leaving battalions vulnerable to being isolated during jamming events.</p> <p>Project EK9, Unified Network Operations (UNO) will deliver an integrated Network Operations (NetOps) capability, based upon an open framework, aggregating data, which enables common planning, configuration, management, monitoring, and defense of the Network. This will be accomplished through the integration, co-hosting, and federation of multiple NetOps systems from the hand held devices to the Enterprise. UNO aligns with the Army's intent to develop NetOps prototypes, conduct development operations (DevOps), get user feedback, make adjustments and ultimately deliver enhanced capabilities to the operational force in the shortest time possible using what is available in industry or through other government agencies through an adapt and buy approach based on experimentation and demonstration.</p> <p>Project ER9, Command Post Integrated Infrastructure (CPI2), fields mobile Command Post Nodes by integrating supporting mission command solutions in accordance with Directed Requirement with a FY20 First Unit Equipped in order to enhance the survivability and mobility of brigade and below command post formations. On order, Command Post Integrated Infrastructure will replace selected elements of the legacy command post to provide improved expeditionary capability, survivability, agility, and scalability for Corps and Division Main and Tactical Command Posts, Brigade Main and Tactical Command Posts, and Battalion Command Posts. It will ensure information and support systems are introduced into the Command Post through physical integration allowing the commander to tailor the Command Post as missions dictate.</p> <p>Project EQ8, Mobile/Handheld Computing Environment, supports the Nett Warrior (NW) Program (named in honor of Medal of Honor recipient Colonel Robert C. Nett), also known as the Ground Soldier System (GSS) Program. The program leverages commercial smart devices and secure Army tactical radios to provide the</p>		

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>
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dismounted leader an integrated mission command and situational awareness system for use during combat operations. The NW system provides leaders electronic real-time information on friendly positions; information about enemy activity and movement; navigational data and map imagery; a collaborative planning tool; and other mission related graphics which effectively puts the power of the entire Army tactical network in the hands of the dismounted leader.

Project EW3, Unit Task Reorganization (UTR), supports the Army's Network Modernization Strategy LOE 1, Unified Network. UTR is the process performed by the S6 and their staff to affect change on the network in order to support the operational mission and dynamic nature of the Army. Currently network challenges exist during this process with regard to: maintaining accurate and up to date information, distributing configuration files and activating / re-establishing the network. UTR strives to make authoritative NETOPS Data available across all systems, reduce cognitive burden for soldiers to plan and manage the network and reduce manual touch labor.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	164.409	178.693	128.654	-	128.654
Current President's Budget	157.852	169.607	140.637	-	140.637
Total Adjustments	-6.557	-9.086	11.983	-	11.983
• Congressional General Reductions	-0.103	-0.200			
• Congressional Directed Reductions	-26.500	-13.886			
• Congressional Rescissions	-	-			
• Congressional Adds	25.000	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-4.954	-			
• Adjustments to Budget Years	-	-	11.983	-	11.983

Change Summary Explanation

FY 2020 Base funding increase of \$11.983 million is driven by the following program changes in support of Army Network Modernization efforts:

- Project 323 / Common Hardware Systems was decreased by \$.084M
- Project C29/ CTSF was decreased by \$.074M
- Project EJ4 / Command Post Computing Environment (CPCE) was increased by \$10.319M
- Project EJ5 / Mounted Computing Environment (MCE) was increased by \$4.464M
- Project EJ6 / Tactical Enhancement was decreased by \$10.009M
- Project EK9 / Tactical Network Operations and Management was decreased by \$5.042M
- Project EQ8 / Mobile/Handheld Computing Environment (M/HHCE) was decreased by \$4.705M
- Project ER9 / Expeditionary Army Command Post was increased by \$20.114M
- Project EW3 / Unit Task Reorganization (UTR) Development was decreased by \$3.0M

FY 2018 Congressional Rescissions:

Project C34: \$0.193M

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	
Project EK9: \$4.655M		

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) 323 / Common Hardware Systems			
COST (\$ in Millions)	Prior Years	FY 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
323: Common Hardware Systems	-	5.033	4.873	5.481	-	5.481	5.003	4.099	4.210	5.003	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 323, the Common Hardware Systems (CHS) program supports the Army's Network Modernization Strategy Line of Effort (LOE) 1 Network Enabling Functions. CHS is a designated Army Strategic Source that acquires and sustains highly flexible, cost effective, and simplified non developmental C4ISR solutions that integrates the latest and emerging commercial technology onto the Converged Mission Command Network.

CHS provides technical support, environmental and survivability testing, system design, end of life/configuration management, and strengthens cyber security/supply chain risk management across Army tactical programs to ensure interoperability and integration of hardware throughout the computing infrastructure. CHS continuously analyzes and tracks hardware from cradle-to-grave, from emerging technology until end-of-life. CHS conducts hardware evaluations that facilitate and simplify the selection of common hardware solutions across numerous Army programs and agencies including: Mission Command; Tactical Network; Tactical Radios; Distributed Common Ground Station Army; Aviation Systems; Counter Rocket, Artillery, Mortar; Communication Electronics Command; Communications Electronics Research, Development, and Engineering Command, among others. CHS rapidly procures common hardware configurations across the Integrated Tactical Network (ITN), Common Operating Environment (COE), the sustainment community, and tactical programs that enables the continuous modernization in support of all four Network Modernization Lines of Effort and future Network CFT experimentation. CHS logistical services include worldwide 72 hour turnaround repair through strategically located support centers for tactical military units, tailorable supply chain and cybersecurity measures, manages customizable warranty, maintenance and failure rate reporting, and technical support services to support specific Army program requirements. CHS supports better buying power initiatives by creating efficiencies through economies of scale, price breaks, streamlined processes, reduced cycle times, and centralized contracting.

CHS is a model for modern acquisition strategy that provides hardware solutions including servers, storage, clients, networking devices, ruggedized platforms, hand held end devices, operational transit cases, installation kits, and peripheral devices, procured from 65 small and 40 large businesses. CHS is partnered with the CECOM Integrated Logistics Support Center (ILSC) to develop a model for sustaining COTS IT using the Standard Army Supply System. CHS uses a Public Private Partnership (P3) with Tobyhanna Army Depot in order to leverage the innovation, resources and leadership skills of both TYAD and CHS in order to provide the best value to the Soldier.

CHS supports Better Buying Power (BBP) initiatives by creating efficiencies on a micro and macro level through volume discounting, economies of scale, the elimination of duplication of effort, reduced barriers to entry, price breaks, streamlined processes, reduced cycle times, and centralized contracting. CHS provides the Army with a highly efficient Return on Investment (ROI), approximately 33:1, having provided customer PMs with validated cost avoidances of nearly \$800 Million since FY14.

FY 2020 funds support CHS to continue enabling the streamlined and rapid acquisition and delivery of CHS equipment and associated logistical services in support of customer requirements. It will support technology insertions and enable hardware and systems engineering, and evaluations. FY20 requirements support the initiation of

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems
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CHS 6 contract pre award activities and CHS Information Systems infrastructure - Common Hardware Systems-Rapid Acquisition and Procurement Integrated Database System (CHS-RAPIDS).

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Acquisition Support for CHS and customer programs</p> <p>Description: Funding is provided for the following effort.</p> <p>FY 2019 Plans: Will continue CHS program support and acquisition support for CHS and customer programs.</p> <p>FY 2020 Base Plans: Will continue acquisition support for CHS and customer programs. CHS rapidly procures common hardware configurations across the Common Operating Environment (COE), the sustainment community, and tactical programs that enables the continuous modernization of a converged network. PMO costs will be covered by OMA funding.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to shifting resources to expand acquisition manpower in order to support a larger customer base and an expected increase in requirements based on becoming a designated Army Strategic Source.</p>	2.853	2.699	3.333	-	3.333
<p>Title: Logistical service support for customer programs</p> <p>Description: Funding is provided for the following effort.</p> <p>FY 2019 Plans: Will continue CHS Logistical service support for customer programs.</p> <p>FY 2020 Base Plans: CHS logistical services include worldwide 72-hour turnaround repair through strategically located support centers for tactical military units, tailorable supply chain and cybersecurity measures, manages customizable warranty, maintenance and failure rate reporting, and technical support services to support specific Army program requirements.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to shifting manpower away from logistics and onto the acquisition support side to accommodate increased customer requirements.</p>	0.623	0.439	0.422	-	0.422
<p>Title: Technical and Test Support for customer programs</p>	1.557	1.557	1.726	-	1.726

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Funding is provided for the following effort.</p> <p>FY 2019 Plans: Will continue CHS Technical and Test Support for customer programs.</p> <p>FY 2020 Base Plans: CHS provides technical support, environmental and survivability testing, system design, end of life/configuration management, and strengthens cyber security/supply chain management across Army tactical programs to ensure interoperability and integration of hardware throughout the computing infrastructure. CHS conducts hardware evaluations that facilitate and simplify the selection of common hardware solutions across numerous Army programs and agencies.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to shifting resources to support a larger customer base and an expected increase in requirements based on becoming a designated Army Strategic Source.</p>					
<p>Title: FY 2019 SBIR / STTR Transfer</p> <p>FY 2019 Plans: Accounting for SBIR STTR</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Accounting for SBIR STTR</p>	-	0.178	-	-	-
Accomplishments/Planned Programs Subtotals	5.033	4.873	5.481	-	5.481

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

Remarks

D. Acquisition Strategy
The overall goal is to improve interoperability, compatibility and sustainability and lower life cycle costs by standardizing battlefield command and control automation and other warfighting systems (net centric, etc) through centralized buys of modified/ruggedized non-developmental items. CHS will provide seamless, rapid, and consolidated procurement of commercial IT, customizable sustainment strategies, non-personal services, and continuous technology upgrades to support tactical programs fielding schedules. CHS provides a coherent migration strategy for acquisition of warfighting systems and new technology through the use of technology insertion. CHS also conducts common environmental testing of hardware items thereby reducing the testing requirements for individual Project Managers. CHS provides

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

Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
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contractual tools that enable supported programs to effectively and efficiently establish organic sustainment support for commercial IT and utilizes hardware failure data and logistical analysis to support programs sustainment strategy decisions.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems
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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			
Support Costs	C/FP	Various : Various	83.563	-		-		-		-		-	0.000	83.563	-
Product Procurement	C/FP	Various : Various	92.177	-		-		-		-		-	0.000	92.177	-
Technology Insertion	C/FP	Various : Various	17.780	-		-		-		-		-	0.000	17.780	-
CHS-5 Non-Recurring Engineering	C/FP	Various : Various	0.472	-		-		-		-		-	0.000	0.472	-
Program & Acquisition Support	C/FP	Various : Various	-	2.853	Dec 2017	2.699	Dec 2018	3.333	Dec 2019	-		3.333	Continuing	Continuing	Continuing
Logistical Service Support	C/FP	Various : Various	-	0.623	Dec 2017	0.439	Dec 2018	0.422	Dec 2019	-		0.422	Continuing	Continuing	Continuing
Technical & Test Support	C/FP	Various : Various	-	1.557	Dec 2017	1.557	Dec 2018	1.726	Dec 2019	-		1.726	Continuing	Continuing	Continuing
Subtotal			193.992	5.033		4.695		5.481		-		5.481	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			
SBIR/STTR	SS/TBD	APG, MD : APG, MD	-	-		0.178		-		-		-	0.000	0.178	-
Subtotal			-	-		0.178		-		-		-	0.000	0.178	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	193.992	5.033	4.873	5.481	-	5.481	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems

Event Name	FY 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
Technology Insertion & Technical Support (Adding New Hardware)	[Redacted]																											
Environmental and First Article Testing	[Redacted]																											
RESET and Deep Cleaning/Out of Warranty Repair	[Redacted]																											
HW Implementation, Integration and Evaluation	[Redacted]																											
CHS-4 Hardware Deliveries	[Redacted]																											
CHS-5 Contract Award	[Redacted]																											
CHS-5 Hardware Deliveries	[Redacted]																											
CHS-6 Pre-Contract Award	[Redacted]																											
CHS-6 Award	[Redacted]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 323 / Common Hardware Systems

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Technology Insertion & Technical Support (Adding New Hardware to Contract)	1	2007	4	2024
Environmental and First Article Testing	1	2006	4	2024
RESET and Deep Cleaning/Out of Warranty Repair	1	2006	4	2024
HW Implementation, Integration and Evaluation	1	2006	4	2024
CHS-4 Hardware Deliveries	1	2012	4	2019
CHS-5 Contract Award	4	2018	4	2018
CHS-5 Hardware Deliveries	4	2018	3	2023
CHS-6 Pre-Contract Award	3	2020	1	2023
CHS-6 Award	1	2023	1	2023

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 334 / Common Software
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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
334: Common Software	-	0.808	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.808
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 334 Common Software (CS): CS is the suite of systems through which the Army develops, integrates and tests common software products and/or components used for communication between Army Mission Command Systems and the greater Command, Control, Communications, Computers, Intelligence, Surveillance and Reconnaissance (C4ISR) community. The CS project provides state-of-the-art software technologies and functionality that is used by numerous C4ISR and joint systems to eliminate the need for service independent development and duplication of effort. The CS program is the hub of interoperability for the Army's current C4ISR systems.

FY18 funding supports any remaining adjustments to ensure backwards compatibility with previous versions of Common Software products implementations.

There is no funding past FY18 since CS will be transitioning into sustainment in FY19.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Common Software development in support of the C4ISR community	0.753	-	-	-	-
Description: Interoperability and Backwards Compatibility efforts					
Title: Program Management	0.055	-	-	-	-
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					
Accomplishments/Planned Programs Subtotals	0.808	-	-	-	-

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

N/A

Remarks

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) 334 / <i>Common Software</i>

D. Acquisition Strategy

The overall acquisition goal of the CS project is to provide common products that are used horizontally across programs, preventing duplication of effort by Army and Joint programs and facilitating life cycle cost efficiencies. All software development efforts will be competed among Capability Maturity Model Integration (CMMI) certified developers.

In accordance with the approved Net-enabled Mission Command Initial Capabilities Document (NeMC ICD), software capability will be developed in 3-year increments to facilitate messaging, mediation and addressing for Army, Joint and Coalition Partners. The product development funded under this R-Form is an integral part of the C4ISR systems, and a core communication component of the virtualized infrastructure and will be accomplished in part under a Project Manager, Mission Command (PM MC) General Services Administration (GSA) engineering services contract approach which will consist of multiple prime contractors competitively bidding on a single development solicitation. This strategy is designed to optimize opportunities for improved interoperability among the systems, to capture the benefits of competition, and to ensure the rapid integration of new capabilities into warfighter systems. This strategy is also designed to reduce the physical footprint, the logistics support requirements, and to increase operational efficiency by integration of additional system interoperability services which reduce duplication of effort and cost; and allows for development of communication standards across the DoD community.

E. Performance Metrics

N/A

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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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				334 / Common Software							
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	PM Mission Command : Aberdeen, MD	13.181	0.055		-		-		-		-	0.000	13.236	-
Subtotal			13.181	0.055		-		-		-		-	0.000	13.236	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
Common Software Product Engineering/Software Development	C/CPFF	Various Contractors : Various Locations	5.384	-		-		-		-		-	0.000	5.384	-
Mission Command/Army System Engineering & Integration	C/CPFF	Future Skies : Wall Township, NJ	8.764	-		-		-		-		-	0.000	8.764	6.679
Engineering & Integration for Joint and Coalition Interoperability	C/CPFF	Various Contractors : Various Locations	3.362	-		-		-		-		-	0.000	3.362	-
Evaluation, modification, validation & integration of developed SW	C/CPFF	Various Contractors : Various Locations	5.808	-		-		-		-		-	0.000	5.808	4.159
Tactical Server Infrastructure and Application Development	C/CPFF	CECOM Software Engineering Center : APG, MD	5.271	-		-		-		-		-	0.000	5.271	-
Common Software Product Engineering/Software Development	C/FFP	FUTURE SKIES : Wall Twp, NJ	-	0.753		-		-		-		-	0.000	0.753	-
Subtotal			28.589	0.753		-		-		-		-	0.000	29.342	N/A


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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software					Project (Number/Name) 334 / Common Software						
Test and Evaluation (\$ in Millions)															
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
				Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Test/Operational Test	MIPR	Various : Various Locations	9.207	-		-		-		-		-	Continuing	Continuing	-
Subtotal			9.207	-		-		-		-		-	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			50.977	0.808		0.000		-		-		-	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) 334 / Common Software	

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
Common Software Dev & Test2	<div style="display: flex; justify-content: space-between; padding: 5px;"> <div style="width: 45%;"> <p>Arch, System Engr & Dev2</p> <p>SE & Dev2</p> <p>Test & Integration2</p> <p>T&I2</p> <p>AWA 18.1</p> </div> <div style="width: 45%; text-align: center;">  AWA 18.1 </div> </div>																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) 334 / <i>Common Software</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Common Software Dev & Test1	2	2012	2	2017
Arch, System Engr & Dev1	2	2012	2	2016
Test & Integration1	1	2015	2	2017
Common Software Dev & Test2	4	2014	4	2018
Arch, System Engr & Dev2	4	2014	4	2018
Test & Integration2	2	2017	4	2018
AWA 18.1	3	2018	3	2018

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)			
COST (\$ in Millions)	Prior Years	FY 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
C29: Centralized Technical Support Facility (CTSF)	-	4.843	8.809	8.637	-	8.637	7.088	6.754	7.105	7.139	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project C29, The Centralized Technical Support Facility (CTSF) supports the Army's Network Modernization Strategy Line of Effort LOE 1 Network Enabling Functions.

The Central Technical Support Facility's (CTSF) directed mission is to perform Army Interoperability Certification (AIC) testing and configuration management for all operational through tactical level Command, Control, Communications, Computing, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems (individual, family, and system of systems), applications, and hardware prior to release to the field. The CTSF accomplishes this through the enforcement of a standards based architecture while supporting the development and implementation of an integrated computing infrastructure and a converged network. The CTSF functions as the CIO/G6's designated independent test agent and Land/WarNet/Mission Command (LWN/MC) configuration manager. The CTSF provides validated test data to the Department of the Army and Joint agencies to accredit interoperability certifications. The distributed test environment of the CTSF is accomplished through the Federation of Net-centric Sites (FaNS) construct. This FaNS construct addresses distributed integration development and testing using the core infrastructure of the CTSF to harness Army and Joint expertise/resources. Through these federated resources, the CTSF executes or supports interoperability development, integration and certification testing of the systems and system of systems in the Warfighter Mission Area, to include Network Evaluation spinouts, as they become part of the Army's LandWarNet. The cited work is consistent with Strategic Planning Guidance and the Army Modernization and Strategy Plan.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Army Interoperability Certification (AIC) Testing	3.526	4.884	4.618	-	4.618
<p>Description: Conduct Army Interoperability Certification (AIC), planning/coordination/scheduling/ and reporting of Common Operating Environment (COE) and software block testing (local and distributed). Provide stakeholders data collection/data analysis/data dissemination/simulation/stimulation verification/validation. Manage the set-up, configuration, integration, operations and maintenance of the LandWarNet/Mission Command (LWN/MC) systems within the CTSF test environments. Function as the CIO/G-6's Independent Test Agent for Program Managers of LWN/MC systems that have an Acquisition Life Cycle requirement for testing interoperability of software and associated hardware prior to fielding to the Warfighter. Report the results of Army Interoperability Certification Tests to the CIO/G-6, PM, and TRADOC communities to support updates to the G-3/5/7 managed baseline.</p> <p>FY 2019 Plans:</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Continue SWB11-12, and COE v3 and beyond test planning, test case development, test environment architecture set-up, to include information assurance software compliance, and software test tools. Conduct interoperability testing for the SWB11-12 systems that comprise the LWN/MC baseline. Support the ASA(ALT) led Interoperability and Integration Event (I2E) for COE v3.0. Conduct COE v3.0 planning, test case development and architecture set-up incorporating CP testing construct for the CE. Continue work to define the testing methodology as part of the Army transition to a COE strategy, while working to incrementally implement and utilize distributed CP test processes and test architectures that will comprise the Federated Integration Environment (FIE).</p> <p>FY 2020 Base Plans: Continue SWB11-12, and COE v3 and beyond test planning, test case development, test environment architecture set-up, to include cyber security posture assessment and adjustment activities for the systems that comprise the Army's tactical baselines Conduct interoperability testing for the SWB11-12 systems that comprise the LWN/MC baseline to ensure the tactical integrated computing infrastructure is interoperable in a System of Systems (SoS) environment and to enable the CIO/G-6 to enforce a standards based architecture.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: No significant change in requirement</p>					
<p>Title: Engineering Services</p> <p>Description: Provide network engineering support to establish and maintain tactical architectures on the CTSF test floors and to deploying/fielded units at training centers around the world (NIE, JRTC, NTC, JMRC). System engineering support provides hardware virtualization, Army End Point Security System (AESS) support, system validation and integration support to numerous PMs on the integration and risk reduction labs, and assists Army programs with interoperability assessments and AIC rehearsal. Modify and merge army data products for CTSF test architectures. Develop/Maintain Applications for CTSF in-house programs.</p> <p>FY 2019 Plans: Support AIC Integration and Testing. Continue Network Integration Checkout prior to each AIC. Continue support to PMs for integration of future COE insertions and integration. Identify and incorporate software tools to monitor performance and assist in issue resolution. Integrate and implement HBSS technology. Assist PMs in the development of HBSS policies. Assist integration and test architectures to include Program of Record (POR) and non-POR radio communications devices to provide PMs and Materiel Developers testing in realistic environments. Provide CTSF network and systems engineering for validation of end-to-end sensor</p>	0.151	0.156	0.158	-	0.158

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>and platform communications and interoperability. Provide software patch validation; network support for integration and test floors; network support to fielded units; and systems engineering and analysis support to system of systems integration activities. Provide PMs and CTSF Configuration Management (CM) with a Virtualization Suite and assist in virtualizing software. Plan and conduct engineering evaluations for AIC testing and data collection in the Network Integration Evaluation (NIE)/Capability Integration Evaluation (CIE) to leverage the operational environment and NIE/CIE resources. Support Army Warfare Assessment (AWA), Joint Users Interoperability Communications Exercise (JUICE), and Bold Quest technology and interoperability demonstrations. Assist Assistant Secretary of the Army (Acquisition, Logistics and Technology) [ASA(ALT)] in developing and refining Control Point Testing for COE and distributed testing between the Computing Environments (CEs). Assist the CEs in Federation of Net-Centric Sites (FaNS) accreditation for distributed testing. Assist ASA(ALT) in defining the COE architectures and services. Assist in interoperability issues for multiple Combatant Commands. Conduct radio Verification and Validation. Application Programmers continue to develop and modify Configuration Management Tool Suite version 3 (CMTS3) modules.</p> <p>FY 2020 Base Plans: Maintain Network Baseline and Modernization in accordance with the Mission Command Network Modernization Implementation Plan to include Network support for integration and test floors, network support to fielded units, and systems engineering and analysis support to system of systems integration activities. Plan and conduct engineering evaluations for AIC testing and data collection in the Capability Integration Evaluation (CIE) to leverage the operational environment and CIE resources. Work with Network Cross Functional Team on Network modernization. Support AIC Integration and Testing. Continue Network Integration Checkout prior to each AIC. Continue support to PMs for tactical network availability of future COE insertions and integration. Provide CTSF network and systems engineering for validation of end-to-end sensor and platform communications and interoperability. Continue to modernize network equipment and capabilities, research wireless networks and tactical feasibility. Identify and incorporate software tools to monitor network performance and assist in issue resolution. Application Programmers continue to develop and modify Configuration Management Tool Suite version 3 (CMTS3) modules. Assist PMs with integrating systems into the CTSF tactical Network. Integrate and implement Army End Point Security System (AESS) technology, assist PMs in the development of AESS policies. Update CTSF Standard Operating Procedures (SOPs) for CTSF controls ensuring that all users, information systems, and networks that reside within the CTSF Test Floor Network have a strong cybersecurity posture and CTSF is in compliance for Risk Management Framework (RMF) accreditation and continuous monitoring. As part of the CTSF Information Assurance Vulnerability Management (IAVM) Plan, all Network and systems devices are updated with the latest Information Assurance Vulnerability Alerts (IAVA)</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
and Security Technical Implementation Guides (STIGs) on a quarterly schedule. Support Army Warfighting Exercises and Combatant Commands with interoperability technical support as required. FY 2019 to FY 2020 Increase/Decrease Statement: No significant changes					
Title: Configuration Management Description: As the CTSF Configuration Management Office, provide CM functional and physical configuration management and change management to the CTSF Army Interoperability Certification test floor environment. As Army Configuration Management Office (ACMO), establish and maintain oversight control of the Army Master Library for the Army Interoperability Certified Fielded Baseline (AICFB). Archive system software and data products, correlated with their associated documentation, for the Army LandWarNet Mission Command Baseline (ALWNMCB), a subset of the AICFB. Establish and maintain the configuration and change management to the AICFB and the ALWNMCB for Lifecycle Software Management (LCSM). Provide support to the Army Staff (ARSTAF), Material Developers (MATDEV), Project Managers (PM), and System Owners (SO) through the orderly management of product configuration information and product change management (ChM), which enables capability revisions, improved reliability and maintainability, extended life, and reduced cost. Maintain and improve the Configuration Management Tracking System version 3 (CMTSIII), the Army's authoritative database management system (DBMS) for configuration management (CM) of the systems comprising Coalition Interoperability Assurance and Validation (CIAV), and the Warfighter Mission and Business Mission Areas of the Army Information Technology (IT) portfolio. Assist the CIO/G6 in conducting accreditation inspections and training for Federation of Net-centric Sites (FaNS) locations. FY 2019 Plans: Provide CM functional and physical configuration management and change management to the CTSF Army Interoperability Certification test floor environment. Provide CM functional and physical configuration management and change management to the AICFB, to include archiving the required system software, data products and documentation, while correlating the relevant data within the CMTSIII DBMS for visibility to users Army wide. Provide baseline reconciliation to the four quarterly CIO/G6 AICFB reports, identifying to commanders and their G-3/G-6 staff the Army's AIC certified, Interoperability Capability and Limitations assessed, AIC waived, and AIC exempted system software that is authorized to connect to the Army's network. Assist the CIO/G6 in conducting accreditation inspections and training for Federation of Net-centric	0.499	2.717	2.769	-	2.769

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Sites (FaNS) locations. Continue CMTSIII evolutionary developments. Initiate changes to enable CMTSIII to maintain currency/compatibility with Common Operating Environment evolutionary developments.</p> <p>FY 2020 Base Plans: Provide CM functional and physical configuration management and change management to the CTSF Army Interoperability Certification test floor environment. Provide CM functional and physical configuration management and change management to the AICFB, to include archiving the required system software, data products and documentation, while correlating the relevant data within the CMTSIII DBMS for visibility to users Army wide. Provide baseline reconciliation to the four quarterly CIO/G6 AICFB reports, identifying to commanders and their G-3/G-6 staff the Army's AIC certified, Interoperability Capability and Limitations assessed, AIC waived, and AIC exempted system software that is authorized to connect to the Army's network. Assist the CIO/G6 in conducting accreditation inspections and training for Federation of Net-centric Sites (FaNS) locations.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: No significant change in requirement</p>					
<p>Title: Management Operations/Program Office</p> <p>Description: Provide management operations consisting of planning, programming and executing funds; planning and programming for required personnel; planning, programming and executing contracts supporting AIC testing processes; identifying reimbursable tests and collecting/allocating appropriate funds; planning and programming logistics activities, managing/controlling/documenting physical assets and inventories; and perform oversight and coordination of physical security with hosting installation.</p> <p>FY 2019 Plans: Continue to utilize CMTSIII Resource Management Module and Reporting as well as FMIS for use in documenting/programming/executing funds and personnel levels of effort associated with mission activities. Program and execute funding; plan and program manpower requirements and coordinate with CECOM G8 for implementation; identify contracting requirements and develop strategy for implementation in conjunction with CECOM Acquisition Center. Track testing schedule, prepare/coordinate/track customer funding for AIC testing activities (e.g. COE v3.0 tests, CS 11-12 Bi-Annual testing, Joint, Coalition), and infrastructure support. Continue to provide field support coordination for unit training and exercises upon request. Maintain existing infrastructure while continuing to develop coordinate planning/engineering activities associated with transition</p>	0.667	1.052	1.092	-	1.092

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
to permanent facility; continue to enhance physical security, access control, force protection, COOP and EAP activities and exercises. Continue inventory accountability programs and asset control. FY 2020 Base Plans: Program and execute funding. Plan and program manpower, identify contracting requirements and develop strategy for implementation in conjunction with CECOM Acquisition Center. Track testing schedule, prepare/coordinate/track customer funding for AIC testing activities and infrastructure support. Continue to provide field support coordination for unit training and exercises upon request. Maintain existing infrastructure while continuing to develop coordinate planning/engineering activities associated with transition to permanent facility; continue to enhance physical security, access control, force protection, COOP and EAP activities and exercises. Continue inventory accountability programs and asset control. FY 2019 to FY 2020 Increase/Decrease Statement: No significant increase (inflation).					
Accomplishments/Planned Programs Subtotals	4.843	8.809	8.637	-	8.637

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

Remarks

D. Acquisition Strategy
Transition from executing a single test event at a time to multiple simultaneous test events using new universal mission threads, providing speed and efficiency to the test/acquisition timeline. Execute system of systems interoperability testing and certification through the use of Government and Systems Engineering and Technical Analysis (SETA) contract personnel experienced in product development and interoperability testing. Testing and certification occurs in a cyclical fashion, with an expectation of an annual Software Block/Capability Set test followed with cyclical multiple test events to ensure integrity of software baselines to the Warfighter. Engineering Services provides strategic integration of software into a system of systems/family of systems environment to support interoperability testing. Establish and maintain Configuration Management and version control of the Army's Interoperable Battle Command LandWarNet Baseline. Distributed testing capability uses local assets and leverages other federated test facilities to create synergy and realize efficiencies.

E. Performance Metrics
N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)
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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			
MITRE Corp	FFRDC	Engineering Services : Fort Hood, TX	17.178	-		-		-		-		-	0.000	17.178	-
In-House	Allot	Engineering Services : Fort Hood, TX	2.548	-		-		-		-		-	0.000	2.548	-
FY19 SBIR STTR Transfer	TBD	TBD : TBD	-	-		0.224		-		-		-	0.000	0.224	-
Subtotal			19.726	-		0.224		-		-		-	0.000	19.950	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			
CECOM Matrix	Allot	Program and Budget Analysis Support : Fort Hood, TX/ Aberdeen Proving Grounds, MD	4.119	0.363		0.741		0.755		-		0.755	Continuing	Continuing	Continuing
In-House Support	Allot	Management Operations, Logistics Support : Fort Hood, TX	9.928	-		-		-		-		-	0.000	9.928	-
ISSA/Training/TDY	Allot	Site Support Activities : Fort Hood, TX	0.062	0.245		0.250		0.275		-		0.275	Continuing	Continuing	Continuing
Supplies	C/UCA	Management Operations, Logistics Support : Fort Hood, TX	1.375	0.059		0.061		0.062		-		0.062	Continuing	Continuing	Continuing
Moving Costs	Allot	Management Operations, Logistics Support : Fort Hood, TX	-	-		-		0.001		-		0.001	0.000	0.001	Continuing

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)
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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			15.484	0.667		1.052		1.093		-		1.093	Continuing	Continuing	N/A

Remarks
Under "open-the-door" cost model, all In-house support efforts are included under Test & Evaluation.
Moving Costs associated with transitioning to permanent facility beginning in FY18.

Test and Evaluation (\$ in Millions)				FY 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			
CECOM R2 3G	C/CPFF	Test, Configuration Management : Fort Hood, TX	10.548	0.633		3.467	May 2019	2.880	May 2020	-		2.880	Continuing	Continuing	Continuing
CECOM S3	C/CPFF	Facilities, Maintenance, Security : Fort Hood, TX	9.000	1.226		1.227	Aug 2019	1.260	Aug 2020	-		1.260	Continuing	Continuing	Continuing
ISSA	MIPR	Utilities & NEC Support : Fort Hood, TX	4.945	-		-		-		-		-	0.000	4.945	-
ARL Matrix	MIPR	Test : Fort Hood, TX	6.374	-		-		-		-		-	0.000	6.374	-
In-House Support	Allot	Test : Fort Hood, TX	5.100	2.316		2.827		3.398		-		3.398	Continuing	Continuing	Continuing
Instrumentation	C/UCA	Test Equipment Infrastructure : Fort Hood, TX	3.184	0.001		0.012		0.006		-		0.006	Continuing	Continuing	Continuing
Subtotal			39.151	4.176		7.533		7.544		-		7.544	Continuing	Continuing	N/A

Remarks
ARL Matrix effort became a "reimbursable" effort under Open-the-Door cost model effective in FY17; no longer "Direct" funded.
ISSA no longer funded at CTSF level.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019			
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)				
	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	74.361	4.843	8.809		8.637	-	8.637	Continuing	Continuing	N/A	

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

Event Name	FY 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				
11-21 AIC Test event					■																											
11-22 AIC Test event									■																							
11-23 AIC Test event													■																			
11-24 AIC Test event													■																			
11-25 AIC Test event																	■															
11-26 AIC Test event																	■															
11-27 AIC Test event																					■											
Common Operating Environment (COE) v3.0									■																							
COE v3.0 AIC Test event									■																							
COE v3.1 AIC Test event													■																			
COE v3.2 AIC Test event													■																			
COE v3.3 AIC Test event																	■															
COE v3.4 AIC Test event																	■															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

Event Name	FY 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
COE v3.5 AIC Test event																												
Common Operating Environment (COE) v4.0																												
COE v4.1 AIC Test event																												
COE v4.2 AIC Test event																												
COE v4.3 AIC Test event																												
COE v4.4 AIC Test event																												
COE v4.5 AIC Test event																												
Configuration Management (CM)																												
Engineering Services (ES) Test and Integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C29 / Centralized Technical Support Facility (CTSF)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
11-21 AIC Test event	1	2019	1	2019
11-22 AIC Test event	2	2019	3	2019
11-23 AIC Test event	4	2019	4	2019
11-24 AIC Test event	2	2020	2	2020
11-25 AIC Test event	4	2020	4	2020
11-26AIC Test event	2	2021	2	2021
11-27 AIC Test event	4	2021	4	2021
Common Operating Environment (COE) v3.0	1	2019	1	2019
COE v3.0 AIC Test event	2	2019	3	2019
COE v3.1 AIC Test event	4	2019	4	2019
COE v3.2 AIC Test event	2	2020	2	2020
COE v3.3 AIC Test event	4	2020	4	2020
COE v3.4 AIC Test event	2	2021	2	2021
COE v3.5 AIC Test event	4	2021	4	2021
Common Operating Environment (COE) v4.0	2	2022	2	2022
COE v4.1 AIC Test event	4	2022	4	2022
COE v4.2 AIC Test event	2	2023	2	2023
COE v4.3 AIC Test event	4	2023	4	2023
COE v4.4 AIC Test event	2	2024	2	2024
COE v4.5 AIC Test event	4	2024	4	2024
Configuration Management (CM)	1	2019	4	2024
Engineering Services (ES) Test and Integration	1	2019	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) C34 / Army Tac C2 Sys Eng			
COST (\$ in Millions)	Prior Years	FY 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
C34: Army Tac C2 Sys Eng	-	7.457	7.998	9.483	-	9.483	9.716	9.985	11.706	12.085	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project C34, Army TAC C2 Sys Eng, supports the Army's Network Modernization Strategy LOE 1, Unified Network. The System of Systems Engineering coordinates technical efforts across and outside of PEO C3T to ensure integration with the current and future Mission Command Network. Project C34 provides technical support for LOE 1-4 that informs the design and solutions with specific emphasis on the ability for the different efforts to be integrated and interoperable with one another. Project C34, Army Tactical Command and Control Systems Engineering: This project funds the PEO Command, Control, Communications-Tactical (PEO C3T) Technical Management Division (TMD) System of Systems engineering and integration, experimentation, acquisition management, testing, fielding and sustainment support to ensure interoperability and affordability within the PEO C3T portfolio. The TMD focuses on System-of-Systems (SoS) Engineering and Integration for the Mission Command Network with increased emphasis on immediate Warfighter needs as well as leveraging emerging technologies. Fiscal Year 2020 will focus on the continued development, implementation and integration of the Command, Control, Communications, Computers, Combat Systems, Intelligence, Surveillance, and Reconnaissance (C5ISR) network architectures. This includes development of a technology enhancement roadmap for SoS capability evolution across the PEO C3T portfolio that incorporates Cross Functional Team initiatives; network integration support and design products for system validation through various N-CFT lead experimentation and integration testing; integration of tactical Networked capabilities for all Mission Command Network systems, initial fieldings, and integration events; integration of tactical information assurance solutions and security measures for consistent cyber protection; and support to N-CFT evaluations and contract actions.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Continue Mission Command Network Synchronization and Integration Support	0.112	0.118	0.146	-	0.146
Description: .					
FY 2019 Plans: Continue the support of current force and the development of future force C5ISR across the tactical network to ensure all Assistant Secretary of the Army (Acquisition, Logistics & Technology) (ASA(ALT)) programs are synchronized and redundancies and overlapping capabilities are reduced across the network and in synchronization with Common Operating Environment.					
FY 2020 Base Plans: Continue the support of current force and the development of future force C5ISR across the tactical network to ensure all Assistant Secretary of the Army (Acquisition, Logistics & Technology) (ASA(ALT)) programs					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
are synchronized and redundancies and overlapping capabilities are reduced across the network and in synchronization with Common Operating Environment. FY 2019 to FY 2020 Increase/Decrease Statement: Planned program area increase supports continued design work.					
Title: Continue Developmental Test and Integration Test Support between Programs of Record (PORs) and platforms / Command Posts (CPs) to execute System-of-Systems (SoS) and Interoperability Description: . FY 2019 Plans: Continue to mature/revise the design, configuration and establishment of the system of systems integration test infrastructure architecture and implementation. Continue to provide the infrastructure and support in conducting integration testing and systems engineering for C3T non-program of record and program of record systems, products, technical insertions, and systems under evaluation to ensure integration of capabilities across the network. Maintain the FANS Accreditation in support of COE risk reduction testing. Continue the design and coordination of integration testing across the Mission Command Network systems. FY 2020 Base Plans: Continue to mature/revise the design, configuration and establishment of the system of systems integration test infrastructure architecture and implementation. Continue to provide the infrastructure and support in conducting integration testing and systems engineering for C3T non-program of record and program of record systems, products, technical insertions, and systems under evaluation to ensure integration of capabilities across the network. Maintain support of COE risk reduction testing. Continue the design and coordination of integration testing across the Mission Command Network systems. FY 2019 to FY 2020 Increase/Decrease Statement: Increase supports continued development.	1.087	1.147	1.419	-	1.419
Title: Continue Tactical Network Engineering Description: . FY 2019 Plans:	0.623	0.657	0.814	-	0.814

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Develop effective engineering strategies to integrate tactical applications for use across the C3T enterprise network. Continue to perform network planning and integration activities across all cross-domain system-of-systems future capabilities and technologies.</p> <p>FY 2020 Base Plans: Develop effective engineering strategies to integrate tactical applications for use across the C3T enterprise network. Continue to perform network planning and integration activities across all cross-domain system-of-systems future capabilities and technologies.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase supports continued engineering.</p>					
<p>Title: Conduct and Support System Interoperability Engineering and Development of System-of-Systems (SoS) Architectural Products</p> <p>Description: .</p> <p>FY 2019 Plans: Within the PEO C3T portfolio, continue to assess Emerging Technologies, identify critical integrated test points, monitor developmental testing at integration points, develop architectural data processes and products, and facilitate the transition of Network capabilities to the warfighter.</p> <p>FY 2020 Base Plans: Within the PEO C3T portfolio and in conjunction with N-CFT activities, continue to assess Emerging Technologies, identify critical integrated test points, monitor developmental testing at integration points, develop architectural data processes and products, and facilitate the transition of Network capabilities to the warfighter.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Increase supports continued development efforts.</p>	1.400	1.476	1.827	-	1.827
<p>Title: Continue Development and Implementation of Tactical Information Assurance (IA)</p> <p>Description: .</p> <p>FY 2019 Plans: Implement ARCYBER, CIO/G6 and CYBERCOM guidance for execution of Information Assurance policies and procedures at the tactical level. Continue to document the current tactical IA network architecture with the goal of developing recommendations to eliminate inconsistencies/duplications, increasing the security posture,</p>	0.211	0.223	0.276	-	0.276

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
decreasing complexity of operations, and decreasing costs. Continue to plan and design security measures and IA requirements across the tactical network for future capabilities. FY 2020 Base Plans: Implement ARCYBER, CIO/G6 and CYBERCOM guidance for execution of Information Assurance policies and procedures at the tactical level. Continue to document the current tactical IA network architecture with the goal of developing recommendations to eliminate inconsistencies/duplications, increasing the security posture, decreasing complexity of operations, and decreasing costs. Continue to plan and design security measures and IA requirements across the tactical network for future capabilities. FY 2019 to FY 2020 Increase/Decrease Statement: Increase supports continuing development efforts.					
Title: Continue System of Systems Development Description: . FY 2019 Plans: Continue to effectively manage overall System-of-Systems Engineering, Enterprise, and Integration efforts for the PEO C3T portfolio of technology and capability enhancement programs. Continue to conduct SoS engineering design for capabilities planned to field in FY20, FY21 and FY22. . FY 2020 Base Plans: Continue to effectively manage overall System-of-Systems Engineering, Enterprise, and Integration efforts for the PEO C3T portfolio of technology and capability enhancement programs. Continue to conduct SoS engineering design for capabilities planned to field in FY20, FY21 and FY22 to include Program of Record and emerging LOE technologies. FY 2019 to FY 2020 Increase/Decrease Statement: Increase supports continued SoS development.	2.492	2.628	3.254	-	3.254
Title: System of Systems (SoS) Engineering and Integration Evolution of the Network Description: . FY 2019 Plans: Continue to implement cross PEO System of Systems Engineering and Integration processes, analysis and S&T coordination to ensure successful development Engineering and Testing of current and future systems. Continue	1.339	1.412	1.747	-	1.747

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
to develop streamlined processes to support ASA(ALT) SoSE&I and implement Value Engineering (VE) and Lean Six Sigma initiatives across all PEO C3T capabilities to include the Mission partner Environment. FY 2020 Base Plans: In Conjunction with LOE and CFT efforts, continue to implement cross PEO System of Systems Engineering and Integration processes, analysis and S&T coordination to ensure successful development Engineering and Testing of current and future systems. Continue to develop streamlined processes to support ASA(ALT) OCE and implement Value Engineering (VE) and Lean Six Sigma initiatives across all PEO C3T capabilities to include the Mission partner Environment. FY 2019 to FY 2020 Increase/Decrease Statement: Increase supports continuing SoS integration efforts.					
Title: FY18 Rescission	0.193	-	-	-	-
Title: SBIR/STTR FY 2019 Plans: tax FY 2019 to FY 2020 Increase/Decrease Statement: SBIR / STTR adjustment now shown in PB20 for FY19 APPN	-	0.337	-	-	-
Accomplishments/Planned Programs Subtotals	7.457	7.998	9.483	-	9.483

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

N/A

Remarks

Not applicable for this item.

D. Acquisition Strategy

This project provides the technical and programmatic disciplines required for systems engineering and integration, experimentation, acquisition management, testing, interoperability, support to fielding and sustainment. It will focus on System-of-Systems (SoS) Systems Engineering and Integration for the tactical network with increased emphasis on immediate Warfighter needs as well as leveraging emerging technologies, through the G3 LandWarNet Capability Set Development and Integration. The Technical Management Division (TMD) will ensure that the Program Executive Office Command, Control, Communications-Tactical (PEO C3T) capability portfolio is effectively SoS engineered and integrated to meet the tactical Warfighter's evolving mission needs.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) C34 / <i>Army Tac C2 Sys Eng</i>

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) C34 / Army Tac C2 Sys Eng							
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
Emerging Technologies	SS/FP	CACI : Aberdeen Proving Ground, MD	21.092	-		-		-		-		-	0.000	21.092	-
Emerging Technologies	SS/FP	Southwest Research Installation : Aberdeen Proving Ground, MD	0.175	-		-		-		-		-	0.000	0.175	-
System Of System Engineering and Integration, Current and Strategic Initiatives	C/T&M	CSC Aberdeen Proving Ground /Fort Hood, TX : APG	57.690	-		-		-		-		-	0.000	57.690	-
System of System Engineering & Integration, Current & Strategic Initiative, Architecture Integration	C/CPFF	Bowhead (extension) : Aberdeen Proving Ground, MD	11.112	2.164		0.807	Oct 2018	-		-		-	0.000	14.083	-
System of System Engineering & Integration, Current & Strategic Initiative, Architecture Integration	Various	TBD (previously Bowhead. Bowhead PoP ends 12/2018) : APG MD	-	-		2.421	Dec 2018	3.958	Dec 2019	-		3.958	Continuing	Continuing	Continuing
Architecture Integration	C/T&M	CSC : various	9.005	-		-		-		-		-	0.000	9.005	-
Systems Engineering Support	SS/FP	LOCKHEED MARTIN : Eatontown, NJ	7.799	-		-		-		-		-	0.000	7.799	-
Systems Engineering Support	C/CPFF	Northrop Grumman : Arlington, VA	5.282	-		-		-		-		-	0.000	5.282	-
Systems Engineering Support	Various	Various : APG, MD	3.432	0.314		0.322	Oct 2018	0.800	Oct 2019	-		0.800	Continuing	Continuing	Continuing
System of System Architectures, Engineering, and Integration	SS/FP	MITRE : Aberdeen Proving Ground, MD/ Eatontown, NJ	95.332	3.660		3.760	Sep 2019	4.255	Sep 2020	-		4.255	Continuing	Continuing	Continuing
Tactical Network Initialization	SS/FP	Future Skys Inc. : Neptune, NJ	0.600	-		-		-		-		-	0.000	0.600	-

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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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				C34 / Army Tac C2 Sys Eng							
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
System of System Engineering and Integration	C/T&M	CSC : Huntsville, AL	0.183	-		-		-		-		-	0.000	0.183	-
System of System Engineering and Integration	C/T&M	Viatech : NJ	0.367	-		-		-		-		-	0.000	0.367	-
Subtotal			212.069	6.138		7.310		9.013		-		9.013	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	Various	PEO C3T : APG, MD	32.730	0.949		-		-		-		-	0.000	33.679	-
MATRIX	Various	Various : Aberdeen Proving Ground, MD	13.232	0.370		0.351		0.470		-		0.470	Continuing	Continuing	Continuing
OTHER GOVERNMENT SUPPORT	Various	Various : Various	7.377	-		-		-		-		-	0.000	7.377	-
SBIR/STTR TAX	TBD	N/A : N/A	-	-		0.337		-		-		-	0.000	0.337	-
Subtotal			53.339	1.319		0.688		0.470		-		0.470	Continuing	Continuing	N/A
Project Cost Totals			265.408	7.457		7.998		9.483		-		9.483	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng

Event Name	FY 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																												
Mission Command Network S&T																																																								
S&T Synchronization: Oversee PM Transition Status																																																								
S&T Synchronization: Develop S&T Gaps & Review																																																								
S&T Synchronization: Develop PM Plans / POM Initiatives																																																								
S&T Synchronization- Oversee PM Transition Status																																																								
S&T Synchronization Develop S&T Gaps & Review																																																								
S&T Synchronization- Develop PM Plans / POM Initiatives																																																								
Analysis Network Analysis																																																								
System of Systems SEngineer, Integration, and Development																																																								
System of System Solutions Year 1																																																								
SoS PDR																																																								
SoS CDR																																																								
System of Systems Solutions Year 2																																																								

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng

Event Name	FY 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
SoS PDR									3 PDR																			
SoS CDR													4 CDR															
System of Systems Solutions Year 3																												
SoS PDR													5 PDR															
SoS CDR																	6 CDR											
System of System Integration Risk Reduction																												
Integration Test Support SoS RR																												
Integration Test Support SoS RR																												
Integration Test Support SoS RR																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) C34 / Army Tac C2 Sys Eng

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Mission Command Network S&T	1	2019	4	2020
S&T Synchronization: Oversee PM Transition Status	1	2019	4	2019
S&T Synchronization: Develop S&T Gaps & Review	2	2019	3	2019
S&T Synchronization: Develop PM Plans / POM Initiatives	3	2019	4	2019
S&T Synchronization- Oversee PM Transition Status	1	2020	4	2020
S&T Synchronization Develop S&T Gaps & Review	2	2020	3	2020
S&T Synchronization- Develop PM Plans / POM Initiatives	3	2020	4	2020
Analysis Network Analysis	1	2019	4	2020
System of Systems SEngineer, Integration, and Development	1	2019	1	2022
System of System Solutions Year 1	1	2019	1	2020
SoS PDR	2	2019	2	2019
SoS CDR	4	2019	4	2019
System of Systems Solutions Year 2	1	2020	1	2021
SoS PDR	2	2020	2	2020
SoS CDR	4	2020	4	2020
System of Systems Solutions Year 3	1	2021	1	2022
SoS PDR	2	2021	2	2021
SoS CDR	4	2021	4	2021
System of System Integration Risk Reduction	1	2019	4	2020
Integration Test Support SoS RR	1	2019	1	2019
Integration Test Support SoS RR	3	2019	4	2019
Integration Test Support SoS RR	3	2020	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)			
COST (\$ in Millions)	Prior Years	FY 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
EJ4: COMMAND POST COMPUTING ENVIRONMENT (CPCE)	-	59.370	39.975	30.969	-	30.969	31.600	26.500	27.900	27.800	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Common Operating Environment (COE) is an approved set of computing technologies and standards that enables secure and interoperable applications to be developed and executed rapidly across a variety of computing environments (i.e., server(s), client, mobile, sensors, and platform). The Command Post Computing Environment (CPCE) is one of the six computing environments under the COE, which provides the movement and maneuver applications, common computing services such as Cyber tools and e-mail, and includes tactical server capabilities within Command Posts at all echelons (Battalion to Army Service Component Commander).

Command Post Computing Environment (CPCE) supports the Army Network Modernization Strategy Line of Effort 2, Common Operating Environment

The CPCE implements an integrated, interoperable, cyber-secure, cost-effective software infrastructure that serves as the host for a unified set of multiple warfighting functional applications within the command post. This software infrastructure will be central to the COE, allowing interoperability between command posts, mounted platforms, and dismounted handheld devices while supporting collaboration using a common picture with Joint and Unified Action partners. CPCE will provide a core software infrastructure including a common operating picture (COP) tool, common look and feel (user interface), common data strategy, interoperable tactical messaging/chat, and essential movement and maneuver capabilities. CPCE software infrastructure and applications will reside on Tactical Server Infrastructure (TSI) hardware and previously fielded BCCS/TSI servers. The CPCE eliminates "stove-piped" legacy systems, duplicative or redundant implementations, simplifies future application development efforts, and enhances interoperability and data sharing across multiple echelons. Acquisition Goals of the CPCE include: Acquisition Agility, Open System Architectures, Reduced Life Cycle Costs, and a Cyber-Hardened Foundation for applications and services.

The initial version of CPCE completed Initial Operational Test and Evaluation at NIE 18.2 in November 2018, a Fielding / Software Deployment decision is targeted for 2QFY19 along with entering the acquisition life cycle. The new program of record will be comprised of the tactical server infrastructure, Mission Command software infrastructure, and movement/maneuver Warfighting function applications. First Unit Equipped in 4QFY19.

Requirements for the CPCE are established in the AROC approved COE Information Systems Initial Capability Document (IS ICD) and the CPCE Requirements Definition Package (RDP).

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: System Requirements Engineering	5.201	3.241	2.500	-	2.500

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Engineering effort is required to determine technical implementation strategy of high-level requirements into discrete software capabilities. Requirements consolidation, analysis, adjudication, and management of multiple Joint Capabilities Integration Development System (JCIDS) documents, directives, and other sources to determine full capability requirements for CPCE. Effort includes ongoing Requirements Configuration Control Board (CCB) process and decomposition of high-level (L1) requirements into low-level (L2, L3) sub-requirements. Formalized requirements are codified in System / Subsystem Specification (SSS) and multiple System Requirements Specifications (SRS).</p> <p>FY 2019 Plans: For FY19, will continue to ingest infrastructure requirements for incorporation into later versions of CPCE software. Will continue to refine a formal governance process for the incorporation of additional Program of Record (POR) functionality. Assist Programs of Record with determining overlapping requirements that are already satisfied by the CPCE core utilities. Maintain the MC SSS Requirements Verification Traceability Matrix (RVTM) and SSS/SRS.</p> <p>FY 2020 Base Plans: Consolidate, adjudicate, and codify specific technical requirements for future capabilities to be implemented in CPCE core infrastructure and warfighting function applications. Establish process for analysis and technical implementation of external capabilities that are to be incorporated into CPCE and must be interoperable and backwards compatible with legacy systems.</p> <p>This effort's funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: System requirements engineering decreases as the initial version of CPCE is base-lined and fielded. Future requirement engineering will focus on additional capabilities and maturing of the infrastructure baseline.</p>					
<p>Title: SW Dev - Core Infrastructure</p> <p>Description: Provides a core software infrastructure that underpins an integrated mission command capability in command posts, from ASCC to Battalion echelons that provides simplicity, intuitiveness, core services and applications, common look and feel, and warfighter functionality in the areas of Fires, Logistics, Intelligence, Airspace Management and Maneuver. Primary software development efforts include development of a simple Common Operating Picture (COP), a Common Geospatial solution (map), a user interface with "common look</p>	26.363	23.452	17.669	-	17.669

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)			
B. Accomplishments/Planned Programs (\$ in Millions)					
and feel", common Data Services including an extensible database and data persistence, tactical messaging and translation, and backwards compatibility to previously fielded legacy systems. Software development efforts focus on designing the system to reduce the training burden on the Soldier, and the creation of an Integrated Software Development Kit (ISDK) that allows external developers the ability to integrate new capabilities without rebuilding common components.					
FY 2019 Plans: Continue the final integration of the CPCE v3 COTS underlying infrastructure, Core Utilities, backwards compatibility, and Warfighter Function (WfF) Applications into a holistic System of Systems and ensuring that those subsystems function together in accordance to Program requirements and specifications. These responsibilities include software engineering and development of DevOps, test engineering, and release management, Command, Control and Intelligence (C2I) Ultra Light, Open Routing, Data Flows, Extensible Map Platform (EMP) Renderer, Map Based Planning, Joint and Coalition Interoperability, and Tactical Server Infrastructure (Size, Weight and Performance improvement).					
FY 2020 Base Plans: Continue to incorporate new capabilities into the CPCE infrastructure, both COTS and Government-developed. Development and integration of new capabilities and features including additional movement and maneuver functions, engineer functions, and mission planning functions including Map-based Planning Services (MBPS), Joint Planning Services (JPS), and direct data ingest from other warfighting systems.					
This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.					
FY 2019 to FY 2020 Increase/Decrease Statement: System Software Dev-Core Infrastructure cost will decrease as the initial software infrastructure baseline has been developed and future efforts will be to integrate other Warfighting functional capabilities in to the CPCE baseline..					
Title: Hardware/Software Integration					
Description: Hardware / Software Integration within the Command Post Computing Environment consists of research, development, and engineering efforts required to select, engineer, and field a Commercial off the Shelf hardware server and related components. The CPCE software will reside on converged Tactical Server Infrastructure (TSI) server stacks, which host multiple software infrastructure components including Microsoft					
	9.553	4.050	2.900	-	2.900

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)			
B. Accomplishments/Planned Programs (\$ in Millions)					
Exchange, SharePoint, Defensive Cyber Operations (DCO) tools, SQL databases, Active Directory, and others. This enterprise software is tightly-coupled with, and engineered for, specific TSI hardware using virtual machine (VM) technology and must serve as the basis for all other warfighting functions and mission command system software loaded on the server.					
FY 2019 Plans: For FY19, primary effort includes continued development of VM structure of the TSI server architecture to incorporate more processing power and functionality in a reduced footprint. Ongoing efforts to migrate Program of Record functionality to the CPCE will require TSI server stack accommodations and reengineering. This engineering includes server deployment script automation.					
FY 2020 Base Plans: For FY20, efforts will focus on new design requirements for the TSI server architecture to achieve further savings in size, weight, and power. Engineering efforts will continue to refine the automated server provisioning and configuration tool that will allow rapid provisioning of new software capabilities and remote system querying and patching. Additional engineering effort will be required to ensure DCO tools are integrated and unique hardware requirements are accounted for.					
This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.					
FY 2019 to FY 2020 Increase/Decrease Statement: Hardware/Software Integration requirements will decrease as the TSI server automation / configuration tool achieves a stable baseline.					
Title: Joint & Coalition Interoperability					
Description: Consists of efforts in support of Joint Interoperability and Coalition Partner Interoperability. One of the goals of CPCE is to improve the sharing of mission command capabilities among the US Armed Services and our Coalition partners. Engineering effort is required to determine and implement technical approaches to solving data classification and interoperability problems amongst other US services and partner nations.					
FY 2019 Plans: CPCE Joint and Coalition Interoperability plans for FY19 include continued participation in the Program Manager-Computing Environment Working Group (PM-CEWG) and Senior Steering Group-Acquisition (SSG-					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	0.070	0.600	0.400	-	0.400

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>A) events. In addition, CPCE will provide Defense Information Systems Agency (DISA) with engineering requirements for integration and interfaces with the Global Command and Control System - Joint Enterprise (GCCS-JE) and specific requirements for Disconnected, Intermittent, or Limited (DIL) communications in a Denied Operational Environment. This effort will support the DISA's mission to execute contract award for the Global Command and Control System - Joint Enterprise (GCCS-JE) in FY19.</p> <p>FY 2020 Base Plans: CPCE Joint and Coalition Interoperability plans for FY20 include continued participation in the Program Manager-Computing Environment Working Group (PM-CEWG) and Senior Steering Group-Acquisition (SSG-A) events. CPCE will continue to assist Defense Information Systems Agency (DISA) with engineering support for integration with the Global Command and Control System - Joint Enterprise (GCCS-JE) and specific requirements for Disconnected, Intermittent, or Limited (DIL) communications in a Denied Operational Environment. In FY20, CPCE will continue to engineer complete Fires and C2/SA interoperability with the USMC.</p> <p>This effort's funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Joint and Coalition costs will decrease slightly.</p>					
<p>Title: Test and Evaluation</p> <p>Description: Test and evaluation efforts include the planning and conduct of Command Post Computing Environment (CPCE) / Mounted Computing Environment (MCE) T&E events including Developmental Test (DT), System Software Acceptance Testing (SSAT), Integration Events, Risk Reduction Events, Initial Operational Test and Evaluation (IOT&E), and Follow-on Test and Evaluation (FOT&E).</p> <p>FY 2019 Plans: CPCE/MCE completed Initial Operational Test & Evaluation (IOTE) in November 2018 and will participate in after action reviews, adjudicate findings and observations from the formal test. CPCE/MCE will participate in Army Interoperability Certification (AIC) testing for certification of IERs via Army Mission Threads.</p> <p>FY 2020 Base Plans: In FY20, CPCE will conduct multiple developmental tests, experiments, and user juries as new software capabilities and features are developed. CPCE software will also participate in Army Interoperability</p>	7.618	2.350	0.500	-	0.500

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Certification (AIC) testing, Joint Warfighter Assessments, and Army Warfighter Exercises (Wfx), requiring technical system support.</p> <p>This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Test requirements decrease in FY20.</p>					
<p>Title: Program Management</p> <p>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.</p> <p>FY 2019 Plans: Management and oversight funding for government support to be transitioned to OMA funding. Technical Area Contract support will continue for this effort which includes System Development and engineering changes to hardware, software, and network), System Analysis of Program of Record (PoR) systems and future systems, Technical Readiness Assessments, and Stakeholder Technical Interchange Meetings/Events. This support includes the creation and implementation of Functional Support Agreements between PM Mission Command and various Government support agencies such as the Army Research and Development Center (ARDEC) CECOM Research Development and Engineering Command (CERDEC), and other PEOs (e.g. PEO IEW&S). Program Management efforts in the FY19 timeframe will also include business area support to ensure funding and contracts are planned and available for all SW development, system engineering, and T&E efforts.</p> <p>FY 2020 Base Plans: Program office management in the areas of Business, Technical, and Logistics remains a requirement in FY20. This support includes personnel covered by Functional Support Agreements between PM Mission Command and various Government support agencies such as the Army Research and Development Center (ARDEC) CECOM Research Development and Engineering Command (CERDEC), and other PEOs (e.g. PEO IEW&S). Program Management efforts in the FY20 timeframe will also include business area support to ensure funding and contracts are planned and available for all SW development, system engineering, and DT efforts.</p>	7.576	3.500	5.350	-	5.350

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)			
B. Accomplishments/Planned Programs (\$ in Millions)					
This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.					
FY 2019 to FY 2020 Increase/Decrease Statement: Program Management requirements increase from FY19 to FY20 as additional PMO support is required to maintain a baseline, develop a new baseline, and coordinate with other PoRs and Services to ensure interoperability.					
Title: Product Support					
Description: Product Support includes all efforts related to type classification, materiel release, provisioning, life cycle sustainment strategies, training development, and total package fielding.					
FY 2019 Plans: In FY19, CPCE will conduct a logistics demonstration to verify and validate Technical Data Products and complete the formal Life Cycle Sustainment Plan (LCSP), oversee all aspects of total package fielding, common new equipment training and delivery of the final system to the First Unit Equipped (FUE).					
FY 2020 Base Plans: For FY20, CPCE will continue to maintain the fielded baseline version of CPCE infrastructure, update and distribute Technical Data Products for the future baseline software, and continue to oversee and manage all aspects of total package fielding, and new equipment training (NET).					
This effort?s funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.					
FY 2019 to FY 2020 Increase/Decrease Statement: Product Support costs remain stable from FY19 to FY20.					
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	2.989	1.500	1.650	-	1.650
	-	1.282	-	-	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals	59.370	39.975	30.969	-	30.969

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>
• B70000: COE Tactical Server Infrastructure (TSI)	-	20.500	77.533	-	77.533	94.972	97.150	116.234	104.616	Continuing	Continuing

Remarks
Related to CPCE is the Tactical Server Infrastructure (TSI) funding line, B70000, which funds computer hardware servers/hosting platforms for CPCE software.

D. Acquisition Strategy
CPCE supports the Army's Common Operating Environment (COE). It will provide foundational capabilities and services for command post software infrastructure, movement and maneuver applications, tactical DCO infrastructure capabilities and warfighting function applications. The Tactical Server Infrastructure (TSI) hardware will host the CPCE core infrastructure and warfighting function applications.

The initial version of CPCE (v3) meets Minimum Essential Capabilities (MECs) as codified in the approved Command Post Integrated Infrastructure (CPI2) Directed Requirement. The initial version of CPCE completed Initial Operational Test and Evaluation at NIE 18.2 in November 2018, a Fielding / Software Deployment decision is targeted for 2QFY19 along with entering the acquisition life cycle. The new program of record will be comprised of the tactical server infrastructure, Mission Command software infrastructure, and movement/maneuver Warfighting function applications. First Unit Equipped in 4QFY19.

The CPCE is an integration effort consisting of Commercial-Off-The-Shelf / Non-Developmental Item (COTS/NDI) software and Government-developed software that allows for backwards compatibility and development of warfighting capability applications.

Government partners include the U.S. Army Armament Research, Development and Engineering Center (ARDEC) Weapons Software Engineering Center (WSEC), Communications-Electronics Command (CECOM) Software Engineering Center (SEC), Aviation and Missiles Research and Development Center (AMRDEC) Software Engineering Directorate (SED) and Communications-Electronics Research, Development and Engineering Center (CERDEC). Commercial suppliers are assigned efforts through GSA Mission Command Engineering Services vehicles and Multiple Award Task Order (MATO) contracts. Hardware, core software and associated licenses to support converged system architecture is Commercial-off-the-Shelf (COTS) and procured through existing vehicles from GSA, Common Hardware Systems (CHS) and the Army Computer Hardware Enterprise Software and Solutions (CHESS).

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) EJ4 / <i>COMMAND POST COMPUTING ENVIRONMENT (CPCE)</i>

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)
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Management Services (\$ in Millions)				FY 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 Support (Gov't-Core)	Sub Allot	PM Mission Command : APG, MD	4.750	0.853	-	-	-	-	-	-	-	0.000	5.603	-	
PM Support (Gov't-Matrix)	IA	Various Matrix Orgs incl CECOM SEC, LRC, G8, G2, PRD, et al) : APG, MD	4.079	1.668	1.000	-	-	2.500	-	-	-	2.500	0.000	9.247	-
PM Support (SETA Contractor)	C/FFP	Multiple incl CSRA and others : APG, MD	7.798	5.055	2.500	Nov 2018	-	2.850	Nov 2019	-	-	2.850	0.000	18.203	-
Subtotal			16.627	7.576	3.500	-	-	5.350	-	-	-	5.350	0.000	33.053	N/A

Remarks
Funding for Core government support (Management and Oversight of CPCE) transitions to OMA Appropriation in FY19.

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 Requirements Engineering	Various	SW Dev Contractors and Multiple Matrix Orgs : Various Locations	18.630	5.201	3.241	Oct 2018	-	2.500	Oct 2019	-	-	2.500	0.000	29.572	-
Software Development - Core Infrastructure	Option/ Various	ARDEC, CERDEC, Systematic : Picatinny, NJ APG, MD Centerville, VA	106.078	26.363	23.452	Oct 2018	-	17.669	Oct 2019	-	-	17.669	0.000	173.562	-
Joint and Coalition Interoperability	Various	Multiple : Various	0.226	0.070	0.600	Feb 2019	-	0.400	Nov 2019	-	-	0.400	0.000	1.296	-
Hardware / Software Integration	Various	multiple : APG Md	9.648	9.553	4.050	Oct 2018	-	2.900	Oct 2019	-	-	2.900	0.000	26.151	-
FY 2019 SBIR / STTR Transfer	TBD	SBIR / STTR Transfer : Various	-	-	1.282	-	-	-	-	-	-	-	0.000	1.282	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)
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Product Development (\$ in Millions)				FY 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			134.582	41.187		32.625		23.469		-		23.469	0.000	231.863	N/A

Remarks
Software Development efforts will be managed through a combination of COTS Procurement, PM Mission Command technical staff, Matrix Organizations (CERDEC, AMRDEC) and software development contractor firms (contracts and task orders to be determined and competed as necessary).

Support (\$ in Millions)				FY 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 Support	C/FFP	SCCI : Austin, TX	-	2.989		1.500	Jun 2019	1.650	Jun 2020	-		1.650	0.000	6.139	-
Subtotal			-	2.989		1.500		1.650		-		1.650	0.000	6.139	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			
Develop and Conduct Tests and Assessments	MIPR	Multiple Test Agencies : Multiple Locations (Primary APG)	6.735	7.618		2.350	Oct 2018	0.500	Oct 2019	-		0.500	0.000	17.203	-
Subtotal			6.735	7.618		2.350		0.500		-		0.500	0.000	17.203	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			157.944	59.370	39.975	30.969	-	30.969	0.000	288.258	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

Event Name	FY 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 Program of Record Functionality					Integrate PoR Functionality																							
CPCE V3.X Test & Integration																												
JWA 18.1	JWA 18.1																											
Developmental Test V3.0					V3.0 Developmental Testing																							
CPCE V3.0 IOTE					V3.0 IOTE																							
JWA 19.1					1 JWA 19.1																							
Fielding Decision V3.0					2 Fielding Decision																							
First Unit Equipped V3.0					3 First Unit Equipped																							
CPCE V3.1 Design					V3.1 Design																							
CPCE V3.1 Development & Integration									V3.1 Development and Integration																			
Developmental Test V3.1													V3.1 Developmental Testing															
CPCE V3.1 Operational Test																	V3.1 CPCE Operational Test											
Fielding Decision V3.1																	4 Fielding Decision											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

Event Name	FY 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
CPCE V3.2 Design													V3.2 Design															
CPCE V3.2 Development & Integration													V3.2 Development and Integration															
Developmental Test V3.2																									V3.2 Deve			
CPCE V3.2 Operational Test																									V			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ4 / COMMAND POST COMPUTING ENVIRONMENT (CPCE)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Integrate Program of Record Functionality	2	2019	4	2024
CPCE V3.X Test & Integration	1	2018	4	2024
JWA 18.1	1	2018	1	2018
Developmental Test V3.0	4	2018	1	2019
CPCE V3.0 IOTE	1	2019	1	2019
JWA 19.1	1	2019	1	2019
Fielding Decision V3.0	4	2019	4	2019
First Unit Equipped V3.0	4	2019	4	2019
CPCE V3.1 Design	2	2019	4	2019
CPCE V3.1 Development & Integration	4	2019	3	2021
Developmental Test V3.1	3	2021	4	2021
CPCE V3.1 Operational Test	4	2021	4	2021
Fielding Decision V3.1	2	2022	2	2022
CPCE V3.2 Design	3	2021	2	2022
CPCE V3.2 Development & Integration	2	2022	3	2024
Developmental Test V3.2	3	2024	4	2024
CPCE V3.2 Operational Test	4	2024	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)			
COST (\$ in Millions)	Prior Years	FY 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
EJ5: MOUNTED COMPUTING ENVIRONMENT (MCE)	-	16.271	19.166	12.664	-	12.664	18.600	7.496	8.211	6.376	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Common Operating Environment (COE) is an approved set of computing technologies and standards that enables secure and interoperable applications to be developed and executed rapidly across a variety of computing environments (i.e., server(s), client, mobile, sensors, and platform). The Mounted Computing Environment (MCE) is one of six computing environments under the COE, which provides standardization of end-user environments and enables streamlined deployment of new warfighting applications while leveraging existing hardware under the Joint Battle Command-Platform (JBC-P) program.

The Mounted Computing Environment supports the Army Network Modernization Strategy Line of Effort 2, Common Operating Environment by utilizing:

- Interoperable data, message, and waveforms
- Sensors and applications that enable operations across domains
- Integration with Joint C4ISR and strike capabilities

Requirements for the MCE are established in the Army Requirements Oversight Council (AROC)-approved COE Information Systems Initial Capability Document (IS ICD) and the Mounted Computing Environment Requirements Definition Package (RDP). FY20 funding provides the means to continue to manage and develop MCE in concert with the Army's future COE strategy.

Mounted Computing Environment RDT&E resources are used to improve and add software applications while JBC-P RDT&E is used to improve JBC-P hardware, network performance and add network resiliency.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Software Development	9.163	10.841	5.535	-	5.535
Description: Provides an integrated mission command capability across Platforms, through all echelons, that provides simplicity, intuitiveness, core services and applications, common look and feel, and warfighter functionality in the areas of Fires, Logistics, Intelligence, and Maneuver. Primary software development efforts include development of S/A functions and MC applications on a Common Geospatial solution [map], a user interface with "common look and feel", and common Data Services.					
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)			
B. Accomplishments/Planned Programs (\$ in Millions)					
Focus is on integrating existing capability and enabling new capability development in preparation for 4QFY19 fielding of the COE. These responsibilities include continued development of software architecture in conjunction with CPCE, foundational infrastructure, test engineering, Map Based Planning, and Joint and Coalition Interoperability.					
FY 2020 Base Plans: Incorporate new capabilities into the MCE V3 COTS infrastructure, core utilities, backwards compatibility, and Warfighter Function (WfF) Applications into a holistic System of Systems and ensuring that those subsystems function together in accordance to program requirements and specifications.					
FY 2019 to FY 2020 Increase/Decrease Statement: Software development funding decreased to the level of prioritized capabilities to be provided in MCEv3.x.					
Title: Software/Systems Engineering					
Description: Perform Software/Systems Engineering in support of the development of MCE capabilities, applications, and services, to include, but not limited to, conducting engineering studies, software architecture development, system analyses, technical readiness assessments, technical interchange meetings/events, and development of related reports and other deliverables. Coordinate the development of common infrastructure components with the CPCE.					
FY 2019 Plans: Development of software architecture constructs to sustain and integrate existing capability and enable new capability development. System engineering expertise in support of COE baselines, focusing on hardware/software integration, engineering, and development of common services across platforms. Includes planning and engineering of future MCE capabilities using COTS, i.e.: Common Authentication; performance characterization on different HW/SW configurations using Mounted Family of Computer Systems (MFoCS); and coordination of interoperability between external CEs.					
Continue design efforts, to include integration and lab based developmental and system of systems testing, specifically, GPS updates for platform, platform/sensor integration for platform, Risk Management Framework (RMF)/Information Assurance (IA) certification, C2IUL integration, wireless integration into platform, and the Hybrid Operating System.					
FY 2020 Base Plans:					
	4.172	3.905	5.279	-	5.279

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
In FY20, MCE will continue software maturity, integration of 3rd party Program of Record (POR) applications onto the baseline software architecture, and platform integration onto the Army's platforms. MCE will also conduct experimentation with Army units in order to receive direct feedback from users of the MCE software. This feedback and unit experimentation will help shape the future software releases of MCE software to the Army. FY 2019 to FY 2020 Increase/Decrease Statement: Systems engineering funding increased to support level of capabilities to be developed in FY20.					
Title: Test and Evaluation Description: Test and evaluation efforts include the planning and conduct of combined Command Post/Mounted Computing Environment T&E events including Developmental Test, Software Acceptance Testing, Integration Events, Risk Reduction Events, and Initial Operational Test and Evaluation (IOT&E). FY 2019 Plans: In FY19, MCE will participate in formal Initial Operational Test & Evaluation (IOTE) after action reviews and adjudicate findings and observations from the formal test. Following IOTE, MCE will participate in Army Interoperability Certification (AIC) testing for certification of IERs via Army Mission Threads. FY 2020 Base Plans: In FY20, MCE will continue with Developmental Testing (DT) as we improve the current MCE software baseline and as we migrate existing and future 3rd party Programs of Record (POR) developed applications onto the common MCE software baseline. FY 2019 to FY 2020 Increase/Decrease Statement: Test requirements will decrease in FY20 since there are no planned major test events, but Developmental Testing will still occur.	1.912	2.730	0.400	-	0.400
Title: Program Management 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 Integrated Project Teams. FY 2019 Plans:	1.024	0.987	1.450	-	1.450

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Management and oversight funding to be transitioned to OMA funding. Technical Area support of this effort includes System Development and engineering changes to hardware, software, and network), System Analysis of Program of Record (PoR) systems and future systems, Technical Readiness Assessments, and Stakeholder Technical Interchange Meetings/Events. This support includes the creation and implementation of Functional Support Agreements between PM Mission Command and various Government support agencies such as the Army Research and Development Center (ARDEC) CECOM Research Development and Engineering Command (CERDEC), and other PEOs (e.g. PEO IEW&S). Program Management efforts in the FY19 timeframe will also include business area support to ensure funding and contracts are planned and available for all SW development, system engineering, and T&E efforts.</p> <p>FY 2020 Base Plans: Technical Area Contract support will continue for this effort which includes System Development and engineering changes to hardware, software, and network), System Analysis of Program of Record (PoR) systems and future systems, Technical Readiness Assessments, and Stakeholder Technical Interchange Meetings/Events. This support includes the creation and implementation of Functional Support Agreements between PM Mission Command and various Government support agencies such as the Army Research and Development Center (ARDEC) CECOM Research Development and Engineering Command (CERDEC), and other PEOs (e.g. PEO IEW&S). Program Management efforts in the FY20 timeframe will also include business area support to ensure funding and contracts are planned and available for all SW development, system engineering, and DT efforts. This effort's funding will be executed by Program Executive Office for Command, Control and Communications-Tactical.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Program Management requirements will need to increase from FY19 to FY20 to support development of MCE Software and integration of 3rd Party POR Applications onto the MCE Software and integration onto the Army's platforms.</p>					
<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>	-	0.703	-	-	-
Accomplishments/Planned Programs Subtotals	16.271	19.166	12.664	-	12.664

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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C. Other Program Funding Summary (\$ in Millions) N/A		
Remarks N/A		
D. Acquisition Strategy <p>MCE supports the Army's Common Operating Environment (COE), and will serve as the future software for Joint Battle Command - Platform (JBC-P). The JBC-P program provides the hardware and network, while JBC-P software will be replaced with MCE. Future development will continue to leverage JBC-P hardware and MCE software and integrate multiple warfighting systems into the platform (mounted) environment.</p> <p>MCE is being developed over time, with the initial set of v3 Minimum Essential Capabilities (MECs) being delivered in 4QFY19. Subsequent deliveries of capabilities are expected on a 5 year cycle, in accordance with the AROC approved COE IS ICD. This cycle may be adjusted depending on many factors, including fielding priorities, effectiveness of backwards compatibility, and time required to develop and test new capabilities.</p> <p>To accomplish the goals of the MCE, PEO C3T PM MC architects, designs, and develops the hardware, software, network solutions and capabilities required to achieve compliance with the COE. Primary systems architecture engineering is conducted by in-house Government engineering staff with contracted support, matrix elements and MITRE Corporation, a Federally Funded Research and Development Center. Test and Evaluation support is provided by in-house PM MC TMD staff, with support from contractor firms, for preparation and conduct of specific risk reduction events and test events. Developmental testing is being conducted by the software development teams with Government oversight and coordination. IOT&E efforts will be supported by the ATEC community. Hardware to support system architecture and software development is comprised of standardized equipment and is procured using existing contract vehicles such as Mounted Family of Computer Systems (MFoCS).</p>		
E. Performance Metrics N/A		

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)
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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
PM Support(Mixed support: Matrix; SETA Contractor)	Various	PM Mission Command : Aberdeen Proving Ground, MD	2.352	1.024		0.987		1.450		-		1.450	Continuing	Continuing	-
Subtotal			2.352	1.024		0.987		1.450		-		1.450	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
Software Development	Various	PM Mission Cmd, Multiple Matrix Orgs and SW Dev Contractors : Aberdeen Proving Ground, MD	7.719	9.163		10.841		5.535		-		5.535	Continuing	Continuing	-
Software/Systems Engineering	Various	PM Mission Cmd, Multiple Matrix Orgs and SW Dev Contractors : Aberdeen Proving Ground, MD	15.023	4.172		3.905		5.279		-		5.279	Continuing	Continuing	-
FY2019 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.703		-		-		-	0.000	0.703	-
Subtotal			22.742	13.335		15.449		10.814		-		10.814	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, Evaluation and Integration	MIPR	Multiple Test Agencies; Multiple	3.078	1.912		2.730		0.400		-		0.400	Continuing	Continuing	-

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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 / 5					PE 0604818A / Army Tactical Command & Control Hardware & Software					EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)					
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
		Locations : Aberdeen Proving Ground, MD													
Subtotal			3.078	1.912		2.730		0.400		-		0.400	Continuing	Continuing	N/A
Project Cost Totals			28.172	16.271		19.166		12.664		-		12.664	Continuing	Continuing	N/A
Remarks															



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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
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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
MCE Arch, System Engr & Dev	[Redacted]																											
MCE V3 Test & Integration	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
MCE V3 Customer Test	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Limited Fielding Decision	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
First Unit Equipped	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Army Interoperability Certification (AIC)	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Planned Army Interoperability Certification (AIC) 2	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Planned Army Interoperability Certification (AIC) 3	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Planned Army Interoperability Certification (AIC) 4	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Planned Army Interoperability Certification (AIC) 5	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Unit Experimentation	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
MCE V3.X Operational Test	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			
Material Release	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]			

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software		Project (Number/Name) EJ5 / MOUNTED COMPUTING ENVIRONMENT (MCE)	

Event Name	FY 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
Fielding Decision 2																					<div style="text-align: center;">  Fielding Decision (MCE v3.x) </div>							
First Unit Equipped 2																					<div style="text-align: center;">  First Unit Equipped (MCE v3.x) </div>							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) EJ5 / <i>MOUNTED COMPUTING ENVIRONMENT (MCE)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MCE Arch, System Engr & Dev	4	2016	4	2024
MCE V3 Test & Integration	3	2017	4	2018
MCE V3 Customer Test	1	2019	1	2019
Limited Fielding Decision	4	2019	4	2019
First Unit Equipped	1	2020	1	2020
Army Interoperability Certification (AIC)	2	2019	2	2019
Planned Army Interoperability Certification (AIC) 2	4	2020	1	2021
Planned Army Interoperability Certification (AIC) 3	4	2021	1	2022
Planned Army Interoperability Certification (AIC) 4	4	2022	1	2023
Planned Army Interoperability Certification (AIC) 5	4	2023	1	2024
Unit Experimentation	2	2019	2	2022
MCE V3.X Operational Test	4	2022	4	2022
Material Release	2	2023	2	2023
Fielding Decision 2	4	2023	4	2023
First Unit Equipped 2	1	2024	1	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EJ6 / TACTICAL ENHANCEMENT			
COST (\$ in Millions)	Prior Years	FY 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
EJ6: TACTICAL ENHANCEMENT	-	25.000	17.851	1.853	-	1.853	2.868	0.000	0.000	0.000	0.000	47.572
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EJ6, the Tactical Enhancement supports the Army's Network Modernization Strategy Line Of Effort (LOE) 1 - Unified Network

Tactical Enhancement supports the evaluation and testing requirements for Terrestrial Transmission (TRILOS) and Troposcatter Transmission (TROPO) capabilities procured and fielded under the Signal Modernization (SIGMOD) funding line, B00010. TRILOS and TROPO will provide redundancy communications in a Satellite denied environment by providing improved Line of Sight and beyond line of sight radio systems.

In addition this funding will support development of Network Centric Waveform-Resilient (NCW-R). NCW-R is a critical, near-term set of modifications to the current WIN-T SATCOM waveform that will provide limited protection against our adversaries' ability to jam tactical SATCOM Command and control communications on Wideband Global SATCOM (WGS) satellites. NCW-R will provide anti-jam capability and resiliency to WIN-T Program of Record satellite terminals in contested environments. The NCW-R waveform software will operate on WIN-T satellite modems. NCW-R will provide a bridging capability until the next generation protected satellite constellation is launched by the Air Force (projected FY28/29). The current anti-jam protection is limited to two SMART-T terminals per BCT, division and Corps HQs, leaving battalions vulnerable to being isolated during jamming events.

SIGMOD Capabilities:

TRILOS: Enables Mission Command in a Satellite Denied environment at higher throughput than the current High Capacity Line of Sight System (HCLOS). TRILOS will enable Army units to reduce reliance on costly satellite bandwidth. TRILOS will extend the network by utilizing a significantly reduced Size, Weight and Power (SWaP) radio verses the aging HCLOS system.

TROPO: Enables Mission Command in a Satellite Denied environment by providing Beyond Line of Sight (BLOS) capability over longer ranges and at higher throughput than the current BLOS System. TROPO extends the network by utilizing a significantly reduced SWaP radio verses the current system. TROPO will enable Army units to reduce reliance on costly satellite bandwidth.

FY20 funds support NCW-R developmental testing effort to add a projected satellite communication capability to tactical network

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: IOT&E for TROPO systems	-	8.269	-	-	-
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY19 \$8.6M are needed for TROPO IOT&E testing. Due to production contract award date slip (Feb 2019) Operational Test is now planned for 3QFY20. FY 2019 to FY 2020 Increase/Decrease Statement: Funds were moved to Protected AJ TACSAT line 173142/F18 to support future development of protected SATCOM.					
Title: Development of NCW-R FY 2019 Plans: \$8.927 are needed for NCW-R development. NCW-R is an improvement of the NCW waveform and provides a bridging Protected SATCOM capability for Army tactical formations until the Army and Air Force deploy the Protected Tactical Waveform (PTW) and its associated Infrastructure. FY 2019 to FY 2020 Increase/Decrease Statement: Funds in FY20 & FY21 were moved to Protected SATCOM line (1713142.F18) for future development of protected satellite.	25.000	8.927	-	-	-
Title: Development Testing of NCW-R FY 2020 Base Plans: Development testing for NCW-R modem FY 2019 to FY 2020 Increase/Decrease Statement: Increase supports development testing for NCW-R modem	-	-	1.853	-	1.853
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 decrement of \$655K	-	0.655	-	-	-
Accomplishments/Planned Programs Subtotals	25.000	17.851	1.853	-	1.853

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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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	
• B00010: <i>Signal Modernization Program</i>	280.944	82.180	153.933	-	153.933	174.041	190.207	224.490	221.457	0.000	1,327.252

Remarks

B00010 : OPA funding line for Signal Modernization (SIGMOD)

D. Acquisition Strategy

These funds will be used to conduct System Evaluation and Formal Testing of the various Signal Mod capabilities, specifically the TROPO and Terrestrial Transmission (TRILOS) systems. This is in order to facilitate integration into the WIN-T tactical networks. These test events will meet all mandatory testing requirements with full ATEC oversight. This Acquisition Strategy will integrate proven Commercial-Off-The-Shelf (COTS) capabilities into existing WIN-T nodes to expand and enhance network capacity and user access. The TROPO and TRILOS capabilities are acquired as ACAT III programs to replace legacy equipment in the field while utilizing DoDI 5000.02 standard acquisition approaches, starting with Milestone C Determination for TRILOS (3QFY17) and TROPO (4QFY18).

The Army will continue NCW-R development in FY19 and conduct developmental testing beginning in 2nd quarter FY20, followed by certification for operational use over Wideband Global SATCOM (WGS) satellites by Army Space and Missile Defense Command. The Army projects to begin fielding this improved, resilient, satellite communication waveform in 4th Quarter FY20.

E. Performance Metrics

N/A

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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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				EJ6 / TACTICAL ENHANCEMENT								
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				
NCW-R	SS/CPFF	CODES1403AALION SCIENCE AND TECHNOLOGY CORPORATION : 202BURR RIDGE IL 60527-0849FACILITY	1.500	25.000	Jul 2018	8.927	Jan 2019	-		-		-	0.000	35.427	-	
Subtotal			1.500	25.000		8.927		-		-		-	0.000	35.427	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				
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.655	Jan 2019	-		-		-	0.000	0.655	-	
Subtotal			-	-		0.655		-		-		-	0.000	0.655	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				
TRILOS Testing	MIPR	ATEC : Aberdeen Proving Ground, MD	19.823	-		-		-		-		-	0.000	19.823	-	
TROPO Testing	MIPR	ATEC : Aberdeen Proving Ground, MD	-	-		8.269	Nov 2019	-		-		-	0.000	8.269	-	
NCW-R Testing	TBD	GTACS- contract - L3 : Aberdeen Proving Ground, MD	-	-		-		1.853	May 2020	-		1.853	0.000	1.853	-	
Subtotal			19.823	-		8.269		1.853		-		1.853	0.000	29.945	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EJ6 / TACTICAL ENHANCEMENT					
	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	21.323	25.000		17.851		1.853		-		1.853	0.000	66.027	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EJ6 / TACTICAL ENHANCEMENT

Event Name	FY 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
IOC for TRILOS		1 ▲ IOC TRILOS																										
FRP for TRILOS			2 ▲ FRP TRILOS																									
Production/ Fielding TRILOS	[Blue Bar]																											
MS C TROPO			3 ▲ MS C TROPO																									
IOT&E for TROPO									■ IOT&E TROPO																			
FRP for TROPO									4 ▲ FRP TROPO																			
IOC for TROPO									5 ▲ IOC TROPO																			
Production/Fielding TROPO	[Blue Bar]																											
NCW-R Development																												
NCW-R Developmental Testing																												
NCW-R fielding																												
NCW-R Certification																												
NCW-R Operational Testing																												

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

Events	Start		End	
	Quarter	Year	Quarter	Year
BCT SUT for TS-SCI support (NIE 17.2)	4	2017	4	2017
IOT&E for TRILOS	4	2017	4	2017
IOC for TRILOS	3	2018	3	2018
FRP for TRILOS	4	2018	4	2018
Production/ Fielding TRILOS	4	2017	1	2024
MS C TROPO	4	2018	4	2018
IOT&E for TROPO	3	2020	3	2020
FRP for TROPO	3	2020	3	2020
IOC for TROPO	4	2020	4	2020
Production/Fielding TROPO	2	2019	2	2025
NCW-R Development	2	2018	1	2020
NCW-R Developmental Testing	2	2020	4	2020
NCW-R fielding	4	2020	4	2022
NCW-R Certification	3	2020	1	2021
NCW-R Operational Testing	4	2020	1	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT			
COST (\$ in Millions)	Prior Years	FY 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
EK9: TACTICAL NETWORK OPERATIONS AND MANAGEMENT	-	4.655	8.004	3.649	-	3.649	3.378	3.150	3.428	3.934	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Tactical Network Operations (NetOps) Management (TNOM) is the official nomenclature for the funding line. Unified Network Operations (UNO) is the effort that the funding line funds.

A. Mission Description and Budget Item Justification

Line of Effort 1A: Unified Network (Tactical Network Operations (NetOps) Management (TNOM))

Unified Network Operations (UNO) will leverage MTA (Mid-Tier Acquisition) (Section 804) rapid prototyping efforts to develop UNO v1.0 via NetOps capabilities that build upon current efforts, expand those efforts to address CSA priorities, and include emerging capability requirements stemming from Network Cross Functional Team (CFT) initiatives and requirements.

UNO will operationally standardize, integrate, and simplify NetOps capabilities existing at the enterprise/strategic, operational, and tactical levels.

UNO will deliver an integrated Network Operations (NetOps) capability, based upon an open framework, aggregating data, which enables common planning, configuration, management, monitoring, and defense of the Network. This will be accomplished through the integration, co-hosting, and federation of multiple NetOps systems from the hand held devices to the Enterprise. UNO aligns with the Army's intent to develop NetOps prototypes, conduct DevOps, get user feedback, make adjustments and ultimately deliver enhanced capabilities to the operational force in the shortest time possible using what is available in industry or through other government agencies through an adapt and buy approach based on experimentation and demonstration.

FY20 funding will continue support of MTA (Mid-Tier Acquisition) (Section 804) rapid prototyping efforts of UNO v1.0 via capabilities that will be expanded upon based on Network CFT initiatives and directed requirements. UNO v1.0 will be comprised of Network Management, Integrated Planner, Radio Planner, and Federated Data Repository capabilities that utilize the try, buy, decide strategy put forth by Army leadership. The UNO Program Office Management will utilize FY20 funding in support of requisite planning, documentation, and management functions in support of rapid prototyping efforts.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Product Development	-	6.881	2.899	-	2.899

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Network Operations Development</p> <p>FY 2019 Plans: FY19 funding will establish MTA (Section 804) rapid prototyping efforts of UNO v1.0 via NetOps capabilities to address CSA priorities, and include emerging capability requirements stemming from Network CFT initiatives and requirements. Support delivering integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities.</p> <p>Capabilities UNO will expand based upon Network CFT initiatives and requirements are Network Management, Integrated Planner, Radio Planner, and Federated Data Repository utilizing the try, buy, decide strategy put forth by Army leadership.</p> <p>Development of UNO's Radio Planner capability provides the ability to plan and create configuration files as well as manage the latest Tactical radio elements of the Department of Defense Information Network ? Army (DoDIN-A) and monitoring focused on the status of mission network services effectivity.</p> <p>Development of the UNO's Network Management function will provide the ability to manage and troubleshoot the network elements that comprise the DoDIN-A, monitor a local node for network health status, performance, location, and security, in addition to displaying monitored data to the local operator. Management elements include, but are not limited to, the Command Post, Brigades, Echelons, etc.</p> <p>UNO's improvement of the Integrated Planner functionality allows NetOps capabilities to plan, manage and operate the Tactical Internet DoDIN-A with common operating picture, automate the planning functions and the resource management to support unit task organization, and interface with managers and monitors.</p> <p>Initial implementation of UNO's Federated Data Repository enables unit task reorganization (UTR) acting as the distributed data store for NetOps data and provide services that will be used by NetOps planning and management systems and a federated data store that operates over existing Army Tactical networks, typically characterized as a Disconnected, Intermittent and Bandwidth Limited (DIL) operating environment.</p> <p>FY 2020 Base Plans: FY20 funding will continue support of MTA (Section 804) rapid prototyping efforts of UNO v1.0 via NetOps capabilities to address CSA priorities, and include emerging capability requirements stemming from Network</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>CFT initiatives and requirements. Support delivering integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities.</p> <p>Capabilities UNO will expand based upon Network CFT initiatives and requirements are Network Management, Integrated Planner, Radio Planner, and Federated Data Repository utilizing the try, buy, decide strategy put forth by Army leadership.</p> <p>Development of UNO's Radio Planner capability provides the ability to plan and create configuration files as well as manage the latest Tactical radio elements of the Department of Defense Information Network ? Army (DoDIN-A) and monitoring focused on the status of mission network services effectivity.</p> <p>Development of the UNO's Network Management function will provide the ability to manage and troubleshoot the network elements that comprise the DoDIN-A, monitor a local node for network health status, performance, location, and security, in addition to displaying monitored data to the local operator. Management elements include, but are not limited to, the Command Post, Brigades, Echelons, etc.</p> <p>UNO's improvement of the Integrated Planner functionality allows NetOps capabilities to plan, manage and operate the Tactical Internet DoDIN-A with common operating picture, automate the planning functions and the resource management to support unit task organization, and interface with managers and monitors.</p> <p>Continued advancement of UNO's Federated Data Repository enables unit task reorganization (UTR) acting as the distributed data store for NetOps data and provide services that will be used by NetOps planning and management systems and a federated data store that operates over existing Army Tactical networks, typically characterized as a Disconnected, Intermittent and Bandwidth Limited (DIL) operating environment.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The FY19 to FY20 decrease is due to a delay of approved requirements.</p>					
<p>Title: Management Services</p> <p>Description: Program Management Support</p> <p>FY 2019 Plans: FY19 funding will establish the UNO Program Office Management support of requisite planning, documentation, and management functions in support of rapid prototyping efforts.</p>	-	0.750	0.750	-	0.750

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>The FY19 funding will allow the UNO Program Office Management the ability to adhere to all requisite policy and reporting functions associated with MTA (Section 804) programs.</p> <p>FY 2020 Base Plans: FY20 funding will continue support the UNO Program Office Management support of requisite planning, documentation, and management functions in support of rapid prototyping efforts.</p> <p>The FY20 funding will allow the UNO Program Office Management the ability to adhere to all requisite policy and reporting functions associated with MTA (Section 804) programs.</p>					
<p>Title: FY18 Congressional Rescission</p> <p>Description: All FY18 funding was declared excess due to funding ahead of need based on a lack of a validated requirement.</p>	4.655	-	-	-	-
<p>Title: FY19 SBIR/STTR Transfer</p> <p>FY 2019 Plans: FY19 SBIR/STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY19 accounts for SBIR/STTR Transfer</p>	-	0.373	-	-	-
Accomplishments/Planned Programs Subtotals	4.655	8.004	3.649	-	3.649

<p>C. Other Program Funding Summary (\$ in Millions) N/A</p> <p>Remarks</p>
<p>D. Acquisition Strategy UNO will leverage the MTA (Section 804) Rapid Prototyping acquisition strategy allowing for rapid prototyping of NetOps Solutions employing innovative technologies to demonstrate new Plan, Manage, Provision, and Secure Network capabilities that meet Army modernization and operational needs, CSA priorities, and emerging capability requirements stemming from Network Cross Functional Team (CFT) initiatives and requirements.</p> <p>UNO will provide adequate experimentation and incorporate Soldier feedback to mitigate cost, schedule, and performance risks early in program lifecycle, receive analysis of technology/design maturity and component integration/interoperability, and provide requirement refinement.</p>

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) EK9 / <i>TACTICAL NETWORK OPERATIONS AND MANAGEMENT</i>

The objective of the MTA (Section 804) will develop and deliver three prototypes into experimentation events for user feedback in FY20 (UNO v1.0), FY21 (UNO v1.1), and FY22 (UNO v1.2) within simulated operational environment(s) in order to provide operational capabilities in FY21 (UNO v1.0), FY22 (UNO v1.1), FY23 (UNO v1.2), within five years of the development of an approved requirement.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT
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Management Services (\$ in Millions)				FY 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	C/TBD	Various : Various	-	-		0.750	Apr 2019	0.750		-		0.750	Continuing	Continuing	Continuing
Subtotal			-	-		0.750		0.750		-		0.750	Continuing	Continuing	N/A

Remarks
Funding will support the UNO Program Office Management support of requisite planning, documentation, and management functions in support of rapid prototyping efforts, in addition to subsequent yearly fielding decisions. The funding will allow the UNO Program Office Management the ability to adhere to all requisite policy and reporting functions associated with MTA (Section 804) programs.

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/TBD	TBD : TBD	-	-		6.881	Apr 2019	2.899		-		2.899	0.000	9.780	-
Fy19 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.373		-		-		-	0.000	0.373	-
Subtotal			-	-		7.254		2.899		-		2.899	0.000	10.153	N/A

Remarks
Funding will support MTA (Section 804) rapid prototyping efforts of UNO via NetOps capabilities that build upon current efforts, expand those efforts to address CSA priorities, and include emerging capability requirements stemming from Network CFT initiatives and directed requirements. Support delivering integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities.

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			
FY18 Congressional Rescission	C/TBD	NA : NA	-	4.655		-		-		-		-	0.000	4.655	-
Subtotal			-	4.655		-		-		-		-	0.000	4.655	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT			
	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	-	4.655	8.004	3.649	-	3.649	Continuing	Continuing	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT

Event Name	FY 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				
Cyber Center of Excellence (CCoE) 804 Requirement Memorandum					▲ 1																											
MTA Request to DASM									■																							
UNO MTA (Section 804) AAE Approval									▲ 2																							
UNO v1.0 DevOps													■																			
UNO v1.0 Prototype User Feedback													■																			
UNO v1.0 Testing													■																			
UNO v1.0 FQT/OA																	■															
UNO v1.0 Fielding Decision																	▲ 3															
UNO v1.1 Capability Decision Point																					▲ 4											
UNO v1.1 DevOps																	■															
UNO v1.1 Prototype User Feedback																	■															
UNO v1.1 Testing																	■															
UNO v1.1 FQT/OA																					■											

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT

Event Name	FY 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								
UNO v1.1 Fielding Decision													5																							
UNO v1.1 Fielding Decision																																				
UNO v1.2 Capability Decision Point																									6											
UNO v1.2 DevOps																																				
UNO v1.2 Prototype User Feedback																																				
UNO v1.2 Testing																																				
UNO v1.2 FQT/OA																													7							
UNO v1.2 Fielding Decision																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EK9 / TACTICAL NETWORK OPERATIONS AND MANAGEMENT

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Cyber Center of Excellence (CCoE) 804 Requirement Memorandum	2	2019	2	2019
MTA Request to DASM	2	2019	2	2019
UNO MTA (Section 804) AAE Approval	2	2019	2	2019
UNO v1.0 DevOps	3	2019	1	2020
UNO v1.0 Prototype User Feedback	3	2019	1	2020
UNO v1.0 Testing	3	2019	1	2020
UNO v1.0 FQT/OA	1	2020	1	2020
UNO v1.0 Fielding Decision	2	2020	2	2020
UNO v1.1 Capability Decision Point	4	2020	4	2020
UNO v1.1 DevOps	2	2020	1	2021
UNO v1.1 Prototype User Feedback	2	2020	1	2021
UNO v1.1 Testing	2	2020	1	2021
UNO v1.1 FQT/OA	1	2021	1	2021
UNO v1.1 Fielding Decision	2	2021	2	2021
UNO v1.2 Capability Decision Point	4	2021	4	2021
UNO v1.2 DevOps	2	2021	1	2022
UNO v1.2 Prototype User Feedback	2	2021	1	2022
UNO v1.2 Testing	2	2021	1	2022
UNO v1.2 FQT/OA	1	2022	1	2022
UNO v1.2 Fielding Decision	2	2022	2	2022

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>	Project (Number/Name) EK9 / <i>TACTICAL NETWORK OPERATIONS AND MANAGEMENT</i>

Note
Program projects MTA (Section 804) approval will support rapid prototyping efforts of UNO via NetOps capabilities that build upon current efforts, expand those efforts to address CSA priorities, and include emerging capability requirements stemming from Network Cross Functional Team (CFT) initiatives and directed requirements. Support delivering integrated capabilities to plan, install, operate, maintain, and secure the Army's end-to-end network in support of the commander's mission priorities. UNO's capabilities will expand on Network CFT initiatives and directed requirements are Network Management, Integrated Planner, Radio Planner, and Federated Data Repository utilizing the try, buy, decide strategy put forth by Army leadership.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)			
COST (\$ in Millions)	Prior Years	FY 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
EQ8: Mobile/Handheld Computing Environment (M/HHCE)	-	11.402	9.477	4.857	-	4.857	5.160	4.469	4.102	6.121	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EQ8 - The Common Operating Environment (COE) is an approved set of computing technologies and standards that enables secure and interoperable applications to be developed and executed rapidly across a variety of computing environments. The Mobile/Handheld Computing Environment (M/HH CE) is one of the six computing environments under the COE, which provides the standards for all Army hand held applications enabling the use of common End User Devices by Soldiers, thereby eliminating redundant devices and reducing the Soldiers' load.

The M/HH CE supports the Army Network Modernization Strategy Line of Effort (LOE) 1 (Unified Network) and LOE 2 (Common Operating Environment) by utilizing (1) interoperable data, message, and waveforms, (2) sensors and applications that enable operations across domains and (3) integration with Joint C4ISR and strike capabilities. Nett Warrior (NW) complies with the technical standards documented by the M/HH CE and provides the dismounted common computational platform for other products relevant to dismounted Soldiers. Through compliance with the M/HH CE, software applications from other programs are integrated with the NW system, reducing the need for duplicate hardware and resulting in reduced Soldier Load. NW leverages commercial smart phone devices and secure Army tactical radios to provide the dismounted leader an integrated mission command and situational awareness for use during combat operations. NW applied feedback from conventional and Special Operations units to procure and implement Secure but Unclassified (SBU) networking equipment for Security Force Assistance Brigades to enable faster, more flexible Mission Command data exchanges with Joint and Coalition forces while maintaining the existing integrated mission command capability with Joint Battle Command Platform systems. NW uses Commercial-Off-The-Shelf (COTS) and Non Developmental (NDI) communications equipment to create a robust and flexible SBU network that enables faster and more accurate decision making in fights at the tactical level.

Requirements for the M/HH CE are established in the AROC approved COE Information Systems Initial Capability Document (IS ICD) and the draft M/HH CE Requirements Definition Package (RDP).

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Test and Evaluation	2.139	1.971	1.009	-	1.009
Description: Test and Evaluation including annual Network Integration Evaluation (NIE) and Joint Warfighting Assessment (JWA) to gain Soldier feedback.					
FY 2019 Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019			
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)				
B. Accomplishments/Planned Programs (\$ in Millions)						
		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Continue NW test and 3rd party applications evaluation for technical verification at developmental test events and user verification. Conduct a planned Follow-on Test and Evaluation (FOT&E). Support NW as a baseline CIE and JWA system including: Brigade level support, equipping, training, and spares for NW; conduct yearly Army Interoperability Certification; environmental testing; and Information Assurance penetration prevention testing for new commercial smart devices, software and accessories. Support Army Expeditionary Warrior Experiment (AEWE) testing.</p> <p>FY 2020 Base Plans: Continue NW test and 3rd party applications evaluation for technical verification at developmental test events and user verification. Conduct a planned assessment of Integrated Tactical Network (ITN) in an IBCT. Support NW as a baseline NIE/JWA system including: Brigade level support, equipping, training, and spares for NW; conduct yearly Army Interoperability Certification; environmental testing; and Information Assurance penetration prevention testing for new commercial smart devices, software and accessories. Support Army Expeditionary Warrior Experiment (AEWE) testing.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Reduction from FY19 to FY20 based on completion of FOT&E in FY19.</p>						
<p>Title: Hardware and Software Integration and Evaluation for Capability Improvements</p> <p>Description: Hardware and Software Integration and Evaluation for Capability Improvements</p> <p>FY 2019 Plans: Continue to evaluate next End User Devices (EUD) and associated hardware components to stay aligned with commercial and Army evolving requirements. Provide NW software / hardware updates to support incorporation of 3rd party applications onto NW EUD platform, Army Interoperability Certification (AIC) and cyber security testing. Support DARPA Squad X integration and transition.</p> <p>FY 2020 Base Plans: Continue to evaluate next End User Devices (EUD) and associated hardware components to stay aligned with commercial and Army evolving requirements. Provide NW software / hardware updates to support incorporation of 3rd party software applications onto NW EUD platform, Army Interoperability Certification (AIC) and cyber security testing. Support DARPA Squad X integration and transition. Update software to M/HH CE standards</p>		3.496	3.758	1.924	-	1.924

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
as revised to maintain compliance with COE. Continue integration of Cyber Electromagnetic Activities (CEMA) capability into the NW system to support EW threat detections and location finding. FY 2019 to FY 2020 Increase/Decrease Statement: Reduction from FY19 to FY20 based on fewer third party applications to integrate.					
Title: Software Development & Integration Description: Funding is provided for the following efforts. FY 2019 Plans: Continue to evaluate next generation NW map engine and Operating System (OS) trade studies and assured Position, Navigation and Timing (PNT) software development efforts with NW. Update NW Software Development Kit (SDK) with new functionality. Continue incorporating the Army's Common Operating Environment (COE) 3.0 Cross-Cutting Capabilities into NW software. Continue development of NW's next generation Service Oriented Architecture. FY 2020 Base Plans: Continue to evaluate next generation NW map engine and Operating System (OS) trade studies and Assured Position, Navigation and Timing (PNT) software development efforts with NW. Update NW Software Development Kit (SDK) with new functionality. Continue software upgrades to ITN component software based on security and operational requirements. Continue incorporating the Army's Common Operating Environment (COE) 3.0 Cross-Cutting Capabilities into NW software. Continue development of NW's next generation Service Oriented Architecture. FY 2019 to FY 2020 Increase/Decrease Statement: Reduction from FY19 to FY20 based on fewer third party applications to integrate.	2.744	1.002	0.513	-	0.513
Title: Conduct SEPM Support to NW Description: Conduct Systems Engineering and Program Management Support to Nett Warrior FY 2019 Plans: Continue to conduct government systems / software engineering and program management support for NW program. Will collect input from Soldiers to improve NW size, weight, power, fightability, safety and effectiveness via surveys. Will manage system configuration, and execute test, development and integration planning	2.251	1.727	1.068	-	1.068

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)			
B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
including investigation and analysis of emerging innovative commercial technologies to lower the size, weight, power, cost, and increase Nett Warrior functionality. FY 2020 Base Plans: Continue to conduct government systems / software engineering and program management support for NW program. Will collect input from Soldiers to improve NW size, weight, power, fightability, safety and effectiveness via surveys. Will manage system configuration, and execute test, development and integration planning including investigation and analysis of emerging innovative commercial technologies to reduce the size, weight, power, cost, increase NW and ITN functionality. FY 2019 to FY 2020 Increase/Decrease Statement: Reduction from FY19 to FY20 based on fewer third party applications to integrate.					
Title: MHHCE Governance FY 2019 Plans: Continue to provide Mobile Handheld Computing Environment (MHH/CE) governance and standards development for external program integration to eliminate separate handheld devices and reduce Soldier load. FY 2020 Base Plans: Continue to provide Mobile Handheld Computing Environment (MHH/CE) governance and standards development for external program integration to eliminate separate handheld devices and reduce Soldier load. Maintain compliance with overarching COE standards. FY 2019 to FY 2020 Increase/Decrease Statement: Reduction from FY19 to FY20 based on fewer third party applications to integrate.	0.772	0.672	0.343	-	0.343
Title: FY2019 SBIR / STTR Transfer Description: FY2019 SBIR / STTR Transfer FY 2019 Plans: FY2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR / STTR Transfer	-	0.347	-	-	-
Accomplishments/Planned Programs Subtotals	11.402	9.477	4.857	-	4.857

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)
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C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 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>
• R80501: <i>Ground Soldier System</i>	135.768	36.506	111.955	1.760	113.715	156.860	182.214	185.487	188.819	0.000	999.369

Remarks

D. Acquisition Strategy

To capitalize on commercial industry's investment in advanced smart device technology as well as innovation and changes within Army, NW requires annual RDT&E funding for integration and evaluation of new technology. Through this process and at low cost, the Army is able to integrate and evaluate for combat utility the hundreds of millions spent in product development by the major commercial device manufactures. The Nett Warrior (NW) program provides situational awareness and mission command to dismounted combat leaders through a secure commercial smart device, power source, cables and the Integrated Tactical Network. NW funds development and evaluation of new technology and software integration through a combination of competitively awarded contracts. Various existing follow on procurement contracts are utilized to procure a combination of COTs and GOTs NW equipment to include supporting services. NW program completed LRIP/MS C in 2012 followed by two LRIP decisions in 2013-14 in preparation for IOT&E under DOT&E oversight in 4QFY14- 1QFY15. This IOT&E event led to an additional NW Low Rate Initial Production (LRIP) decision in 2015 and a Full Rate Production Decision in FY17. Now in production, NW aggressively seeks operational feedback and, using the DevOps process, identifies and implements capability improvements.

E. Performance Metrics

N/A

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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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				EQ8 / Mobile/Handheld Computing Environment (M/HHCE)							
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 & Program Management Support	Various	Various : Various	2.405	2.251		1.727		1.411		-		1.411	Continuing	Continuing	-
Subtotal			2.405	2.251		1.727		1.411		-		1.411	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
Hardware/Software Integration & Evaluation	Various	Various : Various	4.323	3.496		3.578		1.924		-		1.924	Continuing	Continuing	-
Soldier Borne Sensor	MIPR	Various : Various	7.500	0.772		1.752		-		-		-	0.000	10.024	-
Subtotal			11.823	4.268		5.330		1.924		-		1.924	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
Software Development and Integration	Various	Various : Various	1.333	2.744		1.002		0.513		-		0.513	Continuing	Continuing	-
FY2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.347		-		-		-	0.000	0.347	-
Subtotal			1.333	2.744		1.349		0.513		-		0.513	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
Various Testing Organizations	Various	Various : Various	2.119	2.139		1.071		1.009		-		1.009	Continuing	Continuing	-
Subtotal			2.119	2.139		1.071		1.009		-		1.009	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army							Date: March 2019				
Appropriation/Budget Activity 2040 / 5			R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)				
	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals	17.680	11.402	9.477	4.857	-	4.857	Continuing	Continuing	N/A		

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)

Event Name	FY 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
Robotics and Mobile Sensor Integration FY18	█																											
Software Update Integration FY18		█																										
New Hardware capability testing (environmental/CRBRNE intelligence) FY18			█																									
PFED Inc 2 integration and evaluation FY18			█	█																								
TCAPS integration FY18			█	█																								
TCAPS Integration FY18			█																									
New EUD test and evaluation + LTE (DT) FY18				█																								
Robotics and Mobile Sensor Testing FY18				█																								
Mobile Hand Held Compliance Testing FY18				█																								
New EUD test and evaluation + LTE (OT) FY19						█																						
DARPA Squad X transition Phase 1 FY19						█	█																					
Mech Unit with Nett Warrior DT FY19							█																					
Software Update Testing (CS-18/19) FY19							█	█																				

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)

Event Name	FY 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
New Hardware capability testing (environmental/CRBRNE intelligence) FY19					■																							
Robotics and Mobile Sensor Integration FY19					■																							
TCAPS Integration FY19					■																							
Mobile Hand Held Compliance Testing (FY19)					■																							
Robotics and Mobile Sensor Testing FY19					■																							
TCAPS integration FY19					■																							
New EUD test and evaluation + LTE (DT) FY20													■															
DARPA Squad X transition Phase 2 FY20													■															
New Hardware capability testing (environmental/CRBRNE intelligence) FY20													■															
Mobile Hand Held Compliance Testing (FY20)																	■											
Mech Unit with Nett Warrior DT FY20													■															
Robotics and Mobile Sensor Testing FY20																	■											
Software Update Integration FY20													■															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)	

Event Name	FY 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								
Robotics and Mobile Sensor Integration FY20																																				
TCAPS integration FY20																																				
TCAPS Integration FY20																																				
DARPA Squad X transition formal Testing FY21																																				
Robotics and Mobile Sensor Testing FY21																																				
New EUD test and evaluation + LTE (OT) FY21																																				
New Hardware capability testing (environmental/CRBRNE intelligence) FY21																																				
Software Update Testing (CS-18/19) FY21																																				
Mobile Hand Held Compliance Testing (FY21)																																				
Mech Unit with Nett Warrior OT FY21																																				
DARPA Squad X transition Phase 2 FY21																																				
Software Update Integration FY21																																				
Mobile Hand Held Compliance Testing (FY22)																																				

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)	

Event Name	FY 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 Update Integration FY22																													■																											
Mobile Hand Held Compliance Testing (FY23)																													■				■				■				■				■				■							
Software Update Integration FY23																													■				■				■				■				■				■				■			
New EUD Test and evaluation																													■				■				■				■				■				■				■			
Mobile Hand Held Compliance Testing																													■				■				■				■				■				■				■			
Software Update Integrations (FY24)																													■				■				■				■				■				■				■			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
New EUD test and evaluation + LTE (DT) FY17	1	2017	1	2017
PFED Inc 2 integration and evaluation FY17	2	2017	4	2017
New Hardware capability testing (environmental/CRBRNE intelligence) FY17	3	2017	3	2017
New EUD test and evaluation + LTE (OT) FY17	3	2017	3	2017
Software Update Testing (CS-18/19) FY17	3	2017	3	2017
Mobile Hand Held Compliance Testing (FY17)	3	2017	4	2017
Robotics and Mobile Sensor Integration FY18	1	2018	2	2018
Software Update Integration FY18	2	2018	2	2018
New Hardware capability testing (environmental/CRBRNE intelligence) FY18	3	2018	3	2018
PFED Inc 2 integration and evaluation FY18	3	2018	4	2018
TCAPS integration FY18	3	2018	4	2018
TCAPS Integration FY18	3	2018	3	2018
New EUD test and evaluation + LTE (DT) FY18	3	2018	4	2018
Robotics and Mobile Sensor Testing FY18	4	2018	4	2018
Mobile Hand Held Compliance Testing FY18	4	2018	4	2018
New EUD test and evaluation + LTE (OT) FY19	1	2019	2	2019
DARPA Squad X transition Phase 1 FY19	1	2019	4	2019
Mech Unit with Nett Warrior DT FY19	2	2019	2	2019
Software Update Testing (CS-18/19) FY19	2	2019	3	2019
New Hardware capability testing (environmental/CRBRNE intelligence) FY19	3	2019	3	2019
Robotics and Mobile Sensor Integration FY19	3	2019	3	2019
TCAPS Integration FY19	4	2019	4	2019

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)
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Events	Start		End	
	Quarter	Year	Quarter	Year
Mobile Hand Held Compliance Testing (FY19)	4	2019	4	2019
Robotics and Mobile Sensor Testing FY19	4	2019	4	2019
TCAPS integration FY19	4	2019	4	2019
New EUD test and evaluation + LTE (DT) FY20	1	2020	1	2020
DARPA Squad X transition Phase 2 FY20	1	2020	4	2020
New Hardware capability testing (environmental/CRBRNE intelligence) FY20	2	2020	3	2020
Mobile Hand Held Compliance Testing (FY20)	4	2020	4	2020
Mech Unit with Nett Warrior DT FY20	2	2020	2	2020
Robotics and Mobile Sensor Testing FY20	4	2020	4	2020
Software Update Integration FY20	2	2020	2	2020
Robotics and Mobile Sensor Integration FY20	3	2020	4	2020
TCAPS integration FY20	3	2020	3	2020
TCAPS Integration FY20	3	2020	3	2020
DARPA Squad X transition formal Testing FY21	1	2021	4	2021
Robotics and Mobile Sensor Testing FY21	1	2021	3	2021
New EUD test and evaluation + LTE (OT) FY21	2	2021	3	2021
New Hardware capability testing (environmental/CRBRNE intelligence) FY21	2	2021	3	2021
Software Update Testing (CS-18/19) FY21	2	2021	3	2021
Mobile Hand Held Compliance Testing (FY21)	4	2021	4	2021
Mech Unit with Nett Warrior OT FY21	3	2021	3	2021
DARPA Squad X transition Phase 2 FY21	2	2021	3	2021
Software Update Integration FY21	4	2021	4	2021
Mobile Hand Held Compliance Testing (FY22)	3	2022	3	2022
Software Update Integration FY22	4	2022	4	2022
Mobile Hand Held Compliance Testing (FY23)	3	2022	3	2023

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EQ8 / Mobile/Handheld Computing Environment (M/HHCE)
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Events	Start		End	
	Quarter	Year	Quarter	Year
Software Update Integration FY23	4	2022	4	2023
New EUD Test and evaluation	1	2024	2	2024
Mobile Hand Held Compliance Testing	3	2024	3	2024
Software Update Integrations (FY24)	3	2024	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) ER9 / Expeditionary Army Command Post			
COST (\$ in Millions)	Prior Years	FY 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
ER9: Expeditionary Army Command Post	-	9.601	34.642	35.505	-	35.505	33.493	23.246	20.107	10.007	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Expeditionary Army Command Post funding line supports the Army Network Modernization Strategy Line of Effort 4: Command Post

The Command Post initiative is to implement capabilities that enable the Army to employ command posts across the operational spectrum, from early entry to major combat operations, and that resolve current issues with set up and tear down, survivability, mobility, suitability and footprint. This Line of Effort (LOE) will focus on developing and obtaining approval of requirements for integrated command posts, then delivering these integrated command post designs to Army units.

The CPI2 program addresses the requirements for more mobile, scalable, interoperable, and agile command posts. Current stationary command posts are deemed too large and take too long to setup and teardown making them vulnerable to near peer detection and targeting technologies. By integrating mission command warfighting functions on to formation appropriate vehicle platforms, a dispersed command post construct will enable the battle staff to blend in with the overall maneuver formation while giving the commander the ability to synchronize the close fight on the move. This dispersed mobile command post consists of Mission Command Platforms (MCPs) and Command Post Support Vehicles (CPSVs). The MCP is a formation appropriate vehicle that provides digital workstations for all mission command warfighting functions. The CPSV is the hub of the dispersed command post; it hosts mission command servers, radios, local area network components and a secure wireless capability.

The CPI2 Materiel Development Decision Acquisition Decision Memorandum was signed on 21 June 2018 and directs CPI2 to be executed in a two increment approach. Increment 1 will develop capabilities to address needs identified in the signed Command Post (CP) Directed Requirement (DR) while Increment 2 will execute requirements as identified in the emerging CPI2 Capability Development Document (CDD). Using the buy, try, assess, and decide improved acquisition model which leverages user experimentation to inform follow on program requirements, Increment 1 will prototype and integrate available commercial off the shelf and government programs of record (PORs) that provide mission command and communications functions within the command post. Subsequently, CPI2 will initiate Increment 2 based on an emerging CDD to replace legacy command post systems at Corps, Division, Brigade Combat Teams (BCT) and their subordinate Battalion formations.

FY20 funding provides for the design engineering, prototype manufacturing, and integration efforts for BCTs, with a government solution for First Unit Equipped and an industry solution for the following BCTs. FY20 funding also delivers an experimental Mobile Command Group formation to 1 Corps/Division. Funding includes obtaining the required MCP/CPSV vehicle platforms and Command Post infrastructure systems. In FY20, CPI2 will conduct several training and test events that will provide user assessments on all experimental solutions to inform future design updates and program requirements.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Product Development</p> <p>Description: Includes the costs for design/integration/fabrication and prototyping efforts to address capability gaps identified in current Army command post formations. Costs include ancillary items and platform requirements.</p> <p>FY 2019 Plans: Product Development supports Phase 2 of the Command Post Directed Requirement for acquiring select platforms and ancillary items for System Design, Prototyping, Platform Integration, Assembly for Mission Command Platform (MCP) and Command Post Support Vehicle (CPSV) for 2 Brigade Combat Teams (BCT's). This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2020 Base Plans: Product Development continues efforts initiated in FY19 for System Design, Development Engineering and Platform Integration/Assembly to achieve delivery of Brigade Combat Teams (BCT's) in FY20. Product Development also delivers an experimental Mobile Command Group formation to 1 Corps/Division. Includes engineering and prototyping fixes following user assessments to inform the future CPI2 solutions. This efforts funding will be executed by Program Executive Office Command, Control, Communications Tactical.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Government furnished equipment procured in FY19 was one time purchase.</p>	9.601	29.852	25.705	-	25.705
<p>Title: Systems Test and Evaluation</p> <p>Description: Costs required for test activities to inform CPI2 solution set.</p> <p>FY 2020 Base Plans: Includes costs for test events in FY20 for Developmental test (DT), Operational Assessment (OA) and Early User Tests (EUT) to obtain user feedback from selected units to inform future manufacturing/prototyping designs. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Test events not conducted in prior year.</p>	-	-	4.000	-	4.000
<p>Title: Program Office Management</p>	-	3.200	3.300	-	3.300

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: Contractor/Matrix Labor support and program travel.</p> <p>FY 2019 Plans: Contract and Matrix personnel to support CPI2 in achieving mission requirements to include managing simultaneous design/prototyping efforts being pursued by both government and industry with goal of delivery 2 Brigade Combat Teams (BCT) in FY20. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2020 Base Plans: Contract and Matrix personnel to support CPI2 in achieving mission requirements to include managing multiple design/prototyping efforts, test events and training. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Delta is driven by inflation.</p>					
<p>Title: Support Costs</p> <p>Description: Program costs for training and development of data packages.</p> <p>FY 2020 Base Plans: Supports development of data packages and New Equipment Training (NET) for planned fielding's in FY20. This efforts funding will be executed by Program Executive Office Command, Control, Communications - Tactical.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Costs tied to fielding solutions with 2 BCT not delivered in prior year.</p>	-	-	2.500	-	2.500
<p>Title: FY19 SBIR / STTR Transfer</p> <p>FY 2019 Plans: FY19 SBIR / STTR Transfer</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY19 SBIR / STTR Transfer</p>	-	1.590	-	-	-
Accomplishments/Planned Programs Subtotals	9.601	34.642	35.505	-	35.505

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post
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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
• B29801: CPI2	-	2.855	0.000	-	0.000	50.000	50.000	50.000	50.000	Continuing	Continuing

Remarks

D. Acquisition Strategy

CPI2 Increment 1 will work with the government and with industry to capitalize on their experiences with mobile Command Posts to perform risk reduction events on experimental solutions for the Command Post Support Vehicle and Mission Command Platform as outlined in the Command Post Directed Requirement (DR).

CPI2 will develop the first BCT set through experimentation conducted at Research, Development, Engineering, Command (RDECOM) via a Functional Support Agreement (FSA) for the First Unit Equipped (FUE) for BCT #1. Additionally, CPI2 will leverage industry advancements and innovation using full and open competition with the C5SIR Other Transaction Authority (OTA) to design and prototype the MCP/CPSV for the second BCT set. Finally, CPI2 will deliver an experimental Mobile Command Group formation to 1 Corps/Division. FY20 will culminate with test events on all prototype designs, leading to a Milestone C in FY21 to select the Command Post (CP) solution set for fielding the remaining 3 BCTs and 1 Corps/Division identified in the CP DR.

The CPI2 Capability Development Document (CDD) is projected to re-enter JCIDS staffing in FY19, which will specify the requirements for the CPI2 Increment 2. Increment 2 will execute a competitive contract award planned based on Request For Proposal (RFP) responses and source selection process. This contract is projected to be a 5 year Firm Fixed Priced/Cost Plus Fixed Fee (FFP/CPFF) contract for the design, engineering, prototyping, Developmental Test (DT), New Equipment Training (NET), one Limited User Test (LUT), and one Operational Test (OT) which will encompass CPI2 variants at Corps, Division, and Brigade and Battalion echelons with Option Years for production.

Where needed, CPI2 will leverage existing contracts managed by Project Manager (PM) Joint Light Tactical Vehicle (JLTV), Project Manager (PM) Armored Multi-Purpose Vehicle (AMPV) and Project Manager (PM) Stryker Brigade Combat Team (SBCT) for integration efforts associated with their respective platforms.

E. Performance Metrics

N/A

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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 / 5				PE 0604818A / Army Tactical Command & Control Hardware & Software				ER9 / Expeditionary Army Command Post							
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	WR	Various : Aberdeen Proving Ground MD	-	0.108		3.200	Oct 2018	3.300	Oct 2019	-		3.300	Continuing	Continuing	Continuing
Subtotal			-	0.108		3.200		3.300		-		3.300	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
ISO Containers	C/IDIQ	BERG : TBD	-	9.493	Jul 2018	-		-		-		-	0.000	9.493	-
BCT 1 Design/Fabrication/Integration	MIPR	CERDEC-PIF : Aberdeen Proving Ground, MD	-	-		8.852	Feb 2019	10.300	Oct 2019	-		10.300	Continuing	Continuing	-
BCT 2 Design/Fabrication/Integration	C/FFP	TBD : TBD	-	-		9.500	Jun 2019	14.905	Oct 2019	-		14.905	Continuing	Continuing	-
Platforms	MIPR	PD Medium Tactical Vehicles : Warren, Michigan	-	-		7.000	Feb 2019	-		-		-	0.000	7.000	-
Ancillary Items	MIPR	Various : Various	-	-		4.000	Feb 2019	-		-		-	0.000	4.000	-
MCG Experimentation	MIPR	TBD : TBD	-	-		0.500	Mar 2019	0.500	Oct 2019	-		0.500	0.000	1.000	-
FY19 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.590		-		-		-	0.000	1.590	-
Subtotal			-	9.493		31.442		25.705		-		25.705	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
Tech Manuals/ Training Development Packages,ECPs	TBD	TBD : TBD	-	-		-		2.500	Oct 2019	-		2.500	Continuing	Continuing	-
Subtotal			-	-		-		2.500		-		2.500	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army											Date: March 2019				
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604818A / <i>Army Tactical Command & Control Hardware & Software</i>					Project (Number/Name) ER9 / <i>Expeditionary Army Command Post</i>				

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			
Systems Test and Evaluation	MIPR	ATEC/TCM MC : Various	-	-		-		4.000	Mar 2020	-		4.000	0.000	4.000	-
Subtotal			-	-		-		4.000		-		4.000	0.000	4.000	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			-	9.601	34.642	35.505	-	35.505	Continuing	Continuing	N/A				

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

Event Name	FY 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
Directed Requirement Signed	1 DR Signed																											
CPI2 MDD			2 CPI2 MDD																									
INC 1 Product Development (BCT 1)																												
INC 1: Dev Test (BCT 1)																												
INC 1 New Equipment Training (FUE)																												
INC1 Early User Test (FUE)																												
INC 1 Product Development (BCT 2) OTA																												
INC 1: Dev Test (BCT 2)																												
INC 1 New Equipment Training (BCT 2)																												
INC 1: Early User Test (BCT 2)																												
INC1: MCG Experimentation																												
INC 1: MCG New Equipment Training																												
INC 1: MCG Operational Assessment																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

Event Name	FY 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					
INC 1 Conditional Materiel Release																	3 ▲ INC 1: CMR																
INC 1: Milestone C																	4 ▲ CPI2 MS C																
INC 1 OTA BCT 3-5, 1-2																	■ INC 1: OTA BCT 3-5, 1-2																
INC 1: BCT 3 Fielding																	■ INC1: BCT 3																
INC 1: BCT 4 Fielding																	■ INC1: BCT 4																
INC 1: BCT 5 Fielding																	■ INC 1: BCT 5																
INC 1: Retrofit BCT 1																	■ INC 1: Retrofit BCT 1																
INC 1: Retrofit BCT 2																	■ INC 1: Retrofit BCT 2																
INC 2 CDD																	■ INC 2: CPI2 CDD																
INC 2 DEV/TEST/FRP Option																	■ INC 2: LRIP with FRP Options (Contract)																
INC 2 Limited User Test																	■ INC 2: CPI2 LUT																
INC 2 Operational Test and Evaluation																	■ INC 2: CPI2																
INC 2 FRP																	5 ▲ INC 2:																

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Directed Requirement Signed	1	2018	1	2018
CPI2 MDD	3	2018	3	2018
INC 1 Product Development (BCT 1)	2	2019	1	2021
INC 1: Dev Test (BCT 1)	2	2020	2	2020
INC 1 New Equipment Training (FUE)	3	2020	3	2020
INC1 Early User Test (FUE)	4	2020	4	2020
INC 1 Product Development (BCT 2) OTA	3	2019	1	2021
INC 1: Dev Test (BCT 2)	3	2020	3	2020
INC 1 New Equipment Training (BCT 2)	4	2020	4	2020
INC 1: Early User Test (BCT 2)	4	2020	4	2020
INC1: MCG Experimentation	2	2019	1	2021
INC 1: MCG New Equipment Training	3	2020	4	2020
INC 1: MCG Operational Assessment	4	2020	1	2021
INC 1 Conditional Materiel Release	4	2020	4	2020
INC 1: Milestone C	1	2021	1	2021
INC 1 OTA BCT 3-5, 1-2	2	2021	2	2023
INC 1: BCT 3 Fielding	4	2021	4	2021
INC 1: BCT 4 Fielding	2	2022	2	2022
INC 1: BCT 5 Fielding	3	2022	3	2022
INC 1: Retrofit BCT 1	1	2023	1	2023
INC 1: Retrofit BCT 2	2	2023	2	2023
INC 2 CDD	1	2021	4	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) ER9 / Expeditionary Army Command Post

Events	Start		End	
	Quarter	Year	Quarter	Year
INC 2 DEV/TEST/FRP Option	1	2023	1	2028
INC 2 Limited User Test	1	2024	1	2024
INC 2 Operational Test and Evaluation	3	2024	3	2024
INC 2 FRP	4	2024	4	2024

Note
INC 2 Events assume approval of CPI2 CDD.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development			
COST (\$ in Millions)	Prior Years	FY 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
EW3: Unit Task Reorganization (UTR) Development	-	13.412	18.812	27.539	-	27.539	26.821	24.333	17.517	13.823	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project EW3, Unit Task Reorganization (UTR), supports the Army's Network Modernization Strategy LOE 1, Unified Network. The UTR effort introduces a common set of network operations tools and infrastructure that enable Standards Based Architecture, Converged Networks, and an Integrated Computing Infrastructure supporting the S6 and staff's ability to conduct Network Management, Network Planning, and Network Re-Establishment.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Network Management	3.340	6.526	9.300	-	9.300
Description: UTR is introducing improvements to the way the network is managed, reducing stovepiped management systems and replacing them with integrated tools that provide a consolidated, as well as detailed, view of the network and its components.					
FY 2019 Plans:					
- Support for Peer to Peer (P2P) development, enterprise Over-the-Air Management (eOTAM) oversight, Application Program Interface (API) development and test support					
- Development of eOTAM code for data reduction, security updates, and radio reporting					
- Support for ODIN app development on Common Operating Environment (COE) v3 and CERDEC support for testing and potential ramp off.					
FY 2020 Base Plans:					
- Continue P2P development, eOTAM oversight, API development and test support					
- Continue development of eOTAM code for data reduction, security updates, and radio reporting					
- Continue support for On Demand Information Network (ODIN) application development on COE v3 and CERDEC support for testing and potential ramp off.					
FY 2019 to FY 2020 Increase/Decrease Statement:					
FY20 funding has increased for Network Management by \$2.774M due to allocation of funds towards eOTAM and ODIN software development and code upgrades as well as support to test efforts.					
Title: Network Planning	1.565	0.667	0.667	-	0.667

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Description: UTR is supporting the development of integrated planning tool suite that will improve the ability of Signal Soldiers to plan and develop configurations for upcoming operations and deployments. These tools will provide a holistic planning capability for Converged Networks and Computing Infrastructure incorporating data exchanges between the mission command tools and the network planning tools.</p> <p>FY 2019 Plans: Efforts to provide Crypto Planning interface and analysis of mission threads to create workflow charts for UTR automation using Rapid Provisioning System (RPS) and other tactical capabilities.</p> <p>FY 2020 Base Plans: Development of analytic and planning tools that support Signal Planning in coordination with Mission Command Systems and Applications.</p>					
<p>Title: Network Re-Establishment</p> <p>Description: UTR is implementing tools and technology to reduce the amount of time and troops required to provision network devices with configurations developed during the planning process. Providing a means to deliver configurations without requiring a manual involvement by the Soldier, UTR is leveraging Over the Network (OTN) and Over the Air (OTA) methods to query, load, activate, and monitor network devices.</p> <p>FY 2019 Plans: Complete automated provisioning and patching components of RPS to include User Interface (UI), complete integration efforts for Tactical Server Infrastructure (TSI)v2 Small and TSIv2 Large, complete API documentation and sample code to allow the integration of other hardware and software platforms into the RPS framework.</p> <p>Modularize embedded device code; Analyze mission threads; Deployment of Master Configuration Management Data Base (CMDB) hardware and software (Intra); Deployment of Master CMDB hardware and software (Licensing); Create single UI (UTR Admin); Create single UI (Admin UI); Enable data replication (Data Replication Enhancements); Implement logging and alerting (Tasking); Implement logging and alerting (Logging/Alerting); Implement logging and alerting (Enhance Configuration Management (CM)); Enable data replication (Sync Service Enhancements); Maintain security compliance (Extend RPS API); Maintain security compliance (UTR RPS API)</p> <p>FY 2020 Base Plans:</p>	4.950	5.651	12.209	-	12.209

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development			
B. Accomplishments/Planned Programs (\$ in Millions)					
Continued development of provisioning systems to increase Over the Network and Over the Air capabilities as well as Direct Connection devices that automate provisioning, patching, and updating.					
FY 2019 to FY 2020 Increase/Decrease Statement: FY20 funding has increased by \$5.157 million to account for the additional of security compliance functions in extension of Rapid Provisioning System Application Program Interfaces.					
Title: Infrastructure					
Description: UTR is supporting the development of various elements to facilitate the S6 and staff's ability to execute wartime functions. Developing data models, interface standards, and data repositories that are integrated with the tools and systems that comprise the network.					
FY 2019 Plans: Data model development, architecture and data analysis associated with Federated Data Repository, implementation of Identity Store Orchestration Tool, Modularization of embedded device code, deployment of Master CMDB software					
FY 2020 Base Plans: Continue development of network components that support centralized data, security, and information exchanges, enabling Signal Soldier activities.					
FY 2019 to FY 2020 Increase/Decrease Statement: Increase from FY19 to FY20 funding in the amount of .188K is primarily driven by escalation on continuing efforts.					
Title: System of Systems Engineering and Portfolio Management					
Description: Systems engineering and program management support to include development and maintenance of the NetOps architecture, Systems Engineering Plan, Risk Management Plan, Rapid Prototyping, IPT Management, Requirements Engineering, Integrated Master Schedule, and budget formulation and execution.					
FY 2019 Plans: Continue Systems of Systems Engineering and program management across NetOps portfolio including establishing Architecture and updates of portfolio Management Plan, Risk Management Plan, Rapid Prototyping,					
	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
	2.345	3.664	3.852	-	3.852
	1.212	1.615	1.511	-	1.511

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>IPT/Working Group Management, Requirements Engineering, synchronization of efforts to Integrated Master Schedule.</p> <p>FY 2020 Base Plans: Continue Systems of Systems Engineering and program management across NetOps portfolio including establishing Architecture and updates of portfolio Management Plan, Risk Management Plan, Rapid Prototyping, IPT/Working Group Management, Requirements Engineering, synchronization of efforts in Integrated Master Schedule.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY20 funding has decreased by \$.104M to account for adjustments to contractor level of support.</p>					
<p>Title: SBIR/STTR/FFRDC</p> <p>FY 2019 Plans: FY19 HQDA taxes for Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY19 reflects includes 689K of SBIR/STTR tax amounts not currently identified for FY20.</p>	-	0.689	-	-	-
Accomplishments/Planned Programs Subtotals	13.412	18.812	27.539	-	27.539

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

Remarks

D. Acquisition Strategy
Unit Task Reorganization (UTR) is the process performed by the S6 and their staff to affect change on the network in order to support the operational mission and dynamic nature of the Army. Currently network challenges exist during this process with regard to: maintaining accurate and up to date information, distributing configuration files and activating / re-establishing the network. UTR strives to make authoritative NETOPS available across all systems, reduce cognitive burden for soldiers to plan and manage the network and reduce manual touch labor.

E. Performance Metrics
N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development
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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			
Network Management	C/CPFF	BAH / GS00Q09BGD0019 : APG, MD	0.356	-		0.500	Oct 2018	0.620		-		0.620	Continuing	Continuing	Continuing
Network Management	MIPR	Matrix Organizations : APG MD	-	-		0.500		1.000		-		1.000	Continuing	Continuing	Continuing
Network Management	TBD	TBD : APG, MD	-	-		-		0.400	Nov 2019	-		0.400	Continuing	Continuing	Continuing
Network Management	Various	Harris : APG, MD	0.335	1.000		3.075	Oct 2018	4.100	Oct 2019	-		4.100	Continuing	Continuing	Continuing
Network Management	FFRDC	MITRE : APG, MD	1.200	1.200	Oct 2017	2.400	Oct 2018	3.130		-		3.130	Continuing	Continuing	Continuing
Network Management	Allot	PM TR : APG, MD	0.009	-		0.050		0.050		-		0.050	Continuing	Continuing	Continuing
Network Management	C/CPFF	WSEC (SAIC) W31P4Q-15-A-0024 : APG, MD	0.966	1.140		-		-		-		-	0.000	2.106	-
Network Planning	C/CPFF	ARL/AEWD W911NF-15-D-0008 Task Order 0005 : APG, MD	0.367	0.600		-		-		-		-	0.000	0.967	-
Network Planning	TBD	G2 : San Diego	0.442	-		-		-		-		-	0.000	0.442	-
Network Planning	Various	Federal Resources Contract DLA CodeMettle support : APG, MD	0.417	0.390		-		-		-		-	0.000	0.807	-
Network Planning	C/CPFF	SPAWAR T4S Support via NM RIL N68936-16-D-0016 : APG, MD	0.550	0.575		0.667		-		-		-	0.000	1.792	-
Network Planning	Various	JENM OTA : APG	-	-		-		0.667		-		0.667	Continuing	Continuing	Continuing
Network Reestablishment	C/IDIQ	Microsoft HC1028-13-D-0013 : APG MD	3.713	4.950		5.651		10.808		-		10.808	Continuing	Continuing	Continuing
Infrastructure	TBD	GSA BAH/Contract # GS00Q09BGD0019 Order #	0.317	0.038		-		0.258		-		0.258	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software				Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development							
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
		GSQ0015AJ0098 : APG MD													
Infrastructure	C/CPFF	JHU-APL / CPM -16 : APG MD	0.391	-		0.150		0.300		-		0.300	Continuing	Continuing	Continuing
Infrastructure	TBD	RIK-OTA-18-R-NFDR : APG MD	-	2.095		2.514		2.552		-		2.552	Continuing	Continuing	Continuing
Infrastructure	MIPR	SEC Lab - Integration Facility : APG MD	-	-		1.000		1.000		-		1.000	Continuing	Continuing	Continuing
SoS System Engineering	C/CPFF	Bowhead W15P7T-15-D-0010 : APG MD	-	0.250		0.400		0.400		-		0.400	Continuing	Continuing	Continuing
SoS System Engineering	C/CPFF	GSA BAH/Contract # GS00Q09BGD0019, Task Order # GSQ0015AJ0098 : APG MD	-	0.511		0.511		0.511		-		0.511	Continuing	Continuing	Continuing
SoS System Engineering	FFRDC	MITRE A280 : APG MD	-	0.297		0.297		0.297		-		0.297	Continuing	Continuing	Continuing
SoS System Engineering	Various	Various : APG MD	0.946	0.366		0.408		1.446		-		1.446	Continuing	Continuing	Continuing
FY19 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.689		-		-		-	0.000	0.689	-
Subtotal			10.009	13.412		18.812		27.539		-		27.539	Continuing	Continuing	N/A
Project Cost Totals			10.009	13.412		18.812		27.539		-		27.539	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development

Event Name	FY 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
Network Management																												
ODIN S/W Development																												
ODIN v1/x																												
ODIN v2.0																												
eOTAM S/W Development OTA mgmt config																												
SHOGUN/eOTAM v1.2 integration/delivery																												
SHOGUN/eOTAM v1.3 integration/delivery																												
eOTAM 2.0																												
Network Planning																												
JENM 3.4																												
INP-P/INPS																												
Network Re-establishment																												
Provision Network Devices (RPS)																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development	

Event Name	FY 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	
RPS 2.1	▲2																												
RPS 2.2			▲5																										
RPS 2.3							▲7																						
RPS 2.4											▲8																		
RPS 2.5												▲9																	
RPS 2.6															▲10														
RPS 2.7																▲11													
RPS 2.9																				▲12									
RPS 3.0																							▲13						
Implement pword manager (Active Directory)	▲3																												
Establish IdAM framework		■																											
Synchronized Service						■																							
SNE testing							▲6																						

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development

Event Name	FY 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
Master RPS/CMDB node	█				█				█				█				█				█							
Create single UI	█				█				█				█				█				█							
Modify CDN	█				█				█				█				█				█							
Implement logging and alerting	█				█				█				█				█				█							
Device APIs security compliance	█				█				█				█				█				█							
Network Infrastructure	█				█				█				█				█				█							
Federated Data Repository	█				█				█				█				█				█							
FDR Data Management	█				█				█				█				█				█							
FDR Data Federation/Synchronization	█				█				█				█				█				█							
FDR Data Mapping/Exchange and Implementation	█				█				█				█				█				█							
Integrate External Systems	█				█				█				█				█				█							
Live Test & Demonstration	█				█				█				█				█				█							
Data Model	█				█				█				█				█				█							

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software		Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development	

Event Name	FY 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 Engineering and Program Management																																																				
Cross Platform Engineering																																																				
Unit Engagement																																																				

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Network Management	1	2018	4	2024
ODIN S/W Development	1	2018	1	2023
ODIN v1/x	1	2018	1	2018
ODIN v2.0	4	2020	1	2023
eOTAM S/W Development OTA mgmt config	4	2018	4	2024
SHOGUN/eOTAM v1.2 integration/delivery	3	2019	3	2019
SHOGUN/eOTAM v1.3 integration/delivery	1	2020	1	2020
eOTAM 2.0	4	2023	4	2023
Network Planning	1	2018	1	2024
JENM 3.4	3	2018	3	2018
INP-P/INPS	1	2019	1	2024
Network Re-establishment	1	2017	2	2024
Provision Network Devices (RPS)	1	2018	1	2023
RPS 2.1	1	2018	1	2018
RPS 2.2	3	2018	3	2018
RPS 2.3	2	2019	2	2019
RPS 2.4	1	2020	1	2020
RPS 2.5	3	2020	3	2020
RPS 2.6	1	2021	1	2021
RPS 2.7	3	2021	3	2021
RPS 2.9	1	2022	1	2022
RPS 3.0	3	2022	3	2022

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604818A / Army Tactical Command & Control Hardware & Software	Project (Number/Name) EW3 / Unit Task Reorganization (UTR) Development
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Events	Start		End	
	Quarter	Year	Quarter	Year
Implement pword manager (Active Directory)	1	2018	1	2018
Establish IdAM framework	2	2018	3	2023
Synchronized Service	2	2019	4	2020
SNE testing	1	2019	1	2019
Master RPS/CMDB node	2	2018	1	2024
Create single UI	1	2018	3	2022
Modify CDN	2	2020	1	2023
Implement logging and alerting	1	2020	3	2020
Device APIs security compliance	3	2021	3	2021
Network Infrastructure	3	2018	2	2024
Federated Data Repository	1	2018	2	2024
FDR Data Management	3	2018	2	2023
FDR Data Federation/Synchronization	3	2018	2	2021
FDR Data Mapping/Exchange and Implementation	4	2018	4	2022
Integrate External Systems	1	2019	4	2021
Live Test & Demonstration	2	2019	2	2024
Data Model	1	2018	4	2020
Systems Engineering and Program Management	1	2018	4	2024
Cross Platform Engineering	1	2019	2	2019
Unit Engagement	1	2018	4	2024

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>
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COST (\$ in Millions)	Prior Years	FY 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	-	31.651	39.289	105.243	-	105.243	103.427	105.394	65.574	69.407	0.000	519.985
E10: <i>Sentinel</i>	-	31.651	39.289	105.243	-	105.243	103.427	105.394	65.574	69.407	0.000	519.985

A. Mission Description and Budget Item Justification

This system is a component of the overall Air and Missile Defense (AMD) architecture and will provide for an incrementally fielded Integrated Air and Missile Defense Fire Control System/capability for the composite Army Air and Missile Defense Brigades. The Sentinel system is a key component of the Army Integrated Air and Missile Defense (AIAMD) architecture and provides critical air surveillance of the forward areas.

Sentinel (AN/MPQ-64A3) consists of a radar-based sensor with its prime mover/power, Identification Friend or Foe (IFF), and Forward Area Air Defense (FAAD) Command, Control and Intelligence (C2I) interfaces. The radar is deployed in both an air defense role and a force protection role for Counter-Rocket, Artillery, and Mortar (C-RAM) missions. The sensor is an advanced three-dimensional battlefield X-Band air defense phased-array radar with an instrumented range of 75 kilometers. Sentinel is capable of operating day or night, in adverse weather conditions, in the battlefield environments of dust, smoke, aerosols and enemy countermeasures. It provides 360-degree azimuth coverage for acquisition tracking. Sentinel contributes to the digital battlefield by automatically detecting, classifying, identifying and reporting targets (cruise missiles, unmanned aircraft systems, rotary wing and fixed wing aircraft). Sentinel acquires targets sufficiently forward of the battle area to allow weapons reaction time and engagement at optimum ranges. Sentinel's integrated IFF reduces the potential for fratricide of US and Coalition aircraft.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	32.968	39.338	91.534	-	91.534
Current President's Budget	31.651	39.289	105.243	-	105.243
Total Adjustments	-1.317	-0.049	13.709	-	13.709
• Congressional General Reductions	-0.027	-0.049			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.290	-			
• Adjustments to Budget Years	-	-	13.709	-	13.709

Change Summary Explanation

The increase in overall program funding will support ongoing Sentinel A3 modifications and the Sentinel Active Electronically Scanned Array (AESA) (Sentinel A4) contract award for Engineering and Manufacturing Development (EMD). FY 2020 increase of \$13.709 million addresses upgrades to the Sentinel Counter

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

Appropriation/Budget Activity
2040: *Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)*

R-1 Program Element (Number/Name)
PE 0604820A / *Radar Development*

Rocket, Artillery and Mortar (C-RAM) capability as well as the Resiliency and Software Assurance Modification (RSAM) upgrade to incorporate software messaging to counter emerging threats.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>				Project (Number/Name) E10 / <i>Sentinel</i>			
COST (\$ in Millions)	Prior Years	FY 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
E10: <i>Sentinel</i>	-	31.651	39.289	105.243	-	105.243	103.427	105.394	65.574	69.407	0.000	519.985
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Mission & System Description:

This system is a component of the overall Air and Missile Defense (AMD) architecture and will provide for an incrementally fielded Integrated Air and Missile Defense Fire Control System/capability for the composite Army Air and Missile Defense Brigades. The Sentinel system is a key component of the Army Integrated Air and Missile Defense (AIAMD) architecture and provides critical air surveillance of the forward areas.

Sentinel (AN/MPQ-64A3) consists of a radar-based sensor with its prime mover/power, Identification Friend or Foe (IFF), and Forward Area Air Defense (FAAD) Command, Control and Intelligence (C2I) interfaces. The radar is deployed in both an air defense role and a force protection role for Counter-Rocket, Artillery, and Mortar (C-RAM) missions. The sensor is an advanced three-dimensional battlefield X-Band air defense phased-array radar with an instrumented range of 75 kilometers. Sentinel is capable of operating day or night, in adverse weather conditions, in the battlefield environments of dust, smoke, aerosols and enemy countermeasures. It provides 360-degree azimuth coverage for acquisition tracking. Sentinel contributes to the digital battlefield by automatically detecting, classifying, identifying and reporting targets (cruise missiles, unmanned aircraft systems, rotary wing and fixed wing aircraft). Sentinel acquires targets sufficiently forward of the battle area to allow weapons reaction time and engagement at optimum ranges. Sentinel's integrated IFF reduces the potential for fratricide of US and Coalition aircraft.

The Research and Development funding supports Sentinel modernization/upgrades, hardware/software issue resolution, resolution of obsolescence issues, engineering studies, and cost reduction initiatives. The funding for Fiscal Year (FY) 2018 through FY 2024 development activities addresses the following Sentinel system capability gaps and obsolescence issues identified by the User: 1) Target Detection gap; 2) Target Tracking gap; 3) Net Readiness gap; 4) Electronic Counter Measures (ECM) gap; 5) Unmanned Aircraft Systems (UAS) Defense gap; and 5) Rockets, Artillery & Mortars (RAM) gap.

FY 2020 Funds address the following:

Electronic Attack/Electronic Protect (EA/EP) addresses the electronic countermeasures (ECM) gap. This effort continues through the life of the radar, addressing both changing threats and electronic counter measure gaps.

The Active Electronically Scanned Array (AESA) (Sentinel A4) is the next generation of radar technology to replace the current phase and frequency scanned array used by Sentinel today. The AESA Antenna will provide increased capability including extended range for ground-based surveillance and situational awareness, faster and more accurate Non-Cooperative Target Recognition (NCTR) for clearing fires and preventing fratricide, improved Fire Control (FC) quality track accuracy, and management of larger track loads. The AESA will also provide improved operation in severe/urban clutter. The system will detect and track small targets, such as Unmanned Aircraft Systems (UAS) and Cruise Missiles, in clutter and will detect and track slow targets, such as UAS and Rotary Wing (RW) aircraft, at low altitudes

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
<p>in clutter. The system will detect, track, and classify Rocket, Artillery, and Mortar (RAM) threats and will support Integrated Air and Missile Defense Battle Command System (IBCS) requirements and can contribute sensor support for mitigating current and future Indirect Fire Protection Capability Increment 2 mission requirements.</p> <p>Mode S upgrade to existing Sentinel Identification Friend or Foe (IFF) will address Sentinel's objective requirement to interrogate IFF mode S which is currently not being met. Mode S transmissions are a key component of the Automatic Dependent Surveillance-Broadcast (ADS-B) surveillance technology being used by the Federal Aviation Administration for tracking aircraft as part of the Next Generation Air Transportation System (NextGen). In the United States, all aircraft required to have transponders (most aircraft) must transition to Mode S capable units by 2020. Without the Mode S upgrade, Sentinel will have to rely on these aircraft transponders responding to the legacy mode 3/A interrogations. The data available in the Mode S response will be valuable in identifying the aircraft and correlating Sentinel tracks with civil aviation tracks/data and other track data sources. Addresses the M Code Global Positioning System (GPS) capability requirement with the new interrogator.</p> <p>Resiliency and Software Assurance Modification (RSAM) upgrade to counter emerging threats and provide the Operational Commander Assured Position Navigation and Timing capabilities. Sentinel SW will be updated to accept new RSAM messages and provide RSAM status to the Radar operator.</p> <p>Counter Rocket, Artillery & Mortars (C-RAM) capability increase to current Sentinel A3's effectiveness against the Low, Slow, Small (LSS) and RAM threat. This effort develops and implements advanced waveforms and processing to significantly enhance RAM capabilities. These efforts will provide fire control quality data to support RAM interceptors.</p> <p>Additional Development:</p> <p>Signal Data Processor (SDP)/North Finding Module (NFM) addresses the Target Detection, Target Tracking, and Electronic Countermeasures (ECM) capability gaps and funds the mitigation of the SDP and NFM obsolescence issues. SDP cards are estimated to go obsolete every four to six years. Provides for new SDP kit to address obsolescence issues and allow for additional Electronic Protect capability.</p> <p>Medium Bandwidth Waveform upgrade will address latent tracking issues that currently exist with Sentinel in certain applications. This development effort modifies firmware as well as software in the Sentinel radar. This effort will provide better target resolution and more accurate tracking in the slant range coordinate. This improved target resolution and tracking accuracy will provide improved retention of target identification and more robust tracking that addresses the latent tracking issues.</p> <p>Sentinel System of Systems: Software Development in support of a system of systems architecture (IAMD and IFPC Inc 2-I) for a required simulation capability. The simulation capability will add a high fidelity representation of Sentinel to IAMD to allow for optimum engagement management and mission planning. Supports Sentinel Digital Simulation Software (SDS/SENTSIM) development efforts for testing of future capabilities. Includes software development for Low Slow Small in a test fix test environment as well as integration and testing of the IAMD B kit on board the Sentinel FMTV platform.</p>		

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
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Adjunct sensor technology effort will integrate and test a supplemental technology for the Sentinel A3 radar to detect and identify current and emerging threats. Adjunct sensor technology compliments current radar capabilities to improve system performance and reduces adversaries countermeasure abilities by improving system electronic protect capabilities.

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: Funding is provided for the following efforts:</p> <p>FY 2019 Plans: Integrate firmware, software and hardware. Design and build prototype subsystems/components for testing. Complete software code coding and modification of the system search and track logic, clutter mapping, and waveforms. Characterize performance, design & replace firmware, software and hardware. Perform technical assessments, concept studies, cost reduction, risk reduction, threat analysis, and required documentation. Continue analysis of technology, program milestone documentation, development of contract requirement packages and proposal evaluation activities in support of Active Electronically Scanned Array (AESA) technology. Support acquisition and contract activities for Sentinel AESA in preparation for Milestone B and contract award.</p> <p>FY 2020 Base Plans: Will integrate firmware, software and hardware. Design and build prototype subsystems/components for testing. Complete software code coding and modification of the system search and track logic, clutter mapping, and waveforms for Counter Rocket, Artillery, & Mortar (C-RAM) and Counter Unmanned Aircraft System (C-UAS) missions as well as the Resiliency and Software Assurance Modification (RSAM) upgrade effort. Characterize performance, design & replace firmware, software and hardware. Perform technical assessments, concept studies, cost reduction, risk reduction, threat analysis, and required documentation. Continue development of Active Electronically Scanned Array (AESA) technology, conduct design reviews for Sentinel AESA (Sentinel A4), begin procurement of material for Engineering and Manufacturing Development (EMD) assets.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Initiate Counter Rocket, Artillery, & Mortar (C-RAM) improvement capabilities to the Sentinel A3 and continued support for Sentinel AESA (Sentinel A4) Engineering and Manufacturing Development (EMD) efforts. FY 2020 contains the first full year of the EMD Contract for Sentinel AESA A4 as well as the procurement of material for five (5) EMD assets; FY 2019 only contained four (4) months of the EMD contract effort.</p>	26.865	33.114	102.130	-	102.130
<p>Title: Test & Evaluation</p> <p>Description: Funding is provided for the following efforts:</p>	4.786	4.735	3.113	-	3.113

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>FY 2019 Plans: Conduct software qualification test and hardware verification testing, field testing against representative targets. Prepare logistics products and required documentation for materiel release of software and hardware upgrades.</p> <p>FY 2020 Base Plans: Will conduct software qualification test and hardware verification testing, field testing against representative targets. Prepare logistics products and required documentation for materiel release of software and hardware upgrades.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to completion of major hardware upgrade testing for the Sentinel A3 program. Active Electronically Scanned Array (AESA) (Sentinel A4) testing will not commence until a later date.</p>					
<p>Title: FY2019 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>	-	1.440	-	-	-
Accomplishments/Planned Programs Subtotals	31.651	39.289	105.243	-	105.243

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
• EF9: System Integration and Test	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	0.000	565.065
• 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
• 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
• FM3: Future Interceptor	-	-	8.000	-	8.000	8.000	8.000	88.918	120.000	0.000	232.918
• 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
• DU3: IFPC2	10.871	40.979	0.000	-	0.000	-	-	-	-	0.000	51.850
• 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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army									Date: March 2019		
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604820A / Radar Development				Project (Number/Name) E10 / Sentinel			

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	
• C62001: IFPC Inc 2-I Block 1 Missile 1	50.056	145.636	0.000	-	0.000	-	-	-	-	0.000	195.692
• 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
• FI4: Maneuver - Short Range Air Defense (M-SHORAD)	19.201	79.016	33.100	6.000	39.100	105.700	341.100	382.600	308.700	0.000	1,275.417
• C14300: M-SHORAD - Procurement	-	-	0.000	262.100	262.100	537.400	292.200	80.500	78.600	Continuing	Continuing
• 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

Remarks

These programs are an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

D. Acquisition Strategy

Sentinel was procured from Raytheon as a non-developmental item. Raytheon owns the Technical Data Package (TDP) for the Sentinel A3 and its predecessors and therefore no other contractor has the technical ability to modify the Sentinel radar or Sentinel software. The modifications planned for the Sentinel that fall into this category are: Electronic Attack/Electronic Protect, Signal Data Processor/North Finding Module, Medium Bandwidth, and Mode S. For the Active Electronically Scanned Array, the product office will issue a new contract to develop a modified Sentinel with a new Active Electronically Scanned Array (AESA) antenna.

Electronic Attack/Electronic Protect (EA/EP) (Sentinel A3): The Sentinel Product Office will contract with Raytheon to verify the initial EA/EP Database and update the database, software and hardware with more extensive EA/EP signatures to address evolving threats. The updated database will be tested, documented and released for installation.

Signal Data Processor (SDP)/North Finding Module (NFM) Obsolescence (Sentinel A3): The Sentinel Product Office will contract with Raytheon to upgrade and mitigate the Signal Data Processor and North Finding Module issues. The updated SDP and NFM hardware will be tested, documented and released for installation in the field.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
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Medium Bandwidth Waveform (Sentinel A3): The Sentinel Product Office will contract with Raytheon to address latent tracking issues that currently exist with Sentinel in certain applications. The effort modifies firmware as well as software in the Sentinel radar. The updated medium bandwidth waveform software and firmware will be tested, documented and released for installation in the field.

Mode S (Sentinel A3): The Sentinel Product Office will contract with Raytheon to address both Sentinel's objective requirement to interrogate Identification Friend or Foe (IFF) mode S on board commercial aircraft as well as the M Code Global Positioning System (GPS) capability. The updated software will be tested, documented and released for installation in the field.

RSAM (Sentinel A3): The Sentinel Product Office will contract with Raytheon to address Sentinel's Resiliency and Software Assurance Modification (RSAM) requirement by updating Sentinel software to accept and respond to the new RSAM messages. The updated software will be tested, documented and released for installation in the field.

Active Electronically Scanned Array (AESA) (Sentinel A4): The Sentinel Product Office will award a new competitive contract to develop an AESA antenna and other associated radar modifications for integration with the existing Sentinel A3 hardware and software. The CMDS Product Office will support requirement documentation and conduct design analysis to include analysis of technology, decision review preparation, and contract package development for acquisition of the AESA antenna and other radar modifications to upgrade the current Sentinel A3. The software and hardware will be tested, documented and released for installation in the field.

Sentinel System of Systems (Sentinel A3): The Sentinel Product Office will contract with Raytheon for risk reduction efforts in the development of the software package to support the identification and engagement of Low Slow Small target sets. The Sentinel Product Office will work with Other Government Agencies to finalize integration and test of the IAMD B Kit on board the Sentinel platform and to add simulation capability to allow a high fidelity representation of Sentinel to IAMD.

Counter Rocket, Artillery & Mortars (Sentinel A3): The Sentinel Product Office will contract with Raytheon for software development to add increased capabilities against the Low Slow Small and Rocket, Artillery & Mortars (RAM) threats. The software will be tested, documented and released for installation in the field.

Adjunct Sensor (Sentinel A3): The Sentinel Product Office will integrate and test a government off the shelf adjunct sensor. The sensor will be tested, documented and released for installation in the field.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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Management Services (\$ in Millions)				FY 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			
Electronic Attack/ Electronic Protect	Various	Various : Multiple	0.425	-		-		-		-		-	0.000	0.425	-
Signal Data Processor North Finding Module	Various	Various : Multiple	0.125	-		-		-		-		-	0.000	0.125	-
Medium Bandwidth Waveform	Various	Various : Multiple	0.213	-		-		-		-		-	0.000	0.213	-
Active Electronically Scanned Array (A4)	Various	Various : Multiple	0.549	-		-		-		-		-	0.000	0.549	-
Management Support	Various	Various : Multiple	1.498	2.841	Nov 2017	2.843	Nov 2018	4.015	Nov 2019	-		4.015	Continuing	Continuing	Continuing
Subtotal			2.810	2.841		2.843		4.015		-		4.015	Continuing	Continuing	N/A

Remarks
The Management Services increase in FY20 is due to the additional Product Office support required for the Sentinel A4 development contract. Additional systems engineering and logistics oversight required to support Sentinel A4 development contract.

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			
Signal Data Processor/ North Finding Module	Various	Raytheon & Various : Fullerton, CA / Various	4.669	-		-		-		-		-	0.000	4.669	-
Medium Bandwidth Waveform	Various	Raytheon & Various : Fullerton, CA / Various	1.645	0.222	Jan 2018	-		-		-		-	0.000	1.867	-
System of Systems	Various	Raytheon & Various : Fullerton, CA / Various	-	4.900	Jan 2018	-		-		-		-	0.000	4.900	-
Electronic Attack/ Electronic Protect	Various	Raytheon & Various : Fullerton, CA / Various	8.856	6.460	Jan 2018	6.188	Jan 2019	5.358	Jan 2020	-		5.358	Continuing	Continuing	-
Active Electronically Scanned Array (A4)	C/CPIF	TBD & Cruise Missile Defense Systems :	6.780	12.024	Jan 2018	20.213	May 2019	79.685	May 2020	-		79.685	Continuing	Continuing	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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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
		TBD and Huntsville, AL													
Mode S	Various	Raytheon & Various : Fullerton, CA / Various	-	1.838	Jan 2018	5.134	Jan 2019	0.887	Jan 2020	-		0.887	0.000	7.859	-
Resiliency and Software Assurance Modification (RSAM) upgrade	Various	Raytheon & Various : Fullerton, CA / Various	-	-		-		2.209	Jan 2020	-		2.209	0.000	2.209	-
Counter Rocket Artillery and Mortars	Various	Raytheon & Various : Fullerton, CA / Various	-	-		-		9.240	Jan 2020	-		9.240	Continuing	Continuing	-
FY 2019 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		1.440		-		-		-	0.000	1.440	-
Subtotal			21.950	25.444		32.975		97.379		-		97.379	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
Signal Data Processor North Finding Module	Various	Raytheon & Various : Fullerton, CA / Various	1.105	-		-		-		-		-	0.000	1.105	-
Medium Bandwidth Waveform	Various	Raytheon & Various : Fullerton, CA / Various	0.623	0.151	Jan 2018	-		-		-		-	0.000	0.774	-
System of Systems	Various	Raytheon & Various : Fullerton, CA / Various	-	1.561	Jan 2018	-		-		-		-	0.000	1.561	-
Electronic Attack/ Electronic Protect	Various	Raytheon & Various : Fullerton, CA / Various	1.320	1.138	Jan 2018	1.501	Jan 2019	0.765	Jan 2020	-		0.765	Continuing	Continuing	-
Mode S	Various	Raytheon & Various : Fullerton, CA / Various	-	0.516	Jan 2018	1.970	Jan 2019	1.264	Jan 2020	-		1.264	Continuing	Continuing	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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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			
Resiliency and Software Assurance Modification (RSAM) upgrade	Various	Raytheon & Various : Fullerton, CA / Various	-	-		-		0.500	Jan 2020	-		0.500	0.000	0.500	-
Counter Rocket Artillery and Mortars	Various	Raytheon & Various : Fullerton, CA / Various	-	-		-		1.320	Jan 2020	-		1.320	Continuing	Continuing	-
Subtotal			3.048	3.366		3.471		3.849		-		3.849	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		27.808	31.651	39.289	105.243	-	105.243	Continuing	Continuing	N/A

Remarks

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / Radar Development	Project (Number/Name) E10 / Sentinel
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Event Name	FY 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
Electronic Attack/Electronic Protect (EA/EP)																												
Medium Bandwidth																												
System of Systems																												
Mode S																												
Resiliency and Software Assurance Modification (RSAM) upgrade																												
Active Electronically Scanned Array (AESA) (A4)																												
Counter Rocket Artillery and Mortars																												
Adjunct Sensor																												

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604820A / <i>Radar Development</i>	Project (Number/Name) E10 / <i>Sentinel</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Battle Space Improvement	4	2012	4	2015
Stop, Stare and Track (SS&T)	4	2012	4	2015
Cross Domain Solution (CDS) Network Interface / Cyber Security	2	2015	4	2016
Electronic Attack/Electronic Protect (EA/EP)	2	2015	4	2033
Signal Data Processor (SDP) / North Finding Module (NFM)	2	2015	4	2017
Medium Bandwidth	2	2016	4	2018
System of Systems	2	2018	4	2018
Mode S	2	2018	4	2020
Resiliency and Software Assurance Modification (RSAM) upgrade	4	2019	4	2020
Active Electronically Scanned Array (AESA) (A4)	1	2017	4	2033
Counter Rocket Artillery and Mortars	2	2020	4	2021
Adjunct Sensor	2	2021	4	2022

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>
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COST (\$ in Millions)	Prior Years	FY 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	-	47.575	36.810	46.683	-	46.683	28.725	1.729	0.000	0.000	0.000	161.522
DV6: <i>General Fund Enterprise Business System</i>	-	37.974	35.257	35.782	-	35.782	17.601	0.000	0.000	0.000	0.000	126.614
GF5: <i>General Fund Enterprise Business System</i>	-	9.601	1.553	10.901	-	10.901	11.124	1.729	0.000	0.000	0.000	34.908

Note

Effective February 2, 2017, the Department of Defense Instruction (DoDI) 5000.75 was issued to establish policy for use of Business Capability Acquisition Cycle for Defense Business Systems, applying to the General Fund Enterprise Business System (GFEBS). This DoDI supersedes DoDI 5000.02, improving the alignment of business systems to commercial best practices as well as optimizing efficiencies and effectiveness across DoD for the acquisition of business systems. Decisions rendered by the Milestone Decision Authority, as outlined in DoDI 5000.75, are referred to as "Authority To Proceed" and replace DoDI 5000.02 "Milestones."

A. Mission Description and Budget Item Justification

GF5 - General Fund Enterprise Business System (GFEBS): GFEBS is the Army's core financial management system for administering its General Fund. Full Deployment was reached in 2012 and the system is currently in sustainment while also conducting capability enhancements to meet policy and user needs. GFEBS follows the DoD Business Enterprise Architecture which is aligned to the mandated Federal Enterprise Architecture. GFEBS was implemented to fulfill the needs and comply with the Federal Financial Management Improvement Act, The Chief Financial Officers Act of 1990, the Government Performance and Results Act of 1993, the Government Management Reform Act of 1994, the Clinger-Cohen Act of 1996, and to fulfill the stated mission of the Assistant Secretary of the Army for Financial Management and Comptroller. GFEBS subsumed the capabilities, in full or in part, of financial systems operating in excess of 40 years including the Standard Finance System and other costly feeder systems which do not allow the Department of Defense or the U.S. government to achieve an unqualified audit opinion on its financial statements. GFEBS was developed using a commercial off-the-shelf Enterprise Resource Planning system that is certified by the Chief, Financial Officer Council and provides six core financial functions (United States General Ledger (USGL), Cost Management, Funds Control, Payable Management, Real Property, Receivable Management and Reports). GFEBS allows tactical commanders to make informed decisions with virtually real time information. On 1 October 2008, GFEBS deployed Wave 1 to end users at Fort Jackson Garrison, Defense Finance Accounting Service (DFAS) Indianapolis, and several other organizations. The Full Deployment Decision was received by the Milestone Decision Authority on 24 June 2011, and Full Deployment was achieved on 1 July 2012. In addition to providing general sustainment efforts, the program requires RDTE funding to provide system upgrades needed to meet audit readiness, compliance, and SAP standards. Additionally, GFEBS continues to make system changes as requested by the user community through the Process Owners Group; an Senior Executive Service/General Officer-level board that prioritizes user needs; many of these changes require RDT&E funding as determined through a set of established business rules.

EV4 - Project not used. In accordance with DoDI 5000.75 capability enhancements will be performed in the GFEBS baseline (Project GF5).

DV6 - General Fund Enterprise Business System-Sensitive Activities (GFEBS-SA): GFEBS-SA is a designated National Security System (NSS) leveraging the GFEBS base system as the Army's core financial management system certified by the Chief Financial Officers Council. The GFEBS base system has reached Full Deployment

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>
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and is currently in sustainment; however, the Army still has classified and sensitive financial activity remaining in legacy systems that cannot be processed in the fully-fielded GFEBS system without compromising classified information or missions, or endangering soldiers." . Therefore, GFEBS-SA is an essential financial program designed to enable the auditability that is needed to comply with the Chief Financial Officers (CFO) Act, the Federal Financial Management Improvement Act (FFMIA), and prevent compromise of data that could cause grave harm to U.S. forces. To protect sensitive information and enable clean auditability, the Army requires a separate instance of GFEBS operated on a secure network for processing sensitive and classified financial transactions. GFEBS-SA will integrate with GFEBS to provide secure, web-based financial execution and reporting capabilities for the Army's classified and sensitive activities. GFEBS-SA is envisioned as a fully functional GFEBS application operated on a secure network (SIPR), leveraging off of the sustained system design while providing additional implementation that includes additional performance requirements designed to protect sensitive intelligence operations and special operations missions. It will process Secret Collateral and below information while providing GFEBS capabilities such as distribution and execution of appropriated funds, cost management, financial reporting, and asset management. GFEBS-SA will be implemented and deployed to 3,000 users across 100 locations worldwide. GFEBS-SA will support information exchanges with organizations that support the Army's sensitive activities mission, including cross-security domain integration between SIPR and NIPR with GFEBS and other system partners. Services will be capable of being upgraded throughout the life of the program in order to incorporate advances in best business practices and technology. The funding requested in FY 2020 supports continued system development in order to allow communication to other systems supporting the auditability of classified financial data, system hosting in the cloud environment, testing, and pre-deployment activities. Overall, the RDT&E funding in FY 2020 supports the transition from development to deployment of the GFEBS-SA effort.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	49.554	37.851	35.699	-	35.699
Current President's Budget	47.575	36.810	46.683	-	46.683
Total Adjustments	-1.979	-1.041	10.984	-	10.984
• Congressional General Reductions	-0.040	-0.046			
• Congressional Directed Reductions	-	-0.995			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-1.939	-			
• Adjustments to Budget Years	-	-	10.984	-	10.984

Change Summary Explanation

For FY 2020, the change comes from an increase in RDTE funding to the GFEBS line (GF5). This increase reflects the additional effort focused on completing the audit-related system enhancements which will give the Army an auditable financial system. The GFEBS Process Owners Group and Functional Governance Board have developed a list of enhancement items and have put the highest priority on those items which move the Army closer to realizing a fully auditable system, and the increase in RDTE is to more quickly develop those enhancement items.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)				Project (Number/Name) DV6 / General Fund Enterprise Business System			
COST (\$ in Millions)	Prior Years	FY 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
DV6: General Fund Enterprise Business System	-	37.974	35.257	35.782	-	35.782	17.601	0.000	0.000	0.000	0.000	126.614
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note
Project DV6 is for General Fund Enterprise Business System - Sensitive Activities (GFEBS-SA).

A. Mission Description and Budget Item Justification

General Fund Enterprise Business System-Sensitive Activities (GFEBS-SA): GFEBS-SA is a designated National Security System (NSS) leveraging the GFEBS base system as the Army's core financial management system certified by the Chief Financial Officers Council. The GFEBS base system has reached Full Deployment and is currently in sustainment; however, the Army still has classified and sensitive financial activity remaining in legacy systems that cannot be processed in the fully-fielded GFEBS system without compromising classified information or missions, or endangering soldiers." . Therefore, GFEBS-SA is an essential financial program designed to enable the auditability that is needed to comply with the Chief Financial Officers (CFO) Act, the Federal Financial Management Improvement Act (FFMIA), and prevent compromise of data that could cause grave harm to U.S. forces. To protect sensitive information and enable clean auditability, the Army requires a separate instance of GFEBS operated on a secure network for processing sensitive and classified financial transactions. GFEBS-SA will integrate with GFEBS to provide secure, web-based financial execution and reporting capabilities for the Army's classified and sensitive activities. GFEBS-SA is envisioned as a fully functional GFEBS application operated on a secure network (SIPR), leveraging off of the sustained system design while providing additional implementation that includes additional performance requirements designed to protect sensitive intelligence operations and special operations missions. It will process Secret Collateral and below information while providing GFEBS capabilities such as distribution and execution of appropriated funds, cost management, financial reporting, and asset management. GFEBS-SA will be implemented and deployed to 3,000 users across 100 locations worldwide. GFEBS-SA will support information exchanges with organizations that support the Army's sensitive activities mission, including cross-security domain integration between SIPR and NIPR with GFEBS and other system partners. Services will be capable of being upgraded throughout the life of the program in order to incorporate advances in best business practices and technology.

The funding requested in FY 2020 supports continued system development in order to allow communication to other systems supporting the auditability of classified financial data, system hosting in the Cloud environment, testing, and pre-deployment activities. Overall, the RDT&E funding in FY 2020 supports the transition from development to deployment of the GFEBS-SA effort. Additionally, funds support efforts to integrate sensitive activity capability across the Enterprise.

Background: Initial implementation of the GFEBS-SA project did not require development funds beyond FY 2016; however, based on a detailed analysis of the original System Integrator, an Army determination was made that they could not deliver a solution to meet the GFEBS-SA requirement. The program was restructured with an Acquisition Decision Memorandum (ADM) on 9 September 2016 in alignment with an Army-validated Operational Needs Statement. A new System Integrator contract began work on 1 May 2017 with a schedule that supports the Army's timeline; minimizing operational risks to the Army's sensitive activity commands.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) DV6 / <i>General Fund Enterprise Business System</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>Title: Software Development</p> <p>Description: Software development includes all RDT&E activities related to the development of the GFEBS-SA system itself. This includes the systems engineering management, planning, and blueprinting as well as the system integrator putting hands on keyboards to integrate the GFEBS solution into the Secret (SIPR) environment to include developing the required interfaces to allow GFEBS-SA to interact with partner systems; and the hardware and software tools necessary to facilitate development.</p> <p>Note: The FY 2019 and FY 2020 RDT&E activities are separated into more defined buckets than in previous years to give more insight into program requirements.</p> <p>FY 2019 Plans: FY 2019 funding supports the software development of the GFEBS-SA product; development of interfaces with partners involved in auditability of classified financial information; system engineering, planning, and analysis; establishment and hosting costs in the Cloud environment; cybersecurity support; and pre-deployment planning activities.</p> <p>FY 2020 Plans: During FY 2020, the team will conduct the final stages of development and fully deploy the system. The RDT&E funding will include costs for the final delivery of the GFEBS-SA solution, the systems engineering management and planning to finalize and deliver all system blueprints and other documentation, and the completion of all cybersecurity processes in order to receive Authority to Operate. Additionally, funds support efforts to integrate sensitive activity capability across the Enterprise.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Costs for software development will decrease in FY 2020 because a majority of the development will have been completed and the system will move into the testing and deployment phases.</p>		24.894	27.633	17.937
<p>Title: Testing</p> <p>Description: Testing includes all efforts related to test planning, Developmental Testing (DT), User Acceptance Testing (UAT), Operational Test & Evaluation (OT&E), and the system integrator labor and site services aligned with each.</p> <p>Note: The FY 2019 and FY 2020 RDT&E activities are separated into more defined buckets than in previous years to give more insight into program requirements.</p> <p>FY 2019 Plans:</p>		0.190	0.960	4.388

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) DV6 / <i>General Fund Enterprise Business System</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<p>FY 2019 testing support includes test planning activities for the Developmental Test and User Acceptance Test, as well as funding for external services such as the Joint Interoperability Test Command (JITC).</p> <p>FY 2020 Plans: During FY 2020, User Acceptance Testing and Developmental Testing will occur prior to and post IOC. These costs support the Government Test requirements with JITC and the Army Test and Evaluation Command (ATEC) as well as ensuring the SI and Command Test Operators are available to support</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The increase in testing costs from FY 2019 to FY 2020 are because all major development activities conclude at the end of FY 2019 and testing activities are conducted throughout FY 2020.</p>				
<p>Title: Program Support</p> <p>Description: Program Support includes program management and training activities. Costs include government management and travel, facilities, and development of recurring training materials.</p> <p>FY 2019 Plans: FY 2019 Program Support includes all activities within the program office. Costs include government management; government technical support; facilities; system engineering and program management tools associated with program execution (i.e., logistics software, program management database and tracking tools, office software, etc.); and support contractors who provide technical expertise, day-to-day program execution, and acquisition support.</p> <p>FY 2020 Plans: Program support costs in FY 2020 includes Program Management Office personnel providing non-technical support (acquisition, operations, financial, logistics, etc.), organizational change management planning and execution of roadshows to communicate the GFEBS-SA mission and purpose to partner commands, and the development of recurring training tools.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The overall level of Program Support has decreased from FY 2019 to FY 2020 because the bulk of costs in FY 2019 was associated with oversight of software development activities. Testing is the major RDT&E activity in FY 2020 and those activities are performed on government installations with portions of overall program support conducted by personnel at the testing site. Therefore, less direct program support is needed by the program.</p>		5.403	6.664	3.715
<p>Title: Data Center Hosting</p> <p>Description: Data center hosting includes all costs associated with hosting of each environment in the Cloud and other recurring resources that makes up the GFEBS-SA infrastructure. Those environments include pre-development, staging, production,</p>		7.487	-	9.742

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) DV6 / General Fund Enterprise Business System
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
continuity of operations (COOP), Quality Assurance, and program management tools. Other resources included in these costs are HANA, the cross-domain investment, the SIPR circuit Attribute Based Access Control (ABAC) data hosting.			
<i>FY 2020 Plans:</i> By the end of FY 2020, GFEBS-SA will be fully operational on each hosting environment.			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Increase from FY19 to FY20 as a result of system development and standing up the cloud environment.			
Accomplishments/Planned Programs Subtotals	37.974	35.257	35.782

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>
• B55511: GFEBS	-	6.424	11.248	-	11.248	7.656	-	-	-	0.000	25.328
<i>SENSITIVE ACTIVITIES</i>											

Remarks
Procurement dollars for GFEBS-SA will be used for the procurement of licenses (for system access and data storage), on-site support, user training, and deployment to all users.

GFEBS-SA OMA requirements are minimal in FY 2020, and will be covered under the base program. Requirements after FY 2020 have been incorporated into the Future Years Defense Program.

D. Acquisition Strategy
Plan, develop, and manage GFEBS-SA as a separate instance from GFEBS base program on the SIPRNet to support delivery of capabilities for this designated National Security System (NSS) in support of the sensitive activity commands. The GFEBS-SA solution will be acquired as a sole source contract with Accenture Federal Services as a single increment. The contract will be a hybrid of Firm Fixed Price and Cost Plus Fixed Fee CLINs to support development efforts and to encourage Accenture Federal Services to deliver a solution in support of the Vice Chief of Staff of the Army recommendation to accelerate the schedule to ensure operational security and Army audit requirements. The contract was awarded in April 2017.

Software will be developed through a single build to achieve full capability. GFEBS-SA will consist of a single release delivered in a limited deployment (size not capability) to the Initial Operational Test and Evaluation (IOT&E) unit, followed by a full deployment to all other users upon successful completion of IOT&E.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) DV6 / General Fund Enterprise Business System

The program will require modernization enhancements after full deployment. These modernization enhancements will require a stream of RDT&E funding to keep the GFEBS-SA system synchronized with the base system by making modifications needed for audit readiness, compliancy, and upgrades required to keep the system up-to-date with SAP standards and Functional Governance Board requirements.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) DV6 / General Fund Enterprise Business System
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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	SS/ Various	Accenture Federal LLC : Alexandria, VA	11.044	24.894	Apr 2018	27.633	Oct 2018	17.937	Mar 2020	-		17.937	29.672	111.180	88.300
Data Center Hosting	TBD	Defense Information Systems Agency : Ft. Meade, MD	-	7.487	Jan 2018	-		9.742	Oct 2019	-		9.742	0.000	17.229	-
Subtotal			11.044	32.381		27.633		27.679		-		27.679	29.672	128.409	N/A

Remarks
The contract is a hybrid of FFP, CPFF and CR CLINs for system development, landscape configuration, test and evaluation, solution delivery and certification/accreditation.

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 Costs	Various	PdM GFEBS SA : Arlington, VA	14.641	5.403	Oct 2017	6.664	Oct 2018	3.715	Oct 2019	-		3.715	24.752	55.175	-
Subtotal			14.641	5.403		6.664		3.715		-		3.715	24.752	55.175	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	IA	JITC/A TEC : Alexandria, VA	4.960	0.190	Jan 2018	0.960	Oct 2018	4.388	Oct 2019	-		4.388	5.855	16.353	-
Subtotal			4.960	0.190		0.960		4.388		-		4.388	5.855	16.353	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		30.645	37.974	35.257	35.782	-	35.782	60.279	199.937	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) DV6 / <i>General Fund Enterprise Business System</i>

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
Program Management																												
Development																												
Testing																												
Deployment																												
Modernization Enhancements																												
Milestone B (ATP 3)																												
Initial Operating Capability (IOC)																												
Full Deployment (FD)																												
License Procurement																												
Sustainment																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) DV6 / <i>General Fund Enterprise Business System</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Program Management	1	2015	4	2020
Development	3	2017	3	2019
Testing	3	2019	2	2020
Deployment	2	2020	4	2020
Modernization Enhancements	1	2021	4	2024
Milestone B (ATP 3)	4	2018	4	2018
Initial Operating Capabiity (IOC)	2	2020	2	2020
Full Deployment (FD)	4	2020	4	2020
License Procurement	1	2019	2	2021
Sustainment	1	2021	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)				Project (Number/Name) GF5 / General Fund Enterprise Business System			
COST (\$ in Millions)	Prior Years	FY 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
GF5: General Fund Enterprise Business System	-	9.601	1.553	10.901	-	10.901	11.124	1.729	0.000	0.000	0.000	34.908
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The General Fund Enterprise Business System (GFEBS) is the Army's core financial management system for administering its General Fund. Full Deployment was reached in 2012 and the system is currently in sustainment while also conducting capability enhancements to meet policy and user needs. It follows the DoD Business Enterprise Architecture which is aligned to the mandated Federal Enterprise Architecture. GFEBS was implemented to fulfill the needs and comply with the Federal Financial Management Improvement Act, The Chief Financial Officers Act of 1990, the Government Performance and Results Act of 1993, the Government Management Reform Act of 1994, the Clinger-Cohen Act of 1996, and to fulfill the stated mission of the Assistant Secretary of the Army for Financial Management and Comptroller. GFEBS subsumed the capabilities, in full or in part, of financial systems operating in excess of 40 years, including the Standard Finance System and other costly feeder systems which do not allow the Department of Defense or the U.S. government to achieve an unqualified audit opinion on its financial statements. GFEBS is used to administer the Army's General Fund. GFEBS was developed using a commercial off-the-shelf Enterprise Resource Planning system that is certified by the Chief, Financial Officer Council and provides six core financial functions (United States General Ledger (USGL), Cost Management, Funds Control, Payable Management, Real Property, Receivable Management and Reports). GFEBS allows tactical commanders to make informed decisions with virtually real time information. On 1 October 2008, GFEBS deployed Wave 1 to end users at Fort Jackson Garrison, Defense Finance Accounting Service (DFAS) Indianapolis, and several other organizations. The Full Deployment Decision was received by the Milestone Decision Authority on 24 June 2011, and Full Deployment was achieved on 1 July 2012. Current efforts include sustaining the system and infrastructure, making modifications needed for audit readiness, compliancy, and upgrades required to maintain the system and meet SAP standards. Additionally, GFEBS continues to make changes as requested by the user community through the Process Owners Group; an Senior Executive Service/ General Officer-level board that prioritizes user needs. Some of these changes require developmental funding and support auditable business environment, financial analytics and enablement of sunseting of legacy systems.

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

	FY 2018	FY 2019	FY 2020
Title: Capability Enhancement	9.601	1.553	10.901
Description: Capability enhancements provide changes to the system that are needed to update the infrastructure as required to meet SAP requirements and best practices, and to support evolving statutory and regulatory requirements. The capability enhancement initiatives are needed to increase the GFEBS capability and performance to maintain compliance with Federal Financial Management Improvement Act (FFMIA), Business Enterprise Agency (BEA), Standard Financial Information Structure (SFIS) requirements, and auditability. These requirements are established and prioritized through a General Officer (GO)/Senior Executive Service (SES)-level Process Owners Group and Functional Governance Board.			
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) GF5 / <i>General Fund Enterprise Business System</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>FY 2019 RDTE funding supports the enhancements requested by the Financial Integration Process Owners Group, as well as enhancements and new capabilities related to audit, compliance, and legacy system retirement.</p> <p>FY 2020 Plans: FY 2020 RDT&E funding will be used to perform system enhancements/upgrades as requested by the Process Owners Group and Functional Governance Board. With increased focus on making the Army auditable, many of these upgrades are aligned with the auditability of GFEBS and have been highly prioritized. The focus for enhancements funded with RDT&E during FY 2020 will be on these audit-related enhancements.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: This increase in FY 2020 reflects the additional effort focused on completing the audit-related system enhancements which will give the Army an auditable financial system. The GFEBS Process Owners Group and Functional Governance Board have developed a list of enhancement items and have put the highest priority on those items which move the Army closer to realizing full auditability. The RDT&E has increased to allow GFEBS to develop those enhancement items more quickly.</p>			
Accomplishments/Planned Programs Subtotals	9.601	1.553	10.901

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 Complete</u>	<u>Total Cost</u>
• BE4168: <i>General Fund Enterprise Business System</i>	4.465	4.552	4.554	-	4.554	4.453	4.571	-	-	0.000	22.595

Remarks
FY 2020 Procurement dollars in the amount of \$4.554 million supports software and hardware infrastructure upgrades to bring GFEBS reporting and analytics in-line with processing performance thresholds established in the GFEBS Capabilities Production Document (CPD). Software upgrades support auditability and compliancy requirements, as well as the maintenance of the system's required software standards.

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) GF5 / General Fund Enterprise Business System
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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	Option/Various	IBM Corp : Bathesda, Maryland	120.968	9.601	Jan 2018	1.553		10.901	Jan 2020	-		10.901	Continuing	Continuing	-
HQAES Integration	C/FFP	VAR : VAR	14.118	-		-		-		-		-	0.000	14.118	-
Subtotal			135.086	9.601		1.553		10.901		-		10.901	Continuing	Continuing	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
Project Cost Totals	135.086	9.601	1.553	10.901	-	10.901	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / General Fund Enterprise Business System (GFEBS)	Project (Number/Name) GF5 / General Fund Enterprise Business System

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
Sustainment Development Task Order Award	Sustainment/Development Contract																											
Capability Enhancements FY18	Capability Enhancements																											
Capability Enhancements FY19					Capability Enhancements																							
Capability Enhancements FY20									Capability Enhancements																			
Capability Enhancements FY21													Capability Enhancements															
Capability Enhancements FY22																	Capability Enhancements											
Capability Enhancements FY23																					Capability Enhancements							
Capability Enhancements FY24																									Capability Enhancements			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604822A / <i>General Fund Enterprise Business System (GFEBS)</i>	Project (Number/Name) GF5 / <i>General Fund Enterprise Business System</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Map/Blueprint/Build Release 1.1	4	2005	3	2006
Realization - Release 1.2	4	2006	1	2009
IOC	3	2009	3	2009
Release 1.3 - Replace STANFINS	1	2008	1	2011
Full Deployment Decision Review	3	2009	3	2009
Release 1.4: Replace SOMARDS	4	2008	1	2011
Full Deployment Decision Review 2	1	2010	1	2010
Hardware Fielding	1	2009	1	2011
HQAES Integration	1	2016	4	2016
Sustainment Development Task Order Award	2	2018	2	2024
Capability Enhancements FY18	1	2018	4	2018
Capability Enhancements FY19	1	2019	4	2019
Capability Enhancements FY20	1	2020	4	2020
Capability Enhancements FY21	1	2021	4	2021
Capability Enhancements FY22	1	2022	4	2022
Capability Enhancements FY23	1	2023	4	2023
Capability Enhancements FY24	1	2024	4	2024

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

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)	R-1 Program Element (Number/Name) PE 0604823A / Firefinder
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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	-	43.762	27.439	17.294	-	17.294	20.026	12.420	13.738	14.597	Continuing	Continuing
L86: LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)	-	2.051	4.189	4.913	-	4.913	5.379	3.459	4.288	4.557	Continuing	Continuing
L87: Hypervelocity Armament System (HAS)	-	34.562	17.595	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	52.157
L88: Enhanced AN/TPQ 36	-	7.149	5.655	12.381	-	12.381	14.647	8.961	9.450	10.040	Continuing	Continuing

A. Mission Description and Budget Item Justification

This program funds design, development and test of primary target acquisition and counterfire radars to automatically detect, locate and classify hostile indirect fire weapons (mortars, artillery, and rockets). The program directly supports the prioritization, tracking and locating of targets, and dissemination of that information for simultaneous attack of multiple threats. It provides the Warfighter with continuous and responsive counterfire target acquisition systems for all types and phases of military operations. Project L86, Lightweight Counter Mortar Radar (LCMR), version AN/TPQ-50 provides 360 degrees of azimuth coverage from ranges of 500 meters to 10 kilometers. The AN/TPQ-50 and AN/TPQ-53 radars are currently fielded to multiple Continental United States (CONUS) and Outside Continental United States (OCONUS) locations to include operational support to Operation Inherent Resolve (OIR) and Operation Freedom's Sentinel (OFS). Project L88, AN/TPQ-53 is a highly mobile radar system that leverages the latest in technology design to accelerate technology infusion and increase range while improving false location rate, reducing obsolescence and increasing reliability. The AN/TPQ-53 provides a system with increased range and accuracy throughout a 90 degree search sector (stare mode) as well as 360 degree coverage (rotating) for locating mortar, artillery and rocket firing positions.

This program line also funds development of an integrated Hypervelocity Armament System (HAS), and associated technologies as they mature to support accelerated demonstration and transition of advanced gun weapon systems, command guided maneuverable projectiles, and tactical sensors. The development of HAS would include advancing artillery powder guns firing Hypervelocity Projectiles (HVPs), resulting in next-generation, common, low drag, guided cannon artillery projectiles capable of completing multiple missions with improved cost effectiveness across different gun systems. Integration with a fire control radar and sensor array will allow closed-loop targeting of moving and relocatable targets beyond the range of conventional artillery.

The Fiscal Year FY 2020 Base funding in the amount of \$17.294 million will support ongoing AN/TPQ-53 test efforts and Army interoperability certifications (AICs), AN/TPQ-50 and AN/TPQ-53 development and testing of modernization efforts for electronic protection and new and emerging threats as well as the performance of technical assessments, engineering studies, risk reduction and required documentation.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>
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B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	45.605	45.473	48.745	-	48.745
Current President's Budget	43.762	27.439	17.294	-	17.294
Total Adjustments	-1.843	-18.034	-31.451	-	-31.451
• Congressional General Reductions	-0.037	-0.034			
• Congressional Directed Reductions	-	-18.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.028	-			
• SBIR/STTR Transfer	-1.778	-			
• Adjustments to Budget Years	-	-	-31.451	-	-31.451

Change Summary Explanation

FY 2020 Adjustment to Budget Year reflects a decrease of \$31.451M for the Hypervelocity Armament System.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>				Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>			
COST (\$ in Millions)	Prior Years	FY 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
L86: <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>	-	2.051	4.189	4.913	-	4.913	5.379	3.459	4.288	4.557	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The AN/TPQ-50 Lightweight Counter Mortar Radar (LCMR) is a highly mobile radar that automatically detects, classifies, tracks, and locates the point of origin of projectiles fired from mortar, artillery, and rocket systems with sufficient accuracy for first round fire for effect. It mitigates close combat radar coverage gaps by providing 360 degrees of azimuth coverage from ranges of 500 meters to 10 kilometers and is capable of being deployed in two configurations, standalone or vehicle mounted. The AN/TPQ-50 system interoperates with mission command systems to provide the maneuver commander increased counterfire radar flexibility. The AN/TPQ-50 is deployed as part of the Counter-Rocket, Artillery, Mortar (C-RAM) system of systems. It provides data to the Forward Area Air Defense Command and Control (FAAD C2) node for the sense and warn force protection capability. The AN/TPQ-50 is currently fielded to multiple Continental United States (CONUS) and Outside Continental United States (OCONUS) locations to include support to Operation Inherent Resolve (OIR) and Operation Freedom's Sentinel (OFS).

The fiscal year (FY) 2020 Research, Development, Test and Evaluation (RDTE) funds of \$4.913 million will continue the work required to enhance the AN/TPQ-50's capability to address electronic protection against cyber electromagnetic activity (CEMA) and other known, new, emerging and evolving threats identified in the Validated Online Lifecycle Threat (VOLT) report. This funding enables the program to develop and integrate sensor protect capabilities into the software baseline, develop advanced protection techniques which take advantage of hardware upgrades, and develop documentation for hardware and software capability improvements. Funding supports all associated testing costs and program support.

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

	FY 2018	FY 2019	FY 2020
Title: Modernization & Emerging Threats	2.051	4.036	4.913
Description: Program modernization effort which completes the development of hardware kits and develops advanced electronic protection techniques via software to combat CEMA. This effort funds the development of capabilities to address vulnerabilities identified in the bi-annual release of the VOLT report and changes on the battlefield due to new tactics, techniques, procedures (TTPs) and/or areas of operation.			
FY 2019 Plans: Continue the work required to enhance the AN/TPQ-50's capability to address electronic protection against CEMA and other known, new, emerging and evolving threats identified in the VOLT. In addition, it integrates developed capabilities into the baseline, develops documentation for hardware and software capability improvements. Funding supports all associated testing costs and program support.			
FY 2020 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Funding enables the continuation of work required to enhance the AN/TPQ-50's capability to address electronic protection against cyber electromagnetic activity (CEMA) and other known, new, emerging and evolving threats identified in the Validated Online Lifecycle Threat (VOLT) report. In addition, it integrates developed capabilities into the baseline, develops documentation for hardware and software capability improvements, and includes operational assessments for capability improvements. Funding supports all associated testing costs and program support. These efforts are executed by the LCMR program.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: The increase in funding from FY 2019 to FY 2020 covers increased modernization development scope and additional testing required to release new software and address capability improvements.</p>			
<p>Title: Small Business Innovation Research (SBIR)/Small Business Technology Transfer (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>	-	0.153	-
Accomplishments/Planned Programs Subtotals	2.051	4.189	4.913

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 Complete</u>	<u>Total Cost</u>
• B05201: <i>Lightweight Counter Mortar Radar</i>	17.080	6.107	5.400	-	5.400	5.500	8.326	7.380	10.072	Continuing	Continuing

Remarks

D. Acquisition Strategy
The AN/TPQ-50 Lightweight Counter Mortar Radar was developed in 2009 to meet Training and Doctrine Command (TRADOC) Capabilities Production Document (CPD) requirements. A favorable full rate production (FRP) decision was achieved on 21 June 2013. The AN/TPQ-50 is currently in full rate production; 400 systems have been procured to complete the program's current AAO requirement.

Research, Development, Test and Evaluation (RDT&E) funding supports modernization development task orders under the national maintenance contract (NMC). The efforts extend through the current Program Objective Memorandum (POM) period.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>

The fiscal year (FY) 2020 RDTE funds of \$4.913 million continues the work required to enhance the AN/TPQ-50's capability to address electronic protection against CEMA and other known, new, emerging and evolving threats identified in the VOLT report. This effort develops and integrates sensor protect capabilities into the software baseline, develop advanced protection techniques which take advantage of hardware upgrades, and develops documentation for hardware and software capability improvements. Funding supports all associated testing costs and program support.

E. Performance Metrics

N/A

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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 / 5				PE 0604823A / Firefinder				L86 / LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)							
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 (Government Support)	Various	Various : Activities	1.582	-		0.376	Mar 2019	0.569	Nov 2019	-		0.569	Continuing	Continuing	Continuing
Program Management (Contractor Support)	C/CPFF	Various : APG, MD	0.564	0.363	Mar 2018	-		-		-		-	Continuing	Continuing	Continuing
Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)	TBD	Various : Various	-	-		0.153	Dec 2018	-		-		-	0.000	0.153	-
Subtotal			2.146	0.363		0.529		0.569		-		0.569	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
Electronic Protection	SS/CPFF	Various : Various	2.330	-		-		-		-		-	0.000	2.330	1.410
Modernization & New and Emerging Threats	SS/CPFF	Various : Various	2.473	1.375	Nov 2017	2.447	May 2019	2.819	Nov 2019	-		2.819	Continuing	Continuing	Continuing
Subtotal			4.803	1.375		2.447		2.819		-		2.819	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 (Government)	Various	Various : Activities	4.871	0.313	Jul 2018	1.213	Aug 2019	1.525	Nov 2019	-		1.525	Continuing	Continuing	Continuing
Subtotal			4.871	0.313		1.213		1.525		-		1.525	Continuing	Continuing	N/A
Project Cost Totals			11.820	2.051		4.189		4.913		-		4.913	Continuing	Continuing	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>		Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>	

Event Name	FY 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 & New and Emerging Threats																												
Government Test																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L86 / <i>LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Electronic Protection	3	2016	4	2017
Modernization & New and Emerging Threats	3	2016	4	2024
Government Test	3	2017	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>				Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</i>			
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
L87: <i>Hypervelocity Armament System (HAS)</i>	-	34.562	17.595	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	52.157
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project L87 The Hypervelocity Armament System (HAS) and associated technologies are composed of advanced gun weapon systems, command guided maneuverable projectiles, and tactical sensors. The development of HAS would include advancing artillery powder guns firing Hypervelocity Projectiles (HVPs), resulting in a next generation, common, low drag, guided cannon artillery projectiles capable of completing multiple missions with improved cost effectiveness. Integration with a fire control radar and sensor array will allow closed-loop targeting of moving and relocatable targets beyond the range of conventional artillery.

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

	FY 2018	FY 2019	FY 2020
Title: Hypervelocity Armament System (HAS) (RDECOM)	34.562	-	-
Description: The Hypervelocity Armament System (HAS) will integrate advanced artillery gun systems firing HVPs with closed loop fire control sensors to engage high value moving targets beyond common artillery ranges.			
Title: Development	-	11.200	-
Description: Funding is provided for all development efforts on Hypervelocity Armament System (HAS) technology transitions.			
FY 2019 Plans: Finalize initial incremental technology transition requirements and specifications, contract requirements package development and begin execution of contracts and development. Continue support for system evaluation, requirement/specification work, integration development and test plans, prototyping, and developmental testing for the Hypervelocity Armament System to include projectile, sensor arrays and radars, launch platforms, fire control software and tracking to verify and validate performance against high value threats at greatly increased ranges.			
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding has been adjusted to support the Army's modernization priorities.			
Title: Program Management	-	5.173	-
Description: Funding is provided for all program management efforts on Hypervelocity Armament System (HAS).			
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Begin the development for all required documents, office staff and engineering Integrated Product Team (IPT) development.			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> FY 2020 funding has been adjusted to support the Army's modernization priorities.			
<i>Title:</i> Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR) <i>Description:</i> FY 2019 SBIR/STTR transfer	-	1.222	-
<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	34.562	17.595	-

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

Remarks

D. Acquisition Strategy
The Army will leverage Strategic Capabilities Office (SCO) prototypes and technologies to continue transition from the FY 2018 program into programs of record.

The Army is transitioning prototype articles from the SCO demonstration to develop advanced gun systems, command guided maneuverable projectiles, and fire control sensors capable of engaging tactical range targets. Emerging requirements include communication suite changes, munitions updates, and introduction of new munitions require software and/or hardware updates to ensure full compatibility and maintain operational viability.

E. Performance Metrics
N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army											Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / Firefinder				Project (Number/Name) L87 / Hypervelocity Armament System (HAS)				

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			
HAS Product Development	C/Various	TBD : TBD	-	34.562		11.212		-		-		-	0.000	45.774	-
Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)	TBD	Various : Various	-	-		1.222	Dec 2018	-		-		-	0.000	1.222	-
Subtotal			-	34.562		12.434		-		-		-	0.000	46.996	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	MIPR	PM/PEO : VARIOUS	-	-		5.161		-		-		-	0.000	5.161	-
Subtotal			-	-		5.161		-		-		-	0.000	5.161	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			-	34.562	17.595	-	-	-	0.000	52.157

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</i>	

Event Name	FY 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
Hypervelocity Armament System Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L87 / <i>Hypervelocity Armament System (HAS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Hypervelocity Armament System Development	1	2018	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>				Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>			
COST (\$ in Millions)	Prior Years	FY 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
L88: <i>Enhanced AN/TPQ 36</i>	-	7.149	5.655	12.381	-	12.381	14.647	8.961	9.450	10.040	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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

The FY 2020 funds of \$12.381 million supports ongoing test efforts, continued extended range development and testing, Army interoperability certifications (AICs), testing of modernization efforts for electronic protection and emerging threats as well as the performance of technical assessments, engineering studies, risk reduction and required documentation.

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

	FY 2018	FY 2019	FY 2020
Title: Test support	2.414	3.189	4.250
Description: Funding supports testing efforts and associated Program Management Office (PMO) requirements.			
FY 2019 Plans: Test activities include engineering and customer testing, Army interoperability certification (AIC) testing, a network vulnerability and penetration assessment, electronic protection testing, as well as associated PMO and test support costs.			
FY 2020 Plans: Conduct engineering and customer testing, Army interoperability certification (AIC) testing, a network vulnerability and penetration assessment, and electronic protection testing. Funds include associated PMO and test support costs. Funds will be executed by the Enhanced AN/TPQ-36 program.			
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 funds redirected to support extended range development. FY 2019 - FY 2020 increase due to concurrent development and testing of multiple software builds.			
Title: Electronic Protection and Emerging Threats	1.060	0.171	2.269

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: The effort improves spectrum management and mitigates electromagnetic interference (EMI) from commercial and military bands. This effort also develops and improves radar signal data processor electronic protection algorithms which counter electronic threats. Additionally, this effort funds the development of capabilities to address emerging threats identified in the bi-annual release of the System Threat Assessment Report (STAR)/Validated Online Lifecycle Threat (VOLT) report and changes on the battlefield due to new adversarial tactics, techniques, and procedures (TTPs) and/or areas of operation.</p> <p>FY 2019 Plans: Conduct a live fire test demonstrating enhanced electronic protection algorithms against surrogate threats.</p> <p>FY 2020 Plans: Develop additional electronic protection techniques to mitigate cyber electromagnetic activity (CEMA). Continue development of capabilities to address emerging threats identified in the biannual release of the VOLT, changes in the battlefield and areas of operations. Implement tools and TTPs to allow the radar to operate more efficiently in the presence of electromagnetic interference (EMI). Funding supports associated developmental testing and program support. Funds will be executed by the Enhanced AN/TPQ-36 program.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 funds were redirected to address increased test scope. Development efforts for electronic protection and emerging threats resume in FY 2020.</p>			
<p>Title: Extended Range</p> <p>Description: Funding supports the development, integration, and testing of an extended range capability supporting the Army Chief of Staff's number one modernization priority of Long-Range Precision Fires.</p> <p>FY 2019 Plans: Funds support the development, integration and testing of an extended range prototype capability. Funds also support the updates to systems engineering and design documentation.</p> <p>FY 2020 Plans: Will conduct regression and live fire testing of the extended range capability. Implement design and software changes based on results from testing performed in an operationally representative environment. Integrate a proven extended range capability into the program's software baseline and conduct initial integration testing. These funds will be executed by the Enhanced AN/TPQ-36 program.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funds increase to continue the development of extended range software and supports initial integration testing.</p>	3.675	2.087	5.862
<p>Title: Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)</p>	-	0.208	-

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
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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	7.149	5.655	12.381

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>
• B05310: <i>AN/TPQ-53 Counterfire Target Acquisition Radar</i>	400.530	324.150	16.416	-	16.416	10.267	12.175	30.239	42.312	Continuing	Continuing

Remarks

D. Acquisition Strategy

The AN/TPQ-53 leverages technology developed in the multi-mission radar advanced technology objective (ATO) program. In 2006, the Government awarded a contract following full and open competition for the design of the AN/TPQ-53 radar and the purchase of four non-recurring engineering (NRE) radars. Twelve additional quick reaction capability (QRC) radars were purchased under the same contract in response to an urgent directed procurement in July 2008. The Milestone Decision Authority (MDA) approved the acquisition of up to 20 more QRC radars. Twenty systems were procured through two separate contract actions in 2010 and 2011. A competitive production contract for Low Rate Initial Production (LRIP) systems was awarded in 2012 and options for additional systems were awarded in 2013, 2014, and 2015. Production and delivery of all QRC/Initial Production (IP) systems are complete, and production of LRIP systems is ongoing. A Full Rate Production (FRP) decision was obtained in December 2015. The FRP contract to fill the remainder of the Army Acquisition Objective (AAO) was awarded in March 2017. Additionally, all initial production systems will be retrofitted to the FRP configuration. The AAO was increased from 174 to 189 systems in May 2017; 174 systems have been procured to date. FRP system deliveries continue through FY 2021. The system replaces all of the AN/TPQ-36 and AN/TPQ-37 systems in the fleet.

RDT&E funding supports modernization development and extended range software development task orders under the existing FRP contract. The efforts extend through the current Program Objective Memorandum (POM) period.

The FY 2020 funds of \$12.381 million supports ongoing test efforts, continued extended range development and testing, Army interoperability certifications (AICs), testing of modernization efforts for electronic protection and emerging threats as well as the performance of technical assessments, engineering studies, risk reduction and required documentation.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
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E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
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Management Services (\$ in Millions)				FY 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 (Government)	Various	Various : Various	1.587	0.566	Apr 2018	0.417	Nov 2018	1.117	Oct 2019	-		1.117	Continuing	Continuing	Continuing
Program Management (Contractor)	Various	Various : APG, MD	3.969	0.405	May 2018	0.125	May 2019	0.129	May 2020	-		0.129	Continuing	Continuing	Continuing
Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)	TBD	Various : Various	-	-		0.208	Dec 2018	-		-		-	Continuing	Continuing	Continuing
Subtotal			5.556	0.971		0.750		1.246		-		1.246	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			
Electronic Protection and Emerging Threats	SS/FPIF	Lockheed Martin : Syracuse, NY	5.680	1.060	Mar 2018	0.171	Dec 2018	2.269	Oct 2019	-		2.269	Continuing	Continuing	Continuing
High Clutter Environment	SS/CPFF	Lockheed Martin : Syracuse, NY	10.340	-		-		-		-		-	0.000	10.340	-
Low Quadrant Elevation (QE) Shots	SS/CPFF	Lockheed Martin : Syracuse, NY	4.865	-		-		-		-		-	0.000	4.865	-
Extended Range	SS/FPIF	Lockheed Martin : Syracuse, NY	-	3.675	Sep 2018	2.087	Jan 2019	5.862	Oct 2019	-		5.862	Continuing	Continuing	Continuing
Signal Data Processor (SDP)	SS/CPFF	Lockheed Martin : Syracuse, NY	1.992	-		-		-		-		-	0.000	1.992	-
Global Positioning System (GPS) Military Code (M-Code)	SS/CPFF	Lockheed Martin : Syracuse, NY	1.411	-		-		-		-		-	Continuing	Continuing	Continuing
Wireless Communication Upgrade	SS/CPFF	Lockheed Martin : Syracuse, NY	1.942	-		-		-		-		-	0.000	1.942	-
Subtotal			26.230	4.735		2.258		8.131		-		8.131	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0604823A / Firefinder				Project (Number/Name) L88 / Enhanced AN/TPQ 36					
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
Program Support	SS/CPFF	Georgia Tech Research Institute (GTRI) : Atlanta, GA	0.996	0.365	Mar 2018	0.300	Mar 2019	0.300	Mar 2020	-		0.300	Continuing	Continuing	Continuing
Subtotal			0.996	0.365		0.300		0.300		-		0.300	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	Various	Various : Activities	52.806	1.078	Nov 2017	2.347	Jan 2019	2.704	Oct 2019	-		2.704	Continuing	Continuing	Continuing
Subtotal			52.806	1.078		2.347		2.704		-		2.704	Continuing	Continuing	N/A
Project Cost Totals			85.588	7.149		5.655		12.381		-		12.381	Continuing	Continuing	N/A
Remarks															

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
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Event Name	FY 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 Support																												
Electronic Protection (EP) and Emerging Threats																												
EP and Emerging Threats																												
Extended Range																												

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604823A / <i>Firefinder</i>	Project (Number/Name) L88 / <i>Enhanced AN/TPQ 36</i>
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Test Support	1	2016	4	2024
Electronic Protection (EP) and Emerging Threats	1	2016	2	2019
EP and Emerging Threats	1	2020	4	2024
Extended Range	4	2018	4	2021

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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 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>
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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	-	15.490	10.382	5.803	-	5.803	3.917	3.140	4.464	3.823	Continuing	Continuing
DX7: <i>TACTICAL COMMUNICATIONS AND PROTECTIVE SYSTEM</i>	-	0.850	0.325	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.175
EY2: <i>Integrated Soldier Power Data System - Core</i>	-	6.671	2.859	1.439	-	1.439	1.243	0.000	0.000	2.506	Continuing	Continuing
EY3: <i>Soldier Power Generator</i>	-	0.000	0.318	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.318
EY4: <i>Universal Battery Charger</i>	-	1.663	1.406	1.433	-	1.433	1.461	0.901	0.916	0.000	0.000	7.780
FK4: <i>Soldier Borne Sensor (SBS)</i>	-	0.000	0.000	1.512	-	1.512	1.213	2.239	3.548	1.317	0.000	9.829
S65: <i>Platoon Power Generator</i>	-	6.306	5.474	1.419	-	1.419	0.000	0.000	0.000	0.000	0.000	13.199

A. Mission Description and Budget Item Justification

This program element contains five projects:

Project DX7 - Tactical Communications and Protective System (TCAPS): TCAPS enables Soldiers to communicate over radios in combat environments while simultaneously providing hearing protection from both steady state and impulse noise. Project

Project EY2 - Integrated Soldier Power Data System - Core: Integrated Soldier Power and Data System-Core, Conformal Wearable Battery, Squad Power Manager (SPI) fills the power and energy gaps created by the increase in mission essential, Soldier portable power consumers, such as situational awareness displays, GPS systems, weapon sensors, radios, and other devices.

Project EY3 - Soldier Power Generator (SPG) - fills the power and energy gap created by the increase in mission essential and power consuming devices, by providing a single charging solution capable of providing power to handheld communication devices and a suite of military batteries. SPG is intended for use in the most austere operating environments providing the Soldier with energy independency for extended mission duration. The system will provide the Soldier with a lightweight, worn or carried power generation capability, integrated within the warfighters combat load.

Project EY4 - Universal Battery Charger: Universal Battery Charger (UBC) fills the power and energy gap created by the increase in mission essential, Soldier portable power consumers, by providing a sole charging solution capable of providing power to handheld communication devices and a suite of military batteries.

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>
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Project FK4 - Soldier Borne Sensor (SBS): The SBS is a small unmanned aerial vehicle. The SBS provides a near term solution to three Army War-fighting Challenges at the Infantry Squad level: develop situational understanding, conduct air-ground reconnaissance, and conduct joint combined arms maneuver. The system is simple to deploy and use to support the squad leader's decision-making process. The system allows Soldiers to obtain local situational awareness and understanding of their immediate surroundings while remaining in covered or concealed positions. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy. This SBS project is not a new start: funding from this project transferred from PE: 06005053A / Grounds Robotics project 655053.FB8.

S65 - Soldier Power: Soldier Power enables dismounted Soldiers to efficiently execute missions for longer durations by reducing the logistical burden associated with fuel and primary (disposable) batteries. Platoon Power Generation (PPG) - PM E2S2: This project supports the demonstration and development of a PPG. The Small Unit Power (SUP) PPG (1kW Generator) will provide small units with sufficient portable power to sustain Modified Table of Organizational Equipment (MTOE) unit power demand in support of 48 to 72 hour missions using a common logistical fuel (JP-8). It will be used for charging batteries and powering various types of Army communications and electronics devices.

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	16.127	10.395	6.237	-	6.237
Current President's Budget	15.490	10.382	5.803	-	5.803
Total Adjustments	-0.637	-0.013	-0.434	-	-0.434
• Congressional General Reductions	-0.013	-0.013			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.624	-			
• Adjustments to Budget Years	-	-	-0.434	-	-0.434

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>				Project (Number/Name) DX7 / <i>TACTICAL COMMUNICATIONS AND PROTECTIVE 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
DX7: <i>TACTICAL COMMUNICATIONS AND PROTECTIVE SYSTEM</i>	-	0.850	0.325	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.175
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Description: The Tactical Communications and Protective System (TCAPS) and TCAPS-Lite provide Soldiers with advanced, active hearing protection that simultaneously protects Soldiers' hearing while enabling situational awareness and mission command. TCAPS protects Soldiers against harmful impulse and steady state noises characteristic of combat environments while also enabling Soldiers to communicate with each other using voice communications over a tactical radio, while TCAPS-Lite provides protection for Soldiers without a radio. Both systems enhance survivability and situational awareness by allowing Soldiers to amplify faint sounds that would not be otherwise audible or intelligible. TCAPS and TCAPS-Lite reduces Soldiers noise induced hearing damage and includes integration and interface of products on Soldiers.

TCAPS and TCAPS-Lite contribute to the reduction of post-service disability compensation and limits lost in-service time related to hearing injuries. TCAPS Program of Record will continue to employ commercial-off-the-shelf (COTS) solutions that are evaluated periodically. The commercial solutions that meet the technical requirements and are rated the best by the Soldiers will transition to production and fielding.

Justification: No FY2020 funding requested.

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

	FY 2018	FY 2019	FY 2020
Title: TCAPS testing and evaluation. Description: Test articles procurement and testing & evaluation. FY 2019 Plans: Conduct TCAPS-Lite Generation 2 developmental and operational testing. FY 2019 to FY 2020 Increase/Decrease Statement: FY20 funding reduced to zero.	0.654	0.261	-
Title: System Engineering and Program Management (SEPM) Description: TCAPS system engineering and program management support. FY 2019 Plans:	0.196	0.064	-

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) DX7 / <i>TACTICAL COMMUNICATIONS AND PROTECTIVE SYSTEM</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Continue development of performance parameters for TCAPS-Lite Generation 2.			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Funding reduced to zero.			
Accomplishments/Planned Programs Subtotals	0.850	0.325	-

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
• B55510: <i>Tactical Communications And Protective System</i>	4.411	10.368	0.000	-	0.000	-	-	-	-	0.000	14.779

Remarks

D. Acquisition Strategy

TCAPS is an ACAT IV program that leverages commercial-off-the-shelf (COTS) technology. TCAPS conducts periodic relook of commercial technology to seek improved capabilities, reduce costs and transition to production. Uses Defense Logistics Agency (DLA), General Services Administration (GSA) and other contracts to acquire products for evaluation and production.

E. Performance Metrics

N/A

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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 / 5				PE 0604827A / Soldier Systems - Warrior Dem/Val				DX7 / TACTICAL COMMUNICATIONS AND PROTECTIVE 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
SEPM	MIPR	PEO Soldier : Ft Belvoir, VA	0.674	0.196		0.064		-		-		-	0.000	0.934	-
Subtotal			0.674	0.196		0.064		-		-		-	0.000	0.934	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
Test Articles (Engineering Assessment)	MIPR	DLA DSCP : Philadelphia, PA	0.082	-		-		-		-		-	0.000	0.082	-
Test Articles (Development Test)	MIPR	DLA DSCP : Philadelphia, PA	0.150	-		-		-		-		-	0.000	0.150	-
Test Articles (OT)	MIPR	DLA DSCP : Philadelphia, PA	0.405	-		-		-		-		-	0.000	0.405	-
Subtotal			0.637	-		-		-		-		-	0.000	0.637	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
Annual Relook of Technology/Evaluation	MIPR	ATEC, AEC, OTC, ARL-SLAD : Various Locations	0.752	-		-		-		-		-	0.000	0.752	-
Developmental and Operational Test	Various	ATEC, AEC, OTC, ARL-SLAD : Various Locations	1.225	0.654		0.261		-		-		-	0.000	2.140	-
Customer Test	Various	Army Hearing Program Office : Various Locations	0.028	-		-		-		-		-	0.000	0.028	-
Subtotal			2.005	0.654		0.261		-		-		-	0.000	2.920	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army									Date: March 2019				
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>			Project (Number/Name) DX7 / <i>TACTICAL COMMUNICATIONS AND PROTECTIVE SYSTEM</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	3.316	0.850		0.325		-		-		-	0.000	4.491	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) DX7 / <i>TACTICAL COMMUNICATIONS AND PROTECTIVE 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
Annual Relook of Technology for Evaluation/Integration Test for FY19	[REDACTED]				[REDACTED]																							
Developmental and Operational Assessment for FY19 Fielding	[REDACTED]				[REDACTED]																							
Annual Relook of Technology for Evaluation/Integration Test for FY20 Fielding	[REDACTED]				[REDACTED]																							
Developmental and Operational Assessment for FY20 Fielding	[REDACTED]				[REDACTED]																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) DX7 / <i>TACTICAL COMMUNICATIONS AND PROTECTIVE SYSTEM</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Annual Relook of Technology for Evaluation/Integration Test for FY16 Fielding	1	2015	3	2015
Technical Gen 2 headset test	3	2015	4	2015
Operation Gen 2 headset test	4	2015	4	2015
Developmental and Operational Assessment for FY16 Fielding	2	2015	4	2015
TCAPS/TCAPS Lite Post Implementation Review	4	2016	4	2016
VIC3 cable test	4	2016	4	2016
Annual Relook of Technology for Evaluation/Integration Test for FY17 Fielding	1	2016	3	2016
Developmental and Operational Assessment for FY17 Fielding	2	2016	4	2016
Annual Relook of Technology for Evaluation/Integration for FY18 Fielding	1	2017	3	2017
Developmental and Operational Assessment for FY18	2	2017	4	2017
Annual Relook of Technology for Evaluation/Integration Test for FY19 Fielding	1	2018	3	2018
Developmental and Operational Assessment for FY19 Fielding	2	2018	4	2018
Annual Relook of Technology for Evaluation/Integration Test for FY20 Fielding	1	2019	3	2019
Developmental and Operational Assessment for FY20 Fielding	2	2019	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>				Project (Number/Name) EY2 / <i>Integrated Soldier Power Data System - Core</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
EY2: <i>Integrated Soldier Power Data System - Core</i>	-	6.671	2.859	1.439	-	1.439	1.243	0.000	0.000	2.506	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Integrated Soldier Power Data System - Core (ISPDS-C) funding was realigned from Program Element: 0604827A (Soldier Systems Warrior Dem/Val)/Project: S65 (Soldier Power) starting in FY2018.

A. Mission Description and Budget Item Justification

Soldier Power Integration (SPI) includes power and data managing/distribution devices, cutting-edge energy storage solutions, and power scavenging devices. These capabilities fill the power and energy gaps created by the increase in mission essential, Soldier portable power consumers, such as heads up displays, situational awareness displays, GPS systems, weapon sensors, radios, and other devices. This RDT&E line develops power sources and power management solutions for the individual Soldier and squad for use in the most austere operating environments. SPI systems will enable dismounted Soldiers to execute their missions more efficiently, for longer durations and with fewer battery resupplies while reducing the logistical and physical burden associated with moving fuel and primary (disposable) batteries, and allow dismounted Soldiers to operate independently for longer missions without being tethered to a large generator, vehicle, or supply train. This effort is consistent with the Soldier Protection Capability Development Document (CDD) (March 2011), Operational Energy Initial Capabilities Document (26 April 2012), the Small Unit Power CDD (26 September 2013), and the draft SPM, ISPDS-C with Conformal Central Power Source Capability Production Document (May 2017).

Justification: FY20 RDT&E develops and evaluates Intra-Soldier Wireless solutions, fuel cell based solutions and improved mission duration batteries.

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

	FY 2018	FY 2019	FY 2020
Title: Test and Evaluation	1.210	0.443	0.220
Description: Test and validate new battery chemistries and interfaces with the IPSPDS-C and SPM.			
FY 2019 Plans: Will continue to evaluate intra-Soldier wireless technologies.			
FY 2020 Plans: Will continue to evaluate intra-Soldier wireless technologies and test and validate new battery chemistries.			
FY 2019 to FY 2020 Increase/Decrease Statement: HQDA re-prioritization			
Title: Test and Evaluation of E-textile integrated vest	-	0.061	0.131

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY2 / <i>Integrated Soldier Power Data System - Core</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: Test and validate two new E-textile integrated IOTV Generation IV designs. These vest designs will interface with the Next Generation Hub, Command Center, and battery charger efforts.</p> <p>FY 2019 Plans: Receive vest prototypes for testing and evaluations.</p> <p>FY 2020 Plans: Integrate launderable E-textile connectors into existing E-textile vest designs for testing and evaluations.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: HQDA re-prioritization</p>			
<p>Title: System Engineering & Program Management</p> <p>Description: Conduct system engineering and project management for ISDPS-C efforts and Intra-soldier wireless technologies.</p> <p>FY 2019 Plans: Will continue to evaluate intra-Soldier wireless technologies.</p> <p>FY 2020 Plans: Continue to conduct system engineering and project management for ISDPS-C efforts and Intra-soldier wireless technologies.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: HQDA re-prioritization</p>	1.889	0.787	0.173
<p>Title: ISPDS-C/CWB Capability Improvements Integration</p> <p>FY 2019 Plans: Continue to conduct integration of new lightweight, Soldier Power Generation, chargers / harvesters, and generators capable of supporting the variety of power devices used in tactical formations.</p> <p>FY 2020 Plans: Conduct integration of intra-Soldier wireless and fuel cells capable of supporting the variety of power devices used in tactical formations.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: HQDA re-prioritization</p>	3.572	0.662	0.694
<p>Title: Second Source CWB qualification</p>	-	0.814	0.221

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY2 / <i>Integrated Soldier Power Data System - Core</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<p>Description: Qualify one or more vendors for an alternative method of procuring CWBs.</p> <p>FY 2019 Plans: Compete and award an alternative source of procuring the CWB. Conduct Preliminary Design Review (PDR).</p> <p>FY 2020 Plans: Conduct Critical Design Review (CDR) and first article testing. Take delivery of minimum contractual quantity of CWBs.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: HQDA re-prioritization</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: FY2019 SBIR / STTR Transfer</p>	-	0.092	-
Accomplishments/Planned Programs Subtotals	6.671	2.859	1.439

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
• S65: <i>Platoon Power Generator</i>	6.306	5.474	1.419	-	1.419	-	-	-	-	0.000	13.199
• EY4: <i>Universal Battery Charger</i>	1.663	1.406	1.433	-	1.433	1.461	0.901	0.916	-	0.000	7.780
• EY3: <i>Soldier Power Generator</i>	-	0.318	0.000	-	0.000	-	-	-	-	0.000	0.318
• R09103: <i>Universal Battery Charger</i>	1.898	8.456	9.865	-	9.865	10.076	-	-	-	0.000	30.295
• R08090: <i>Integrated Soldier Power Data System - Core</i>	4.533	22.318	17.495	-	17.495	17.837	-	-	-	0.000	62.183

Remarks

D. Acquisition Strategy
Pursue a variety of Soldier power products under full and open competition. Initiatives range from Commercial-Off-The-Shelf (COTS) solutions to developmental efforts. The type of solicitation depends on the maturity of the technology. The power initiatives will be evaluated through scheduled test and evaluation events, and if

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY2 / <i>Integrated Soldier Power Data System - Core</i>

successful, selected for procurement and subsequent fielding and sustainment. The acquisition strategy varies by product. For example, the CWB acquisition strategy consists of two phases: Phase one includes the purchase of test articles using the Defense Logistics Agency (DLA) Special Operational (Spec Ops) Equipment Tailored Logistic Support Program (TLSP) and General Services Administration (GSA) contracts. Phase two includes the procurement of additional test articles through Indefinite Delivery Indefinite Quantity (IDIQ) contracts established through the Army Contracting Command (ACC). The Project Manager office will establish IDIQ contracts to support the SPI requirements over time. Each SPI system will be procured under purchase orders for production quantities that will be awarded on a Firm Fixed Price (FFP) contract. Developmental contracts for intra-soldier wireless technology are awarded through the Army Research, Development and Engineering Command.

E. Performance Metrics

N/A

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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 / 5				PE 0604827A / Soldier Systems - Warrior Dem/Val				EY2 / Integrated Soldier Power Data System - Core								
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 & Program Management Support	MIPR	Various : Various	-	1.889		0.787		0.173		-		0.173	Continuing	Continuing	-	
Subtotal			-	1.889		0.787		0.173		-		0.173	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	
ISPDS-C, CWB Capability Improvements Integration	MIPR	Various : Various	-	3.572		1.476		0.915		-		0.915	0.000	5.963	-	
Subtotal			-	3.572		1.476		0.915		-		0.915	0.000	5.963	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	
FY2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.092		-		-		-	0.000	0.092	-	
Subtotal			-	-		0.092		-		-		-	0.000	0.092	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 & Evaluation	MIPR	Various : Various	-	1.210		0.504		0.351		-		0.351	0.000	2.065	-	
Subtotal			-	1.210		0.504		0.351		-		0.351	0.000	2.065	N/A	

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>				Project (Number/Name) EY2 / <i>Integrated Soldier Power Data System - Core</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	-	6.671		2.859		1.439		-		1.439	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY2 / <i>Integrated Soldier Power Data System - Core</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
Annual Relook of Technology			■																									
Testing of Product Improvements							■																					
Annual Relook of Technology 2 (Fuel Cells, ISW, higher energy batteries)											■																	
Testing of Product Improvements 2 (Fuel Cells, ISW, higher energy batteries)															■													
Power Scavenger Performance Improvements																												
Second Source CWB Qualification																												
E-Textile Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY2 / <i>Integrated Soldier Power Data System - Core</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone C	1	2017	1	2017
CWB Development Testing 1	3	2017	3	2017
Annual Relook of Technology	3	2018	4	2018
Testing of Product Improvements	3	2019	4	2019
Annual Relook of Technology 2 (Fuel Cells, ISW, higher energy batteries)	3	2020	4	2020
Testing of Product Improvements 2 (Fuel Cells, ISW, higher energy batteries)	3	2021	4	2021
Power Scavenger Performance Improvements	2	2019	4	2020
Second Source CWB Qualification	2	2019	2	2020
E-Textile Development	2	2019	4	2019

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>				Project (Number/Name) EY3 / <i>Soldier Power Generator</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
EY3: <i>Soldier Power Generator</i>	-	0.000	0.318	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	0.318
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning in FY19, funding for Soldier Power Generator was realigned from Program Element: 0604827A (Soldier Systems - Warrior Dem/Val)/Project: S65 (Soldier Power).

A. Mission Description and Budget Item Justification

Soldier Power Generation (SPG) fills the power and energy gap created by the increase in mission essential and power consuming devices, by providing charging solutions capable of providing power to handheld communication devices and a suite of military batteries. SPG is intended for use in the most austere operating environments providing the Soldier with energy independency for extended mission duration. The system will provide the Soldier with a lightweight, worn or carried power generation capability, integrated within the warfighters combat load.

Justification: Program has no FY20 RDTE funding.

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

	FY 2018	FY 2019	FY 2020
Title: Test and Evaluation	-	0.318	-
Description: Test emerging technologies.			
FY 2019 Plans: Evaluate emerging power generation technologies.			
FY 2019 to FY 2020 Increase/Decrease Statement: HQDA re-prioritization			
Accomplishments/Planned Programs Subtotals	-	0.318	-

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
• S65: <i>Platoon Power Generator</i>	6.306	5.474	1.419	-	1.419	-	-	-	-	0.000	13.199
• EY2: <i>Integrated Soldier Power Data System - Core</i>	6.671	2.859	1.439	-	1.439	1.243	-	-	2.506	Continuing	Continuing
• EY4: <i>Universal Battery Charger</i>	1.663	1.406	1.433	-	1.433	1.461	0.901	0.916	-	0.000	7.780

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY3 / <i>Soldier Power Generator</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>
• R09103: <i>Universal Battery Charger</i>	1.898	8.456	9.865	-	9.865	10.076	-	-	-	0.000	30.295

Remarks

D. Acquisition Strategy

Develop a range of Soldier Power Generation technologies, based on technical tests and Soldier feedback, to determine the best material solution and then award a competitive contract to pursue test articles. Any follow on production for successful test articles will be through competitively awarded contracts.

E. Performance Metrics

N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY3 / <i>Soldier Power Generator</i>
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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			
System Engineering and Prgram Management (SEPM)	MIPR	PEO Soldier, Ft. Belvoir, VA : TBD	-	-		0.045		-		-		-	0.000	0.045	-
Subtotal			-	-		0.045		-		-		-	0.000	0.045	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			
Development Test	TBD	Various : TBD	-	-		0.273		-		-		-	0.000	0.273	-
Subtotal			-	-		0.273		-		-		-	0.000	0.273	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	-	-	0.318	-	-	-	0.318	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>		Project (Number/Name) EY3 / <i>Soldier Power Generator</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 and Evaluation					Emerging Technologies																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY3 / <i>Soldier Power Generator</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Test and Evaluation	1	2019	4	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>				Project (Number/Name) EY4 / <i>Universal Battery Charger</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
EY4: <i>Universal Battery Charger</i>	-	1.663	1.406	1.433	-	1.433	1.461	0.901	0.916	0.000	0.000	7.780
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Beginning in FY18, funding for Universal Battery Charger realigned from Program Element: 0604827A (Soldier Systems - Warrior Dem/Val)/Project S65 (Soldier Power).

A. Mission Description and Budget Item Justification

The Universal Battery Charger (UBC) fills the power and energy gap created by the increase in mission essential and power consuming devices, by providing a charging solution capable of recharging conformal wearable batteries and a wide variety of handheld communication devices and a suite of military batteries. The UBC is suited for the company and below formations in the most austere operating environments. The system can draw power from wall outlets, vehicle power, and solar power sources. The UBC enables dismounted Soldiers to execute their missions with fewer battery resupplies, thus reducing the logistical burden associated with moving fuel, primary (disposable) batteries, and rechargeable batteries. The UBC capability allows dismounted Soldiers to operate independently for longer missions without being tethered to a large generator, vehicle, or supply train. The UBC can be mounted on wheeled and tracked vehicles. This effort is consistent with the Operational Energy ICD (26 April 2012) and the Universal Battery Charger CPD (27 May 2015). Full Rate Production decision occurred 17 July 2017.

Justification: FY20 RDTE funding increases UBC capability by increasing battery recharge performance, reducing size and also tests and evaluates the increased UBC capability.

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

	FY 2018	FY 2019	FY 2020
Title: Test & Evaluation	1.345	1.115	1.171
FY 2019 Plans: Reduction of Universal Battery Charger size and weight as well as increase the battery recharging performance.			
FY 2020 Plans: Continue to evaluate reduction of UBC and weight as well as increase the battery recharging performance.			
FY 2019 to FY 2020 Increase/Decrease Statement: HQDA re-prioritization			
Title: System Engineering & Program Management	0.318	0.246	0.262
FY 2019 Plans:			

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY4 / <i>Universal Battery Charger</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Continue to develop the UBC Vehicle Integration Kit (VIK) and alternate dismounted charging solutions to reduce Soldier bulk and load. FY 2020 Plans: Conduct design and development of next generation UBC. FY 2019 to FY 2020 Increase/Decrease Statement: HQDA re-prioritization			
Title: FY2019 SBIR / STTR Transfer FY 2019 Plans: FY2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR / STTR Transfer	-	0.045	-
Accomplishments/Planned Programs Subtotals	1.663	1.406	1.433

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
• R09103: <i>Universal Battery Charger</i>	1.898	8.456	9.865	-	9.865	10.076	-	-	-	0.000	30.295
• S65: <i>Platoon Power Generator</i>	6.306	5.474	1.419	-	1.419	-	-	-	-	0.000	13.199
• EY2: <i>Integrated Soldier Power Data System - Core</i>	6.671	2.859	1.439	-	1.439	1.243	-	-	2.506	Continuing	Continuing
• EY3: <i>Soldier Power Generator</i>	-	0.318	0.000	-	0.000	-	-	-	-	0.000	0.318
• R08090: <i>Integrated Soldier Power Data System - Core</i>	4.533	22.318	17.495	-	17.495	17.837	-	-	-	0.000	62.183

Remarks

D. Acquisition Strategy

Competitive development and production contracts will be awarded to test, evaluate, and procure the next generation family of battery chargers to meet the increased power demand on the Soldier. A full and open, five year Indefinite Delivery Indefinite Quantity (IDIQ) production contract was awarded 27 January 2016 to procure the UBC.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY4 / <i>Universal Battery Charger</i>

<u>E. Performance Metrics</u> N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY4 / <i>Universal Battery Charger</i>
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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			
System Engineering/ Program Management Support	MIPR	Various : Various	-	0.250		0.246		0.262		-		0.262	0.318	1.076	-
Subtotal			-	0.250		0.246		0.262		-		0.262	0.318	1.076	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			
FY2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.045		-		-		-	0.000	0.045	-
Subtotal			-	-		0.045		-		-		-	0.000	0.045	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 & Evaluation	MIPR	Various : Various	-	1.413		1.115		1.171		-		1.171	1.139	4.838	-
Subtotal			-	1.413		1.115		1.171		-		1.171	1.139	4.838	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			-	1.663	1.406	1.433	-	1.433	1.457	5.959

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY4 / <i>Universal Battery Charger</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
Alternative Dismounted Charging Solutions Development	[Bar]				[Bar]																							
UBC-Lite Development and Evaluation	[Bar]				[Bar]																							
Evaluation of modernized battery chargers	[Bar]				[Bar]																							
Battery charger performance improvements	[Bar]				[Bar]																							
UBC kit configuration reevaluation	[Bar]				[Bar]																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) EY4 / <i>Universal Battery Charger</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Alternative Dismounted Charging Solutions Development	1	2018	1	2018
UBC-Lite Development and Evaluation	1	2019	4	2019
Evaluation of modernized battery chargers	2	2019	4	2020
Battery charger performance improvements	2	2019	4	2021
UBC kit configuration reevaluation	2	2020	4	2020

Note

Beginning in FY18, funding for Universal Battery Charger was realigned from Program Element: 0604827A (*Soldier Systems - Warrior Dem/Val*)/Project S65/Soldier Power. Prior to this realignment Soldier and Small Unit Power initiated developmental and test power solutions for the UBC technologies.

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>				Project (Number/Name) FK4 / <i>Soldier Borne Sensor (SBS)</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
FK4: <i>Soldier Borne Sensor (SBS)</i>	-	0.000	0.000	1.512	-	1.512	1.213	2.239	3.548	1.317	0.000	9.829
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Not a New Start: funding for this project was previously funded in PE: 0605053A / Grounds Robotics project, FB8.

A. Mission Description and Budget Item Justification

Project FK4 - Soldier Borne Sensor (SBS): The SBS is a small unmanned aerial vehicle. The SBS provides a near term solution to three Army War-fighting Challenges at the Infantry Squad level: develop situational understanding, conduct air-ground reconnaissance, and conduct joint combined arms maneuver. The system is simple to deploy and use to support the squad leader's decision-making process. The system allows Soldiers to obtain local situational awareness and understanding of their immediate surroundings while remaining in covered or concealed positions. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy.

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

	FY 2018	FY 2019	FY 2020
Title: Soldier Borne Sensor (SBS)	-	-	1.512
Description: The SBS provides the small unit a "quick look" capability providing Situational Awareness (SA).			
FY 2020 Plans: The program will utilize other transaction authority (OTA) prototype projects to rapidly incorporate new technologies including GPS-denied operation and integration with the Adaptive Soldier Architecture into prototypes for evaluation. The OTA scope of work (technologies integrated) will be determined based on affordability. OTAs will be established with multiple manufacturers if affordable.			
FY 2019 to FY 2020 Increase/Decrease Statement: In FY20, this SBS project and funding transitions from PE: 0605053A / Ground Robotics project 655053.FB8 to PE: 0604827A / Soldier Systems - Warrior Dem/Val project 654827.FK4.			
Accomplishments/Planned Programs Subtotals	-	-	1.512

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) FK4 / <i>Soldier Borne Sensor (SBS)</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	
• W63798: <i>Soldier Borne Sensor (SBS)</i>	24.000	21.680	23.362	-	23.362	25.927	11.160	19.101	25.293	0.000	150.523
• FD2: <i>Soldier Robotics Systems</i>	1.477	2.105	2.771	-	2.771	3.261	3.290	3.352	3.423	0.000	19.679
• FB8: <i>Soldier Borne Sensor (SBS)</i>	2.197	3.465	0.000	-	0.000	-	-	-	-	0.000	5.662

Remarks

Funding for this project was previously funded in PE: 0605053A / Grounds Robotics project, FB8.

D. Acquisition Strategy

SBS achieved Milestone C September 2017. The program office is utilizing Defense Logistics Agency - Tailored Logistics Support contracts to procure Tranche 1 systems in FY18, FY19, and FY20.

SBS will initiate one, or more, prototype project via other transaction agreement in FY19. The Tranche 2 SBS solution will be selected from these prototypes in FY21.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army	Date: March 2019
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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) FK4 / <i>Soldier Borne Sensor (SBS)</i>
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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			
Improved Imaging	MIPR	Night Vision Electronic Sensors Directorate (NVESD) : Fort Belvoir, Virginia 22060	-	-		-		0.010	Feb 2020	-		0.010	Continuing	Continuing	-
Tranche 2 Prototype	TBD	TBD : TBD	-	-		-		0.953	Feb 2020	-		0.953	Continuing	Continuing	-
Subtotal			-	-		-		0.963		-		0.963	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 Support	Various	Various : Multiple	-	-		-		0.549	Nov 2019	-		0.549	Continuing	Continuing	-
Subtotal			-	-		-		0.549		-		0.549	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			-	-	0.000	1.512	-	1.512	Continuing	Continuing	N/A

Remarks

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

Date: March 2019

Appropriation/Budget Activity
2040 / 5

R-1 Program Element (Number/Name)
PE 0604827A / *Soldier Systems - Warrior*
Dem/Val

Project (Number/Name)
FK4 / *Soldier Borne Sensor (SBS)*

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				
System Technology Improvements and Integration	Improvements & Integration																															
Soldier Touch Points (STP)																	 STP Tranche 1															
Full Rate Production (FRP) Decision																	 FRP															
First Unit Equiped (FUE)																	 FUE															
Tranche 2 - Technology Development	Tranche 2 - Tech Dev																															
Tranche 2 - Technology Integration and Testing	Tranche 2 - Tech Integr & Testing																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) FK4 / <i>Soldier Borne Sensor (SBS)</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
System Technology Improvements and Integration	2	2020	4	2024
Soldier Touch Points (STP)	2	2019	2	2019
Full Rate Production (FRP) Decision	1	2019	1	2019
First Unit Equiped (FUE)	3	2019	3	2019
Tranche 2 - Technology Development	4	2018	4	2020
Tranche 2 - Technology Integration and Testing	4	2019	1	2021

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>				Project (Number/Name) S65 / <i>Platoon Power Generator</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
S65: <i>Platoon Power Generator</i>	-	6.306	5.474	1.419	-	1.419	0.000	0.000	0.000	0.000	0.000	13.199
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Soldier and Small Unit Power (SUP) enables dismounted Soldiers to efficiently execute missions for longer durations by reducing the logistical burden associated with fuel and primary (disposable) batteries. Power solutions address energy deficits resulting from increased power demands associated with providing the Soldier with increased situational awareness displays, Global Positioning System (GPS) systems, weapon sensors, radios, and other devices. The Soldier and Small Unit Power system develops and tests power sources and solutions suited for the individual Soldier, team, squad, and platoon in the most austere operating environments. Develops and evaluates additional sources of power such as individual Soldier worn systems, renewable energy, and kinetic energy harvesting technologies. This effort is consistent with the Sep 2013 Small Unit Power CDD, the Dec 2011 Operational Energy ICD, and the Mar 2011 Soldier Protection CDD, and the Universal Battery Charger CPD (May 2015).

Platoon Power Generation - PM E2S2: This project supports the demonstration and development of a Platoon Power Generation (PPG). The Small Unit Power PPG will provide small units with no less than 900 Watts of portable power to sustain Modified Table of Organizational Equipment (MTOE) unit power demand in support of 48 to 72 hour missions using a common logistical fuel (JP-8). It will be used for charging batteries and powering various types of Army communications and electronics devices. It will provide sufficient power to recharge and power all Platoon equipment and fulfill residual power gaps at the Squad and Soldier level. The generator will provide Platoon power for charging batteries when away from vehicles in all Brigade Combat Teams (Stryker, Armor and Infantry), Rangers and Special Forces in austere environments. FY 2020 funds will be used to complete the Engineering and Manufacturing Development (EMD) Phase.

Funding supports modernization of the current power generation for Soldier borne sensors by investigating technology insertions including, but not limited to a modified COTS generator concept and proprietary fuel atomization. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational energy concepts.

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

	FY 2018	FY 2019	FY 2020
Title: Platoon Power Generation (PPG) - PM E2S2	6.306	5.273	1.419
Description: Manage an EMD phase R&D contract for the PPG.			
FY 2019 Plans: Continue with EMD Phase. Support Critical Design Review (CDR) and Developmental Testing.			
FY 2020 Plans: Complete EMD Phase and Developmental Testing, which culminates in a user test.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) S65 / <i>Platoon Power Generator</i>
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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Reduced funding in FY20 is due to the EMD Phase and Developmental Testing ending in 2nd Qtr of 2020.			
Title: FY 2019 SBIR / STTR Transfer	-	0.201	-
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	6.306	5.474	1.419

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
• R08090: <i>Integrated Soldier Power Data System - Core</i>	4.533	22.318	17.495	-	17.495	17.837	-	-	-	0.000	62.183
• R09103: <i>Universal Battery Charger</i>	1.898	8.456	9.865	-	9.865	10.076	-	-	-	0.000	30.295
• EY2: <i>Integrated Soldier Power Data System - Core</i>	6.671	2.859	1.439	-	1.439	1.243	-	-	2.506	Continuing	Continuing
• EY4: <i>Universal Battery Charger</i>	1.663	1.406	1.433	-	1.433	1.461	0.901	0.916	-	0.000	7.780
• EY3: <i>Soldier Power Generator</i>	-	0.318	0.000	-	0.000	-	-	-	-	0.000	0.318

Remarks

D. Acquisition Strategy
PEO CS/CSS Effort on the Platoon Power Generation - PM E2S2:

Utilizing Other Transactional Agreement (OTA) contract vehicle culminating in an EMD award of three (3) Firm Fixed Price (FFP) contracts supporting an 18-24 month Engineering and Manufacturing Development (EMD) phase. Three selected contractors have been awarded EMD contracts and will separately fabricate and produce the minimum order of 15 Small Unit Power Platoon Power Generation (>900 Watts) systems (5 per vendor). The selected vendors will produce 5 additional systems to undergo developmental test (DT), a logistics demonstration (LD), pre-production qualification test, and limited user / operational test (LUT/OT). Upon successful completion of these tests and completion of logistics supportability, the performance data and Soldier's feedback will be utilized in preparation for Milestone C (MS C) 3rd Qtr FY20.

E. Performance Metrics
N/A

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) S65 / <i>Platoon Power Generator</i>
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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			
Platoon Power Generation	Various	PM E2S2 : Fort Belvoir, VA	-	0.225		0.230		0.070		-		0.070	0.000	0.525	-
Subtotal			-	0.225		0.230		0.070		-		0.070	0.000	0.525	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			
Platoon Power Generation	C/FFP	Picatinny : Contractor Sites	1.500	4.618		4.263		0.500		-		0.500	1.500	12.381	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.201		-		-		-	0.000	0.201	-
Subtotal			1.500	4.618		4.464		0.500		-		0.500	1.500	12.582	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			
Platoon Power Generation	MIPR	APG : APG	1.356	1.463		0.230		0.449		-		0.449	0.600	4.098	-
Subtotal			1.356	1.463		0.230		0.449		-		0.449	0.600	4.098	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			
Platoon Power Generation	MIPR	Ft. Benning : Ft. Benning	0.220	-		0.550		0.400		-		0.400	0.220	1.390	-
Subtotal			0.220	-		0.550		0.400		-		0.400	0.220	1.390	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date: March 2019					
Appropriation/Budget Activity 2040 / 5				R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>				Project (Number/Name) S65 / <i>Platoon Power Generator</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	3.076	6.306		5.474		1.419		-		1.419	2.320	18.595	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) S65 / <i>Platoon Power Generator</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
Milestone B (PPG)					▲ 1				Milestone B Platoon Power Generation (PPG)																			
EMD Contract Award (PPG)					▲ 2				Contract Award (PPG)																			
EMD Contract (PPG)					▲ 3				EMD Contract (PPG)																			
Critical Design Review (CDR) (PPG)					▲ 3				CDR (PPG)																			
Developmental Testing (PPG)					▲ 4				DT (PPG)																			
Limited User Test (LUT) (PPG)					▲ 4				LUT (PPG)																			
Milestone C/LRIP (PPG)					▲ 5				Milestone C (PPG)																			

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604827A / <i>Soldier Systems - Warrior Dem/Val</i>	Project (Number/Name) S65 / <i>Platoon Power Generator</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Milestone B (PPG)	1	2019	1	2019
EMD Contract Award (PPG)	2	2019	2	2019
EMD Contract (PPG)	2	2019	2	2020
Critical Design Review (CDR) (PPG)	2	2019	2	2019
Developmental Testing (PPG)	3	2019	1	2020
Limited User Test (LUT) (PPG)	2	2020	2	2020
Milestone C/LRIP (PPG)	3	2020	3	2020