# 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 4** 

UNCLASSIFIED

Army • Budget Estimates FY 2020 • RDT&E Program

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### UNCLASSIFIED RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY APPROPRIATION LANGUAGE

For expenses necessary for basic and applied scientific research, development, test and evaluation, including maintenance, rehabilitation, lease, and operation of facilities and equipment, \$12,396,895,000.00 to remain available for obligation until September 30, 2021.

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

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

### COST STATEMENT

The following Justification Books were prepared at a cost of \$366,803: Aircraft (ACFT), Missiles (MSLS), Weapons & Tracked Combat Vehicles (WTCV), Ammunition (AMMO), Other Procurement Army (OPA) 1 – Tactical & Support Vehicles, Other Procurement Army (OPA) 2 – Communications & Electronics, Other Procurement Army (OPA) 3 & 4 - Other Support Equipment & Spares, Research, Development, Test and Evaluation (RDTE) for: Budget Activity 1, Budget Activity 2, Budget Activity 3, Budget Activity 4, Budget Activity 5A, Budget Activity 5B, Budget Activity 6, and Budget Activity 7.

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

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

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

<b>Budget</b> Activity	OSDPE / Project	Project Title	
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	

## **New Start Programs:**

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:

Budget		
<u>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

	0601102A / ET6: BASIC RESCH IN CLINICAL &	
01	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
0.2		0602145A / BI2, 0602146A / AP5 & AR1, 0602148A / AL8,
02	0602120A / H16: S31 Technology	0602150A/AD5
02	0602120A / TS1: Tactical Space Research	0602146A / AU5
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 Survivablty	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:**

<b>Budget</b> Activity	OSDPE / Project	OSDPE Title / Project Title	
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	nformation Systems Security Program / Unit Activity Monitoring (UAM)	
07	0303150A / EA5	/WMCCS/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.

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

FY 2018 FY 2019 FY 2019 FY 2019 Appropriation (Base + OCO) Base Enacted OCO Enacted Total Enacted ---------------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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#### Department of Defense FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

FY 2020 OCO for FY 2020 Direct War FY 2020 FY 2020 Total FY 2020 OCO for Base and Enduring Total Requirements Costs 000 (Base + OCO) Appropriation Base ----------\_\_\_\_\_ ---------12,192,771 204,124 204,124 12,396,895 Research, Development, Test & Eval, Army 204,124 204,124 12,396,895 12,192,771 Total Research, Development, Test & Evaluation

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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)

Summary Recap of Budget Activities	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
		**********	**********	
Basic Research	464,187	506,444	10	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
CUMPANY BOGAD OF EVEN Drogramo				
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	X	5,955
Total Research, Development, Test & Evaluation	11,633,461	11,074,556	300,604	11,375,160

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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)

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

Summary Recap of Budget Activities	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted
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
Summary Recap of FYDP Programs				
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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#### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

Summary Recap of Budget Activities	FY 2020 Base	FY 2020 OCO for Base Bequirements	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	eeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeeee				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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#### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

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	
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	2
	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	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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#### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Réquirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	S e c	
						14				
1	0601101A	In-House Laboratory Independent 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			0			U	
7	0602120A	Sensors and Electronic Survivability	7 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		74		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		ir.	×	74,327	U	
17	0602148A	Future Verticle Lift Technology	02	93,601				93,601	U	

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

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 l 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	а.,	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	ט	
36	0602783A	Computer and Software Technology	02	13,707	14,948		14,948	U	

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

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	S e c
								ASTA VERALA AND ASTAC	
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					1+	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			2			U
30	0602705A	Electronics and Electronic Devices	02			12			U
31	0602709A	Night Vision Technology	02			8			U
32	0602712A	Countermine Systems	02						U
33	0602716A	Human Factors Engineering Technology	7 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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#### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e C
37	0602784A	Military Engineering Technology	02	114,947	101,124		101,124	U
38	0602785A	Manpower/Personnel/Training Technology	02	19,791	21,847		21,847	U
39	0602786A	Warfighter Technology	02	58,476	56,532		56,532	U
40	0602787A	Medical Technology	02	88,891	92,003		92,003	U
	Appli	ed 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	Ŭ
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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#### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	S e 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						Ŭ
40	0602787A	Medical Technology	02	99,155				99,155	U
	Appli	ed Research		893,990				893,990	
41	0603001A	Warfighter Advanced Technology	03			5 9			U
42	0603002A	Medical Advanced Technology	03	42,030				42,030	υ
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		X				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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#### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

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

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Line	Element	0		FY 2018	FY 2019	FY 2019	FY 2019	P
No	Number	Item	Act	(Base + OCO)	Base Enacted	OCO Enacted	Total Enacted	c
-								-
53	0603125A	Combating Terrorism - Technology	03	44,088	36,757		36,757	U
		Development						
					1 005			
54	0603130A	TRACTOR NAIL	03	4,880	4,896		4,896	υ
55	06021217		0.2	1 226	6 0/1		6 041	П
55	OODSISIA	IRACION EGGS	03	4,520	0,041		0,041	0
56	0603270A	Electronic Warfare Technology	03	33,249	41,458		41,458	U
				00,210	11,100		,	•
57	0603313A	Missile and Rocket Advanced	03	133,433	94,561		94,561	U
		Technology						
58	0603322A	TRACTOR CAGE	03	12,323	16,845		16,845	U
59	0603457A	C31 Cyber Advanced Development	03					U
60	06034617	High Porformance Computing	03	214 100	218 008		218 098	τī
00	0003401A	Modernization Program	03	214,100	210,090		210,090	0
		Modelinization riogram						
61	0603462A	Next Generation Combat Vehicle	03					U
		Advanced Technology						
62	0603463A	Network C3I Advanced Technology	03					U
63	0603464A	Long Range Precision Fires Advanced	03					Ū
		Technology						
C A	06024657	Entrana Martical Lift Advanced	0.2					TT
04	0603465A	Technology	03					0
		recimorogy						
65	0603466A	Air and Missile Defense Advanced	03					υ
		Technology						
66	0603606A	Landmine Warfare and Barrier	03	18,473	17,097		17,097	U
		Advanced Technology						
67	0000077	Taint Couries Chall Runs Descurs	0.7	E (00	22 700		007 00	TT
6/	U6U36U/A	Joint Service Small Arms Program	03	5,628	22,199		22,199	U
68	06037108	Night Vision Advanced Technology	03	45 617	61, 313		61,313	П
00	00007104	Argine vision Advanced recimorogy	05	40,017	01,010		01,010	0

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

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

Line No	Program Element Number	Item	Act	Fï	r 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	E (Ba	TY 2020 Total ase + OCO)	S e c
22	करतेल में सतिव										-
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				1	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	υ
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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#### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

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 I 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	
	Adva	nced Technology Development		1,503,959	1,585,778		1,585,778		
73	0603305A	Army Missle 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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#### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

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

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	S e C
	the set of the set			********					-
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		x				U
72	0603794A	C3 Advanced Technology	03	X					U
	Advan	ced Technology Development		1,099,564	*****			1,099,564	
73	0603305A	Army Missle Defense Systems Integration	04	10,987				10,987	U
74	0603327A	Air and Missile Defense Systems Engineering	04	15,148		500	500	15,648	Ų
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						υ
77	0603639A	Tank and Medium Caliber Ammunition	04	82,146				82,146	U
78	0603645A	Armored System Modernization - Adv Dev	04	157,656	-		54 <sup>(8)</sup>	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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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 1 c
								-
83	0603790A	NATO Research and Development	04	2,485	3,682		3,682	U
84	0603801A	Aviation - Adv Dev	04	9,653	86,180		86,180	U
85	0603804A	Logistics and Engineer Equipment - Adv Dev	04	29,619	17,230		17,230	U
86	0603807A	Medical Systems - Adv Dev	04	36,279	39,244		39,244	U
87	0603827A	Soldier Systems - Advanced Development	04	60,774	31,022		31,022	U
88	0604017A	Robotics Development	04	38,051	74,368		74,368	U
89	0604020A	Cross Functional Team (CFT) Advanced Development & Prototyping	04		9,488		9,488	U
90	0604021A	Electronic Warfare Technology Maturation (MIP)	04				34	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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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)	S e c
83	0603790A	NATO Research and Development	04	5,406				5,406	U
84	0603801A	Aviation - Adv Dev	0.4	459.290				459,290	υ
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					<b>.</b>	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
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
	Advan	ced Component Development & Prototype	es	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	υ

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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)	S e C
	0.0041017		0.4	136 761				126 761	-
99	0604121A	Refinement & Prototyping	04	130,701				150,701	0
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
	Advar	nced Component Development & Prototype	es	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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Line No	Program Element Number	Item	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	S e C
116	0604622A	Family of Heavy Tactical Vehicles	05	10,086	11,935		11,935	U
117	0604633A	Air Traffic Control	05	3,433	12,332		12,332	U
118	0604642A	Light Tactical Wheeled Vehicles	05	3,619	1,276		1,276	U
119	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	34,794	373,337		373,337	U
120	0604710A	Night Vision Systems - Eng Dev	05	184,389	144,442		144,442	U
121	0604713A	Combat Feeding, Clothing, and Equipment	05	8,561	4,502		4,502	U
122	0604715A	Non-System Training Devices - Eng Dev	05	51,900	44,381		44,381	U
123 ,	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	190,385	93,073	119,300	212,373	U
124	0604742A	Constructive Simulation Systems Development	05	17,921	22,600		22,600	ΰ
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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Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	S e C
116	0604622A	Family of Heavy Tactical Vehicles	05	16,745				16,745	U
117	0604633A	Air Traffic Control	05	6,989	54 (4			6,989	U
118	0604642A	Light Tactical Wheeled Vehicles	05	10,465		÷		10,465	U
119	0604645A	Armored Systems Modernization (ASM) - Eng Dev	05	310,152		ar.		310,152	U
120	0604710A	Night Vision Systems - Eng Dev	05	181,732				181,732	U
121	0604713A	Combat Feeding, Clothing, and $^{top}$ Equipment	05	2,393			38	2,393	U
122	0604715A	Non-System Training Devices - Eng Dev	05	27,412				27,412	U
123	0604741A	Air Defense Command, Control and Intelligence - Eng Dev	05	43,502				43,502	U
124	0604742A	Constructive Simulation Systems Development	05	11,636				11,636	U
125	0604746A	Automatic Test Equipment Development	05	10,915				10,915	U
126	0604760A	Distributive Interactive Simulations (DIS) - Eng Dev	05	7,801				7,801	U
127	0604768A	Brilliant Anti-Armor Submunition (BAT)	05	25,000				25,000	U
128	0604780A	Combined Arms Tactical Trainer (CATT) Core	05	9,241				9,241	U
129	0604798A	Brigade Analysis, Integration and Evaluation	05	42,634				42,634	U
130	0604802A	Weapons and Munitions - Eng Dev	05	181,023				181,023	U

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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
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 <u></u>	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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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)	S e C
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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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No	Element Number	Ttem	Act	FY 2018 (Base + OCO)	FY 2019 Base Enacted	FY 2019 OCO Enacted	FY 2019 Total Enacted	e
								-
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	2	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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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)	S e c -
147	0605031A	Joint Tactical Network (JTN)	05	40,808				40,808	U
148	0605032A	TRACTOR TIRE	05		5				U
149	0605033A	Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	05	3,847			2	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			ε.			U
154	0605038A	Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite	05	6,054	3			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	12	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	0'5	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
	Syste	m 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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							1		-
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			9.11	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	υ
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
	Syste	m 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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### Department of the Army FY 2020 President's Budget Exhibit R-1 FY 2020 President's Budget Total Obligational Authority (Dollars in Thousands)

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	υ
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)	S e C
			-						-
178	0604759A	Major T&E Investment	06	136,565				136,565	U
179	0605103A	Rand Arroyo Center	06	13,113	а С			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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Appropriation: 2040A Research, Development, Test & Eval, Army

Line	Program Element	Thom	7.~+	FY 2018	FY 2019	FY 2019	FY 2019	S e	
NO				(Base + 000)	sase Enacted		Total Enacted	- -	
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	A999999A	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	100
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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Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	Ś e c
100	0.005.05.77		0.0	4 601				4 (01	
196	0605827A	Environmental Quality Technology Mgmt Support	06	4,681				4,081	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	2 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 l 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			5	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	Q607145A	Apache Future Development	07			ā.		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	1	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)	S e c
211	0607136A	Blackhawk Product Improvement	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			12	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	Ú
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	υ
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	υ
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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Appropriation: 2040A Research, Development, Test & Eval, Army

Line No	Program Element Number	Item	Act	FY 2020 Base	FY 2020 OCO for Base Requirements	FY 2020 OCO for Direct War and Enduring Costs	FY 2020 Total OCO	FY 2020 Total (Base + OCO)	S e C
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			4			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	ı 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	S e c
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	2	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	999999999999	Classified Programs		7,154	5,955		5,955	U
	Operat	tional Systems Development		1,830,278	1,735,065	59,741	1,794,806	
Tota	Research,	Development, Test & Eval, Army		11,633,461	11,074,556	300,604	11,375,160	

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						FY 2020 OCO for			
Line	Program Element			FY 2020	FY 2020 OCO for Base	Direct War and Enduring	FY 2020 Total	FY 2020 Total	S e
N0 	Number	Item	Act	Base	Requirements	Costs		(Base + OCO)	с -
246	0305204A	Tactical Unmanned Aerial Vehicles	07	5,097		34,100	34,100	39,197	υ
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		10 1		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	999999999999	Classified Programs		7,273				7,273	U
	Operat	tional Systems Development		1,978,826		73,218	73,218	2,052,044	
Tota	l Research,	Development, Test & Eval, Armý		12,192,771		204,124	204,124	12,396,895	

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74	04	0603327A	Air and Missile Defense Systems Engineering	16
75	04	0603619A	Landmine Warfare and Barrier - Adv Dev	25
76	04	0603627A	Smoke, Obscurant and Target Defeating Sys-Adv Dev	50
77	04	0603639A	Tank and Medium Caliber Ammunition	59
78	04	0603645A	Armored System Modernization - Adv Dev	. 152
79	04	0603747A	Soldier Support and Survivability	165
80	04	0603766A	Tactical Electronic Surveillance System - Adv Dev	193
81	04	0603774A	Night Vision Systems Advanced Development	. 202
82	04	0603779A	Environmental Quality Technology - Dem/Val	222
83	04	0603790A	NATO Research and Development	. 238
84	04	0603801A	Aviation - Adv Dev	250
85	04	0603804A	Logistics and Engineer Equipment - Adv Dev	264
86	04	0603807A	Medical Systems - Adv Dev	. 314
87	04	0603827A	Soldier Systems - Advanced Development	. 352
88	04	0604017A	Robotics Development	391

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#### Line # **Budget Activity Program Element Number Program Element Title** Page 89 04 0604020A Electronic Warfare Technology Maturation (MIP)...... 433 90 04 0604021A 91 04 0604100A 92 04 0604113A Future Tactical Unmanned Aircraft System (FTUAS)...... 445 93 04 0604114A 94 04 0604115A 95 04 0604117A 96 04 0604118A 97 04 0604119A 98 04 0604120A 99 04 0604121A 0604182A 100 04 101 04 0604319A 0604403A 102 04 0604541A 103 04 104 04 0604644A 105 04 0604785A 0305251A 106 04

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

Line #	Budget Activity	Program Element Number	Program Element Title	Page
107	04	1206120A	Assured Positioning, Navigation and Timing (PNT)	655
108	04	1206308A	Army Space Systems Integration	690

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Air and Missile Defense Systems Engineering	0603327A	74	04	
Analysis Of Alternatives	0604100A	91	04	439
Armored System Modernization - Adv Dev	0603645A	78	04	152
Army Advanced Component Development & Prototyping	0604119A	97	04	530
Army Missle Defense Systems Integration	0603305A	73	04	1
Army Space Systems Integration	1206308A	108	04	690
Assured Positioning, Navigation and Timing (PNT)	0604120A	98	04	531
Assured Positioning, Navigation and Timing (PNT)	1206120A	107	04	655
Aviation - Adv Dev	0603801A	84	04	250
Cross Functional Team (CFT) Advanced Development & Prototyping	0604020A	89	04	426
Cyberspace Operations Forces and Force Support	0305251A	106	04	647
Electronic Warfare Technology Maturation (MIP)	0604021A	90	04	433
Environmental Quality Technology - Dem/Val	0603779A	82	04	222
Future Interceptor	0604403A	102	04	597
Future Tactical Unmanned Aircraft System (FTUAS)	0604113A	92	04	445
Hypersonics	0604182A	100	04	579
Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	0604319A	101	04	586

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Program Element Title	Program Element Number	Line #	ВА	Page
Integrated Base Defense (Budget Activity 4)	0604785A	105	04	640
Landmine Warfare and Barrier - Adv Dev	0603619A	75	04	
Logistics and Engineer Equipment - Adv Dev	0603804A	85	04	
Lower Tier Air Missile Defense (LTAMD) Sensor	0604114A	93	04	453
Maneuver - Short Range Air Defense (M-SHORAD)	0604117A	95	04	519
Medical Systems - Adv Dev	0603807A	86	04	314
Mobile Medium Range Missile	0604644A	104	04	634
NATO Research and Development	0603790A	83	04	238
Night Vision Systems Advanced Development	0603774A	81	04	202
Robotics Development	0604017A	88	04	391
Smoke, Obscurant and Target Defeating Sys-Adv Dev	0603627A	76	04	50
Soldier Support and Survivability	0603747A	79	04	165
Soldier Systems - Advanced Development	0603827A	87	04	352
Synthetic Training Environment Refinement & Prototyping	0604121A	99	04	566
TRACTOR BEAM	0604118A	96	04	529
Tactical Electronic Surveillance System - Adv Dev	0603766A	80	04	193
Tank and Medium Caliber Ammunition	0603639A	77	04	59
Technology Maturation Initiatives	0604115A	94	04	
Unified Network Transport	0604541A	103	04	603

Exhibit R-2, RDT&E Budget Item	xhibit R-2, RDT&E Budget Item Justification: PB 2020 Army									Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				<b>R-1 Program Element (Number/Name)</b> PE 0603305A <i>I Army Missle Defense Systems Integration</i>								
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	23.558	60.472	10.987	-	10.987	10.947	11.575	11.614	12.232	0.000	141.385
FG6: Missile Defense (CA)	-	14.000	49.700	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	63.700
TR5: Missile Defense Battlelab	-	9.558	10.772	10.987	-	10.987	10.947	11.575	11.614	12.232	0.000	77.685

### A. Mission Description and Budget Item Justification

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

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

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	9.634	10.777	11.936	-	11.936
Current President's Budget	23.558	60.472	10.987	-	10.987
Total Adjustments	13.924	49.695	-0.949	-	-0.949
<ul> <li>Congressional General Reductions</li> </ul>	-0.002	-0.005			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	14.000	49.700			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
<ul> <li>Reprogrammings</li> </ul>	-	-			
<ul> <li>SBIR/STTR Transfer</li> </ul>	-0.074	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-0.949	-	-0.949

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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Dat	e: March 2019	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603305A <i>I Army Missle Defense Systems Integration</i>		
Congressional Add Details (\$ in Millions, and Includes General Red	luctions)	FY 2018	FY 2019
Project: FG6: Missile Defense (CA)			
Congressional Add: Missile Defense (CA)		14.000	49.700
	Congressional Add Subtotals for Project: FG6	14.000	49.700
	Congressional Add Totals for all Projects	14.000	49.700

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060330 Systems In	ogram Element (Number/Name)Project (Number/Name)03305A I Army Missle DefenseFG6 I Missile Defense (CA)ns IntegrationFG6 I Missile Defense (CA)						
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FG6: Missile Defense (CA)	-	14.000	49.700	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	63.700
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019
Congressional Add: Missile Defense (CA)	14.000	49.700
FY 2018 Accomplishments: Missile Defense (CA)		
FY 2019 Plans: Missile Defense (CA)		
Congressional Adds Subtotals	14.000	49.700

C. Other Program	Funding	Summary	(\$ in	<u>Millions)</u>
N/A				

<u>Remark</u>s

D. Acquisition Strategy

N/A

E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603305A / Army Missle DefenseFG6 / Missile Defense (CA)Systems IntegrationFG6 / Missile Defense (CA)							)		
Management Service	es (\$ in M	illions)	ſ	FY 2	2018	FY 2019		FY 2 Ba	2020 Ise	FY 2	2020 CO	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
Management Support	SS/CPFF	Huntsville : Huntsville	3.303	-		-		-		-		-	0.000	3.303	-
		Subtotal	3.303	-		-		-		-		-	0.000	3.303	N/A
Product Developmen	nt (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
High Power Microwave Lethality	SS/CPFF	Radiance : Huntsville	3.900	-		10.000		-		-		-	0.000	13.900	-
Advanced Electronic/ Environmental Control Unit Thermal Management Prototype	SS/CPAF	Rocky Research : Huntsville	14.000	14.000		15.000		-		-		-	0.000	43.000	-
Technology Complex Compound Materials for Thermal/Energy Management Prototype	SS/CPFF	Radiance : huntsville	2.250	-		-		-		-		-	0.000	2.250	-
Advanced Measurement Optical Range Facility Upgrades	SS/CPFF	Radiance : Huntsville	6.194	-		-		-		-		-	0.000	6.194	-
HWIL Scene Generation and Software Development Lab	SS/CPFF	People Tech : Huntsville	-	-		8.700		-		-		-	0.000	8.700	-
HWIL Environmental Simulators	SS/CPFF	Hill Technologies : Huntsville	-	-		11.000		-		-		-	0.000	11.000	-
Long Ranage Weapons Analysis	SS/CPFF	Radiance : Huntsville	-	-		5.000		-		-		-	0.000	5.000	-
		Subtotal	26.344	14.000		49.700		-		-		-	0.000	90.044	N/A

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Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Army	'								Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603305A / Army Missle Defense Systems IntegrationProject (Number/Name) FG6 / Missile Defense (CA)									
Support (\$ in Millions)					FY 2018 FY 2019		019	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
High Power Microwave Lethality Prototype	SS/CPFF	Georgia Tech : Georgia	0.203	-		-		-		-		-	0.000	0.203	-
Advanced Meaasurement Optical Range Facility Upgrade	SS/CPFF	Huntsville : Huntsville	0.150	-		-		-		-		-	0.000	0.150	-
	-	Subtotal	0.353	-		-		-		-		-	0.000	0.353	N/A
	2018	FY 2020 FY 2 FY 2019 Base O		020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract							
		Project Cost Totals	30.000	14.000		49.700		-		-		-	0.000	93.700	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy						Date: March 20	19	
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0603305A / Army Missle DefenseFG6 / Missile Defense (CA)Systems IntegrationFG6 / Missile Defense (CA)							
Event Name	FY 2018	FY 20	)19	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	
	1 2 3 4	1 2 3	3 4	1 2 3	4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	
Advanced Measurement Optical Range Facility Upgrades									
								<u>.</u>	

Appropriation/Budget Activity					n 2019
204074	R-1 Program E PE 0603305A / Systems Integra	lement (Number/ Army Missle Defe ation	<b>Project (Number/Name)</b> FG6 / Missile Defense (CA)		
	Schedule Details				
		Sta	rt	En	d
Events		Quarter	Year	Quarter	Year
Advanced Measurement Optical Range Facility Upgrades		2	2018	4	2018

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Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060330 Systems In	am Elemen 15A I Army I Integration	<b>t (Number/</b> Missle Defe	<b>Name)</b> nse	Project (N TR5 / Miss	t (Number/Name) Aissile Defense Battlelab			
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	
TR5: Missile Defense Battlelab	-	9.558	10.772	10.987	-	10.987	10.947	11.575	11.614	12.232	0.000	77.685	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

### A. Mission Description and Budget Item Justification

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Prototypes	5.700	6.359	6.649
Description: Funding is provided for the following efforts:			
<i>FY 2019 Plans:</i> Take the lessons learned from the FY 2018 efforts to continue to evaluate new technologies in realistic operating environments. This is accomplished by participating in and providing support to Unified Quest wargames and experiments to analyze and integrate technology to identify the feasibility integration into Army space, missile defense, and high altitude systems. The Space and Missile Defense Command will participate and support biennial rewrites of Army Capstone, Operational and Functional Concepts. Continue to provide operational manager support to STRATCOM, NORTHCOM and SOCOM Joint Technical Capability Demonstrations to ensure Army missile defense equities are represented in advanced technology developments by demonstrating military utility when applied to military equipment and techniques. Examples include: supporting multi service experiments and capability development of the national-directed Phased Adaptive Approach (PAA) for Ballistic Missile Defense (BMD) as it is applied to each of the regional COCOMs; Developing effective Integrated Missile Defense concepts for Army support to the Phased Adaptive Approach (PAA) being implemented within each regional COCOM. A focus area will be informing			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	/larch 2019				
Appropriation/Budget ActivityR-1 Program Element (Number/Name)Project (Number/Name)2040 / 4PE 0603305A / Army Missle Defense Systems IntegrationTR5 / Missile Defense Battlelab								
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2018	FY 2019	FY 2020			
the Missile Defeat Integrated Capability Development Working Group with expe effectiveness of counter ballistic missile time sensitive targeting. Another proje environment for cyber defenders to train on defense of the GMD fire control ne environments. Continue to support TRADOC proponents with their responsibili material, leader development and education, personnel, and facilities (DOTML defense proponent input to Joint Capabilities Integration and Development Sys Development, and Capability Development.	erimentation on improving the timeliness and ect is developing and implementing a training tworks through innovative scenario based trai ties relative to doctrine, organization, training, PF-P) plus related matters to continue missile stem (JCIDS), Science and Technology, Conc	ning ept						
<b>FY 2020 Plans:</b> Take the lessons learned from the FY 2019 efforts to continue to evaluate new This is accomplished by participating in and providing support to Unified Quest integrate technology to identify the feasibility integration into Army missile defe Command will participate and support biennial rewrites of Army Capstone, Ope provide operational manager support to STRATCOM, NORTHCOM and SOCC ensure Army missile defense equities are represented in advanced technology when applied to military equipment and techniques. Examples include: support development of the national-directed Phased Adaptive Approach (PAA) for Bal of the regional COCOMs; Developing effective Integrated Missile Defense com Approach (PAA) being implemented within each regional COCOM. A focus are Capability Development Working Group with experimentation on improving the missile time sensitive targeting. Another project is developing and implementin train on defense of the GMD fire control networks through innovative scenario TRADOC proponents with their responsibilities relative to doctrine, organization education, personnel, and facilities (DOTMLPF-P) plus related matters to conti Capabilities Integration and Development System (JCIDS), Science and Techr Development. Provide Government program management and oversite for DO defense-related programs for which USASMDC/ARSTRAT is the Army's propor- the Army Navy/Transportable Radar Surveillance and Control Model 2 (AN/TP' specific applications of the Command and Control, Battle Management and Co- program management and oversite for National Capital Region?s Integrated A by USASMDC / ARSTRAT, Future Warfare Center. <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>	technologies in realistic operating environme twargames and experiments to analyze and inse systems. The Space and Missile Defense erational and Functional Concepts. Continue to DM Joint Technical Capability Demonstrations of developments by demonstrating military utility ting multi service experiments and capability listic Missile Defense (BMD) as it is applied to cepts for Army support to the Phased Adaptive a will be informing the Missile Defeat Integrat to timeliness and effectiveness of counter ballis g a training environment for cyber defenders to based training environments. Continue to sup n, training, material, leader development and nue missile defense proponent input to Joint hology, Concept Development, and Capability TMLPF-P development and analysis for missi opent - Ground-based Midcourse Defense Sys Y-2) Forward-based Mode Radar (FBM), and ommunications program. Provide Government ir Defense System. These funds will be exect	nts. o to / each e ed tic o port le tem, Army- uted						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603305A / Army Missle Defense Systems Integration	Project (Number/N TR5 / Missile Defer	<b>lame)</b> nse Battlelab				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020			
The increase from FY 2019 to FY 2020 is because of inflation and increquirements for Defense of the Homeland from missile attacks.	creased emphasis on Capability Development prototyp	e	3.858 4.242				
Title: Analysis, and Models and Simulations (M&S)		3.858	4.242	4.338			
Description: Funding is provided for the following efforts:							
Take the lessons learned from the FY 2018 efforts to continue to eva This will be accomplished by supporting ongoing efforts that provide technology gap and cost reduction analysis of missile defense syster determine the ability of the specific technologies to fill capability gaps demonstrations, Analysis and Demonstration Tools/Test Beds for evo needs and continue to be expanded to ensure that advanced technol capabilities. The Future Warfare Center (FWC) will continue to provi development for Extended Air Defense Simulation (EADSIM) deliveri to provide the capability to perform system and cost benefit analysis, The FWC will continue to provide program management for maintena Tactical Operations Simulator (RTOS) delivering operator in the loop distributed exercises and experiments. The FWC will continue to proc and development for the Joint Embedded Messaging System (JEMS communications between disparate systems, protocols and architect	aluate new technologies in realistic operating environment the most realistic operating environment available to per- ms. Realistic operating environments will be available to in terms of utility to the warfighter. Support of technol- olving missile defense concepts will address emerging logy development can adequately enhance missile defe- ide program management for maintenance, sustainment ing the required high fidelity synthetic operating environ operational planning, and exercise/ experimentation su ance, sustainment, and development for Reconfigurable ocapability for air and missile defense simulation in ovide program management for maintenance, sustainment operational data translation application that enables ures.	ents. erform to ogy ense nt, and ment upport. e ient,					
<b>FY 2020 Plans:</b> Take the lessons learned from the FY 2019 efforts and evaluate new accomplished by supporting ongoing efforts that provide the most rear gap and cost reduction analysis of missile defense systems. Realistic ability of the specific technologies to fill capability gaps in terms of uti Analysis and Demonstration Tools/Test Beds for evolving missile defense to be expanded to ensure that advanced technology development ca Future Warfare Center (FWC) will continue to provide program mana Extended Air Defense Simulation (EADSIM) delivering the required h capability to perform system and cost benefit analysis, operational pl continue to provide program management for maintenance, sustainm Simulator (RTOS) delivering operator in the loop capability for air and experiments. The FWC will continue to provide program management	technologies in realistic operating environments. This alistic operating environment available to perform techn c operating environments will be available to determine ility to the warfighter. Support of technology demonstration fense concepts will address emerging needs and contin an adequately enhance missile defense capabilities. The agement for maintenance, sustainment, and development of fidelity synthetic operating environment to provide to anning, and exercise/ experimentation support. The FV nent, and development for Reconfigurable Tactical Ope d missile defense simulation in distributed exercises an of for maintenance, sustainment, and development for	will be nology the tions, nue e ent for the VC will erations id					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019		
Appropriation/Budget Activity 2040 / 4	Priation/Budget Activity     R-1 Program Element (Number/Name)     Pr       1     PE 0603305A / Army Missle Defense     TF       Systems Integration     Systems Integration					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020	
the Joint Embedded Messaging System (JEMS) providing data translation disparate systems, protocols and architectures. These funds will be executed as the system of the sy	application that enables communications betwee uted by USASMDC / ARSTRAT, Future Warfare C	n Center.				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase from FY 2019 to FY 2020 is because of inflation and increase Modeling and Simulation requirements for Defense of the Homeland from	ed emphasis on Capability Development Analysis missile attacks.	, and				
Title: FY2019 SBIR/STTR Transfer			-	0.171	-	
Description: FY2019 SBIR/STTR Transfer						
<i>FY 2019 Plans:</i> FY2019 SBIR/STTR adjustment						
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR/STTR Transfer						
	Accomplishments/Planned Programs Su	btotals	9.558	10.772	10.987	
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A						

hibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	)19			
Appropriation/Budget Activity 2040 / 4							<b>R-1 Program Element (Number/Name)</b> PE 0603305A <i>I Army Missle Defense</i> <i>Systems Integration</i>					Project (Number/Name) TR5 / Missile Defense Battlelab					
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		
vernment Personnel I Operations Support	C/TBD	To Be determined : To be Determined	-	-		9.364		7.258		-		7.258	0.000	16.622	-		
		Subtotal	-	-		9.364		7.258		-		7.258	0.000	16.622	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		
ntracts	Various	To Be Determined : To Be determined	-	1.156		1.237		3.729		-		3.729	0.000	6.122	-		
2019 SBIR/STTR nsger	TBD	TBD : TBD	-	-		0.171		-		-		-	0.000	0.171	-		
		Subtotal	-	1.156		1.408		3.729		-		3.729	0.000	6.293	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		
periments & technology nancements of totypes/tools and nlysis.	, Various	Various Colorado Springs CO and Huntsville AL : Alabama, Colorado Springs	117.427	-		-		-		-		-	Continuing	Continuing	Continuing		
vt Support and Support htracts	Various	Various Colorado Springs CO and Huntsville AL : Alabama, Colorado Springs	130.381	8.402		-		-		-		-	Continuing	Continuing	Continuing		
		Subtotal	247.808	8.402		-		-		-		-	Continuing	Continuing	j N/A		
0603305A: Army 1	Missle Def	ense Systems Integ	gration		UN	ICLASS	SIFIED								12		
0603305A: <i>Army i</i>	Missle Def	Alabama, Colorado Springs Subtotal	247.808	8.402	U	- ICLASS Page 12 0	SIFIED of 15	-	R	-1 Line #	73			- Continuing - Continuing	- Continuing Continuing - Continuing Continuing - Continuing		
Exhibit R-3, RDT&E Project Cost Analysis: PB 2		Date: March 2019															
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Appropriation/Budget Activity 2040 / 4	<b>R-1 Program E</b> PE 0603305A / Systems Integra	Project (Number/Name) TR5 / Missile Defense Battlelab															
	Prior Years	FY 2	2018	FY 2019	FY 2 Ba	:020 se	FY 2 OC	020 ;O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract					
Project Cost Totals	10.772	10.987		-		10.987	Continuing	Continuing	N/A								

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Date: March 2	2019							
Appropriation/Budget Activity 2040 / 4			R-1 PE 0 Syst	Program Elemen 0603305A / Army l tems Integration	ct (Number/Name) Missile Defense Ba	Number/Name) ssile Defense Battlelab			
Event Name	FY 2018 FY		019	FY 2020	FY 2021	FY 2022	2 FY 2023	FY 2024	
Event Name	1 2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1 2 3	4 1 2 3	4 1 2 3 4	
Experiments & technology enhancements of prototypes	Eval integration of tech is	lentified in Warga	ame Cam	n <mark>p</mark> aign Plan and Analysis 12	-14				
Development of Extended Air Defense Simulation Updates									
Reconfigurable Tactical Operations System (RTOS) Developme									
JFCC-Integrated Missile Defense Operational Analysis									
High Energy Laser for AMD									
Analysis Support to JIAMDO									
AN/TPY-2 FBM Transition from MDA to Army									
Missile Defense Simulation Suppt to TRADOC ARCIC Experime									
Force Design Requirements Assessment for Missile Defense Fo									
Allied and Partner Modeling to Inform Integration Efforts to Meet									
Pacific Focused-Adversary Centric Bundled									
Inert Debris Analysis									
Hypersonics Analysis									

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program El PE 0603305A / Systems Integra	lement (Numbe Army Missle Del ation	Project (Number/Name) TR5 / Missile Defense Battlelab			
	Schedule Details					
		Sta	art	E	nd	
Events		Quarter	Year	Quarter	Year	
Experiments & technology enhancements of prototypes		1	2018	4	2023	
Development of Extended Air Defense Simulation Updates		1	2018	4	2023	
Reconfigurable Tactical Operations System (RTOS) Development		1	2018	4	2023	
JFCC-Integrated Missile Defense Operational Analysis		1	2018	4	2023	
High Energy Laser for AMD		1	2015	4	2018	
Analysis Support to JIAMDO		1	2018	4	2023	
AN/TPY-2 FBM Transition from MDA to Army		1	2018	4	2023	
Missile Defense Simulation Suppt to TRADOC ARCIC Experimentation	n	1	2018	4	2023	
Force Design Requirements Assessment for Missile Defense Forces		1	2018	4	2023	
Allied and Partner Modeling to Inform Integration Efforts to Meet Object	ctives	3	2016	4	2018	
Pacific Focused-Adversary Centric Bundled		3	2016	4	2018	
Inert Debris Analysis		3	2017	2	2018	
Hypersonics Analysis		2	2017	4	2018	

Exhibit R-2, RDT&E Budget Item	I Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity           2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced           Component Development & Prototypes (ACD&P)					<b>R-1 Progra</b> PE 060332	am Element 27A I Air and	ering					
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	-	58.812	46.231	15.148	0.500	15.648	27.008	31.444	0.000	0.000	Continuing	Continuing
FG9: Air and Missile Defense (AMD) Electronic Warfare	-	58.812	46.231	15.148	0.500	15.648	27.008	31.444	0.000	0.000	Continuing	Continuing

#### Note

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

#### A. Mission Description and Budget Item Justification

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

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

FY 2020 funding of \$15.648 million will be used to analyze P-12 event data, provide recommendations for rapid countermeasures and potential solutions, conduct destructive CEMA lab events, continue virtualization of additional AMD system of systems architecture for future CEMA assessments against advanced destructive cyber and electromagnetic threats. Funding will also be used to initiate planning and preparation for the P-13 event.

ibit R-2, RDT&E Budget Item Justification: PB 2020 A	Date	Date: March 2019								
propriation/Budget Activity 0: Research, Development, Test & Evaluation, Army I BA nponent Development & Prototypes (ACD&P)	4: Advanced	<b>R-1 Program Element (Number/Name)</b> PE 0603327A <i>I Air and Missile Defense Systems Engineering</i>								
Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total					
Previous President's Budget	57.649	43.802	43.273	-	4	3.273				
Current President's Budget	58.812	46.231	15.148	0.500	) 15.648					
Total Adjustments	1.163	2.429	-28.125	0.500	-2	27.625				
Congressional General Reductions	-0.017	-0.031								
<ul> <li>Congressional Directed Reductions</li> </ul>	-13.000	-17.540								
<ul> <li>Congressional Rescissions</li> </ul>	-	-								
Congressional Adds	15.000	20.000								
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-								
Reprogrammings	-	-								
SBIR/STTR Transfer	-0.820	-								
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-28.125	0.500	-2	27.625				
Congressional Add Details (\$ in Millions, and Inclu	ides General Re	ductions)			FY 2018	FY 2019				
Project: FG9: Air and Missile Defense (AMD) Electro	nic Warfare			-	L					
Congressional Add: Interoperability of integrated a	air and missile de	fense.		-	15.000	20.000				
			Congressional Add Subto	otals for Project: FG9	15.000	20.000				
			Congressional Add	Totals for all Projects	15.000	20.000				
Change Summary Explanation The FY 2020 change is primarily driven by the transit	ion of ALPS to PE	E 0604741 Proje	ect 126.							

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060332 Systems E	am Elemen 27A I Air and Ingineering	<b>t (Number/</b> d Missile De	oject (Number/Name) 69 I Air and Missile Defense (AMD) ectronic Warfare					
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	
FG9: Air and Missile Defense (AMD) Electronic Warfare	-	58.812	46.231	15.148	0.500	15.648	27.008	31.444	0.000	0.000	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### Note

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

#### A. Mission Description and Budget Item Justification

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

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

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: Advanced Electronic Protection Enhancements and ALPS Development/Integration	43.812	24.743	15.148	0.500	15.648
<b>Description:</b> Provides Cyber and Electromagnetic Activities (CEMA) planning, conducts CEMA demonstrations and post-mission analysis, and develops/integrates Army Long-Range Persistent Surveillance (ALPS).					
FY 2019 Plans:					

Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603327A <i>I Air and Missile Defense</i> <i>Systems Engineering</i>	<b>Project (Number/Name)</b> FG9 I Air and Missile Defense (AMD) Electronic Warfare

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
Funding is provided for continued planning and preparation and to conduct the P-12 event. Funding will also be used to continue the Cyber and Electromagnetic Activities (CEMA) roadmap and strategy that ensures coordination and execution of prioritized goals. Virtualize IAMD and PATRIOT components, validate the models, and assess them in a contested environment. Continue virtualization of additional IAMD sensors and launchers. Continue ALPS development and integration of ALPS into the Army AMD architecture.	FY 2018	FY 2019	Base	000	Total
<i>FY 2020 Base Plans:</i> Funding will be provided for continued system analysis to identify and recommend rapid mitigation concepts following the P-12 event; initial planning and preparation activities for P-13; conduct a CEMA lab event (C Series) with a virtualized AIAMD systems of systems architecture to measure system and mission performance against advanced destructive cyber and electromagnetic threats; continue development of algorithm based solutions to identify, characterize, and mitigate performance impacts of CEMA threats; update the Cyber and Electromagnetic Activities (CEMA) roadmap and strategy to ensure coordination and execution of prioritized goals; and to continue virtualization of additional AIAMD sensors, launchers, C2, and supporting architecture.					
<i>FY 2020 OCO Plans:</i> Funds will be used to continue an operational assessment of ALPS prototype systems in support of a Combatant Commander identified need.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> The funding reduction from FY 2019 to FY 2020 is driven by the transition of ALPS to PE 0604741A, Project 126.					
Title: FY 2019 SBIR/STTR Transfer	-	1.488	-	-	-
<i>FY 2019 Plans:</i> FY 2019 SBIR/STTR Transfer.					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR Transfer					
Accomplishments/Planned Programs Subtotals	43.812	26.231	15.148	0.500	15.648
	FY 2018	FY 2019			
Congressional Add: Interoperability of integrated air and missile defense.	15.000	20.000			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603327A / Air and Missile De Systems Engineering	Name) fense	<b>Project (N</b> FG9 <i>I Air a</i> <i>Electronic</i>	<b>umber/Name)</b> and Missile Defense (AMD) Warfare
		FY 2018	FY 2019	]
FY 2018 Accomplishments: Interoperability of integrated air and missile defe	nse.			
FY 2019 Plans: Interoperability of integrated air and missile defense.				
	Congressional Adds Subtotals	15.000	20.000	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>				
D. Acquisition Strategy Assessment events will be conducted approximately every two years in live ar assessments, funding will also be provided through various contracts for subject	nd simulated CEMA environments. ect matter expertise.	In addition	to Governm	nent planning and conduct of
E. Performance Metrics				

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 System	ogram Ele 3327A I A as Enginee	ement (N Air and M ering	lumber/N lissile Defe	ame) ense	Project FG9 / A Electror	(Numbe ir and Mis nic Warfar	r/ <b>Name)</b> ssile Defe re	nse (AMI	)
Management Service	es (\$ in N	lillions)		FY	2018	FY	2019	FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	Various	Various : Various	-	2.831	Nov 2017	1.688	Nov 2018	0.949	Nov 2019	-		0.949	Continuing	Continuing	Continuing
		Subtotal	-	2.831		1.688		0.949		-		0.949	Continuing	Continuing	, N/A
Product Developme	nt (\$ in M	illions)	ſ	FY	2018	FY 2019		FY	2020 ase	FY 2	2020 CO	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 Integration Assessment	Various	Various : Various	-	1.538	Dec 2017	2.840	Nov 2018	2.715	Nov 2019	-		2.715	Continuing	Continuing	Continuing
ALPS Development/ Integration	Various	Various : Various	6.100	22.731	Jan 2018	7.495	Jan 2019	0.000		0.500	Jan 2020	0.500	0.000	36.826	-
Interoperabiity of Integrated AMD	SS/CPFF	Various : Various	-	15.000	Aug 2018	20.000	Feb 2019	-		-		-	0.000	35.000	-
FY 2019 SBIR/STTR Transfer	TBD	Army Budget Office : Pentagon, Washington, DC	-	-		1.488		-		-		-	0.000	1.488	-
		Subtotal	6.100	39.269		31.823		2.715		0.500		3.215	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2018	FY	2019	FY 2020 Base		FY 2020		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
Component Assessments & Research and Trade Studies	Various	Various : Various	-	12.512	Feb 2018	5.850	Feb 2019	8.481	Feb 2020	-		8.481	Continuing	Continuing	, Continuing
		Subtotal	-	12.512		5.850		8.481		-		8.481	Continuing	Continuing	N/A
PE 0603327A: Air and Army	Missile D	efense Systems Er	ngineer		UN	Page 6	of 9		R	-1 Line #	74				21

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	)19		
Appropriation/Budget Activity 2040 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0603327A <i>I Air and Missile Defense</i> <i>Systems Engineering</i>						<b>Project (Number/Name)</b> FG9 I Air and Missile Defense (AMD) Electronic Warfare				
Test and Evaluation (\$ in Millions)					2018	FY 2	2019	FY 2020 Base		FY 2 O	2020 CO	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	
Demonstration Planning and Execution	Various	Various : Various	-	4.200	Nov 2017	6.870	Nov 2018	3.003	Nov 2019	-		3.003	Continuing	Continuing	Continuing	
		Subtotal	-	4.200		6.870		3.003		-		3.003	Continuing	Continuing	N/A	
		Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals 6.100 58.812						46.231		15.148		0.500		15.648	Continuing	Continuing	N/A	

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Nrmy							Date	e: March 20	19	
Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06 <i>Syste</i>	rograr 603327 ms Eng	n Elemer A I Air an gineering	nt (Number/Name) ad Missile Defense	Project FG9 / Aii Electroni	Numbe and M c Warfa	e <b>r/Name)</b> lissile Defer are	nse (AM	iD)
EventName	FY 2018	FY 20	19	F١	( 2020	FY 2021	FY 2022		FY 2023	F	r 2024
Event Name	1 2 3 4	1 2 3	3 4	1 2	3 4	1 2 3 4	1 2 3 4	1	2 3 4	1 2	3 4
P-11 Demonstration											
P-11 Analysis Efforts, Trade Studies, and Implementation											
P-12 Demonstration Planning Efforts											
P-12 Demonstration											
P-12 Analysis Efforts, Trade Studies, and Implementation											
P-13 Demonstration Planning Efforts											
P-13 Demonstration											
P-13 Analysis Effort, Trade Studies, and Implementation											
P-14 Demonstration Planning Efforts											
Air and Missile Defense Systems Hardware Virtualization											
ALPS Prototype Development and Integration											

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	h 2019
ppropriation/Budget Activity 040 / 4	<b>R-1 Program</b> PE 0603327A <i>Systems Engir</i>	Element (Numbe I Air and Missile D neering	r/Name) Defense	<b>Project (Number/Nam</b> FG9 <i>I Air and Missile L</i> <i>Electronic Warfare</i>	n <b>e)</b> Defense (AMD)
	Schedule Details	6			
		Sta	art	E	nd
Events		Quarter	Year	Quarter	Year
P-11 Demonstration		2	2018	3	2018
P-11 Analysis Efforts, Trade Studies, and Implementation		3	2018	1	2019
P-12 Demonstration Planning Efforts		4	2018	4	2019
P-12 Demonstration		4	2019	1	2020
P-12 Analysis Efforts, Trade Studies, and Implementation		1	2020	4	2020
P-13 Demonstration Planning Efforts		4	2020	2	2021
P-13 Demonstration		3	2021	3	2021
P-13 Analysis Effort, Trade Studies, and Implementation		4	2021	2	2022
P-14 Demonstration Planning Efforts		1	2022	4	2022
Air and Missile Defense Systems Hardware Virtualization		2	2019	4	2022
ALPS Prototype Development and Integration		4	2017	4	2019

Exhibit R-2, RDT&E Budget Item	n Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACD	ation, Army 0&P)	I BA 4: Adva	anced	<b>R-1 Progra</b> PE 060361	am Elemen 9A / Landm	<b>t (Number/</b> hine Warfare	Name) e and Barrie	er - Adv 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	-	69.237	45.198	92.915	-	92.915	6.963	0.000	0.000	0.000	Continuing	Continuing
606: Cntrmn/Barrier Adv Dev	-	3.187	2.964	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.151
BU5: Standoff Volcano Obstacle (SAVO) Adv Tech	-	0.000	0.000	12.983	-	12.983	6.963	0.000	0.000	0.000	0.000	19.946
EK7: Area Denial Capability Development	-	66.050	42.234	79.932	-	79.932	0.000	0.000	0.000	0.000	Continuing	Continuing

#### A. Mission Description and Budget Item Justification

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

Project 606 enables component development of a new detection capability for explosive hazards, improvised explosive devices (IED), and components in support of route clearance operations. These capabilities will enhance the effectiveness of the Route Clearance Platoon within the Engineer Company, the Brigade Combat Team as well as with other related Army missions.

Project BU5 Standoff Activated Volcano Obstacle (SAVO) provides an interim Anti-Vehicle (AV) capability to address the Army's directed close tactical obstacle capability gap. FY 2020 funding resources the initiation of the SAVO program. 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.

Project EK7 Area Denial Capability Development will evaluate integrated technologies and prototype systems in a realistic operating environment to expedite technology transition for Terrain Shaping Obstacles. The obstacles will deny the enemy terrain and freedom of action while allowing friendly forces to maneuver freely within the same battle space. Area Denial Capability Development provides controlled scalable effects against mounted enemy forces that disrupt, turn, fix, delay or block their ability to maneuver. Area Denial Capability Development enables the Combatant Commander to shape the battle space without exposing friendly forces to enemy engagement and to actively detect and engage the enemy at all operational ranges. Area Denial Capability Development, maintenance, repair, and product improvements.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 An	my			Date:	March 2019
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	1: Advanced	<b>R-1 Program El</b> PE 0603619A / L	ement (Number/Name) .andmine Warfare and E	Barrier - Adv Dev	
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	72.909	45.254	98.627	-	98.627
Current President's Budget	69.237	45.198	92.915	-	92.915
Total Adjustments	-3.672	-0.056	-5.712	-	-5.712
<ul> <li>Congressional General Reductions</li> </ul>	-0.059	-0.056			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-0.797	-			
SBIR/STTR Transfer	-2.816	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-5.712	-	-5.712

#### **Change Summary Explanation**

FY 2018 Congressional General Reduction in the amount of \$0.059 million due to Section 8024 (f), Federally Funded Research and Development Center (FFRDC) reductions.

FY 2018 SBIR/STTR Transfer in the amount of -\$2.816 million breakout: Project 606 is \$0.162 million and Project EK7 is \$2.654 million.

FY 2018 Congressional Rescission of \$20M.

FY 2019 Congressional General Reduction in the amount of \$0.056 million due to Section 8024 (f), Federally Funded Research and Development Center (FFRDC) reductions.

FY 2019 SBIR/STTR Transfer in the amount of -\$1.643 million breakout: Project 606 is \$0.095 million and Project EK7 is \$1.548 million.

FY 2020 funding decrease of \$5.712 million supports the Army's modernization priorities in support of the National Defense Strategy.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	vrmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060361 <i>Barrier - A</i>	a <b>m Element</b> 9A I Landm dv Dev	: <b>(Number</b> /l ine Warfare	Name) e and	Project (N 606 / Cntrr	umber/Nan nn/Barrier A	ne) Idv 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
606: Cntrmn/Barrier Adv Dev	-	3.187	2.964	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.151
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note												

Project funding was decreased to support the Army's Modernization priorities in support of the National Defense Strategy.

#### A. Mission Description and Budget Item Justification

Project 606 Countermine/Barrier Advanced Development enables development and evaluation of technologies that will perform detection, neutralization, and clearing of landmines and Improvised Explosive Devices (IEDs) at operational speeds.

The Forward Reconnaissance and Explosive Hazard Detection (FREHD) system is a suite of four capabilities for use by route clearance patrols to provide standoff detection of explosive hazards: vehicle-mounted anomaly detection; pinpoint explosive hazard detection; explosive hazard vapor and particle detection; and remote visualization. FREHD increases the rate of advance of the route clearance formation while removing Soldiers and equipment from the proximity of blast and fragmentation.

There are no FY 2020 Base Research, Development, Test & Evaluation (RDT&E) funds requested for this project.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: Husky Mounted Detection System (HMDS) Engineering and Program Management	1.435	-	-	-	-
Description: Supports System Engineering and Program Management					
Title: HMDS Explosive Hazard Detection Technology Development	1.478	-	-	-	-
Description: Explosive Hazard Detection Technology Analysis					
Title: HMDS Explosive Hazard Detection Test and Evaluation	0.274	-	-	-	-
Description: Explosive Hazard Detection Test and Evaluation					
Title: Forward Reconnaissance and Explosive Hazard Detection (FREHD)	-	2.869	-	-	-
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army							Date: Mai	rch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 Pr</b> PE 06 <i>Barriel</i>	<b>rogram Eler</b> 03619A <i>I La</i> r - Adv Dev	nent (Numbe ndmine Warfa	r/ <b>Name)</b> re and	Project (N 606 / Cntrn	umber/Na nn/Barrier	<b>me)</b> Adv Dev	
B. Accomplishments/Planned Pro	grams (\$ in N	<u>/lillions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Conduct the Milestone Decision Aut Analysis of Alternatives (AoA) and th Risk Reduction (TMRR)	hority (MDA) ne Milestone d	delegation, t documentation	he Materiel I on for the ini	Developmen tiation of Teo	t Decision (N chnology Ma	/IDD), the turation and					
FY 2019 to FY 2020 Increase/Decr In FY2020 FREHD has no funding	ease Statem	ent:									
Title: FY 2019 SBIR / STTR Transfe	er						-	0.095	-	-	-
<b>FY 2019 Plans:</b> SBIR / STTR Tax											
FY 2019 to FY 2020 Increase/Decr FY 2019 SBIR / STTR Transfer	ease Statem	ent:									
			Accomplisi	nments/Plar	nned Progra	ms Subtotal	<b>s</b> 3.187	2.964	-	-	-
C. Other Program Funding Summa	ary (\$ in Milli	<u>ons)</u>									
	2 .		FY 2020	FY 2020	FY 2020					Cost To	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	Base	000	<u>Total</u>	<u>FY 2021</u>	FY 2022	FY 2023	FY 2024	<u>Complete</u>	Total Cost
<ul> <li>415: Mine Neutral/Detection</li> </ul>	12.537	33.204	17.910	-	17.910	0.727	0.645	5.000	4.630	Continuing	Continuing
<ul> <li>R64001: HUSKY MOUNTED</li> </ul>	16.695	35.834	83.082	34.253	117.335	152.437	67.879	-	-	0.000	390.180
DETECTION SYSTEM (HMDS)											
• R64002: <i>HMDS - GROUND</i>	16.695	35.834	53.700	34.253	87.953	57.453	12.129	-	-	0.000	210.064
PENETRATING RADAR											
• K64003: HMDS - DEEP	-	-	29.382	-	29.382	94.984	55.750	-	-	0.000	180.116
BURIED DE LECTION											
Romarke											

#### **Remarks**

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

#### D. Acquisition Strategy

The Husky Mounted Detection System (HMDS) program is pursuing an acquisition approach that delivers capability to the Warfighter by leveraging the Quick Reaction Capability (QRC) Ground Penetrating Radar (GPR) currently deployed in support of Operation Enduring Freedom (OEF) and Operation Inherent Resolve (OIR). In FY 2018, as part Engineering Development activities, the program will execute an Engineering Change Proposal (ECP) to add a wire detection capability to address evolving threat, and Infrared illumination to enable nighttime operation. A second ECP to improve operational availability of the HMDS during inclement weather

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget ActivityR2040 / 4PlBaseBase	R-1 Program Element (Number/Name) PE 0603619A I Landmine Warfare and Barrier - Adv Dev	Project (N 606 / Cntrn	umber/Name) mn/Barrier Adv Dev

and address obsolescence and Cyber Security deficiencies will follow. As part of the Advanced Development activities, the HMDS Program will conduct additional development and evaluation of technologies to address a broader spectrum of emerging threats, interoperability with electronic countermeasures, and detection and neutralization of landmines and Improvised Explosive Devices (IEDs) at operational speeds.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 0603 <i>Barrier</i>	o <b>gram Ele</b> 3619A <i>I L</i> - <i>Adv Dev</i>	ement (N andmine	umber/Na Warfare a	ame) and	<b>Project</b> 606 / <i>Ci</i>	(Number htrmn/Bar	r/ <b>Name)</b> rier Adv D	ev	
Management Service	es (\$ in M	illions)		FY 2	018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	2020 CO	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 - HMDS	MIPR	PM Terrestrial Sensors : Fort Belvoir, VA	-	0.300		-		-		-		-	0.000	0.300	-
Program Management - FREHD	Allot	PM CCS : Picatinny Arsenal, NJ	-	-		0.133	Mar 2019	-		-		-	0.000	0.133	-
	-!	Subtotal	-	0.300		0.133		-		-		-	0.000	0.433	N/A
Product Developme	nt (\$ in M	illions)		FY 2	018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	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 To Be Determined	TBD	TBD : TBD	-	0.780		-		-		-		-	0.000	0.780	-
FY19 SBIR / STTR	TBD	TBD : TBD	-	-		0.095		-		-		-	0.000	0.095	_
		Subtotal	-	0.780		0.095		-		-		-	0.000	0.875	N/A
Support (\$ in Million	s)			FY 2	018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method	Performing	Prior		Award		Award		Award		Award		Cost To	Total	Target Value of Contract
	o iype	Activity & Location	Years	Cost	Date	Cost	Date	Cost	Date	Cost	Date	Cost	Complete	Cost	
HMDS Explosive Hazard Detection - Technology Analysis	MIPR	Activity & Location TRADOC : Ft. Eustis, VA	Years -	<b>Cost</b> 0.488	Date	Cost -	Date	Cost -	Date	Cost -	Date	_ Cost	0.000	0.488	-
HMDS Explosive Hazard Detection - Technology Analysis HMDS Explosive Hazard Detection - Engineering Support	MIPR	Activity & Location TRADOC : Ft. Eustis, VA CERDEC NVESD : Ft. Belvoir, VA	Years - -	Cost 0.488 1.115	Date	Cost - -	Date	Cost - -	Date	<u>Cost</u> - -	Date		Complete           0.000           0.000	0.488	-
HMDS Explosive Hazard Detection - Technology Analysis HMDS Explosive Hazard Detection - Engineering Support HMDS Explosive Hazard Detection - System Analysis and Test Design	MIPR MIPR FFRDC	Activity & Location TRADOC : Ft. Eustis, VA CERDEC NVESD : Ft. Belvoir, VA IDA : Alexandria, VA	Years - - -	Cost 0.488 1.115 0.230	Date	Cost - - -	Date	Cost - -	Date	<u>Cost</u> - -	Date		Complete           0.000           0.000           0.000	0.488	-
HMDS Explosive Hazard Detection - Technology Analysis HMDS Explosive Hazard Detection - Engineering Support HMDS Explosive Hazard Detection - System Analysis and Test Design FREHD	MIPR MIPR FFRDC MIPR	Activity & Location TRADOC : Ft. Eustis, VA CERDEC NVESD : Ft. Belvoir, VA IDA : Alexandria, VA Various : Various	Years - - -	Cost 0.488 1.115 0.230	Date	Cost - - - 2.736	Date	Cost - - -	Date	<u>Cost</u> - - -	Date		Complete 0.000 0.000 0.000	0.488	-

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	,				<b>R-1 Pro</b> PE 060 <i>Barrier</i>	o <b>gram El</b> o 3619A / L - Adv Dev	e <b>ment (N</b> .andmine /	umber/N Warfare	<b>ame)</b> and	Project 606 / Cr	(Numbei htrmn/Bar	r/ <b>Name)</b> rier Adv E	)ev	
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 O(	2020 CO	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 Explosive Hazard Detection	MIPR	ATEC : Alexandria, VA	-	0.274		-		-		-		-	Continuing	Continuing	-
		Subtotal	-	0.274		-		-		-		-	Continuing	Continuing	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 O(	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	3.187		2.964		-		-		-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy						Date: March 20	19
Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06 <i>Barrie</i>	P <b>rogram Elemen</b> 603619A <i>I Landn</i> er - Adv Dev	t (Number/Name nine Warfare and	e) Project (N 606 / Cntr	<b>lumber/Name)</b> mn/Barrier Adv D	ev
Event Name	FY 2018	FY 20	19	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/FREHD								

ppropriation/Budget Activity				Date: March	า 2019
)40 / 4	<b>R-1 Program I</b> PE 0603619A <i>Barrier - Adv D</i>	Element (Number/N Landmine Warfare ev	ame) and	Project (Number/Name 606 / Cntrmn/Barrier Ac	e) Iv Dev
	Schedule Details	;			
		Start		En	d
Events		Quarter	Year	Quarter	Year
HMDS/FREHD		1	2018	4	2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603619A / Landmine Warfare and Barrier - Adv DevProject (Number/Name) BU5 / Standoff Volcano 						n <b>e)</b> o Obstacle (	(SAVO)				
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
BU5: Standoff Volcano Obstacle (SAVO) Adv Tech	-	0.000	0.000	12.983	-	12.983	6.963	0.000	0.000	0.000	0.000	19.946
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

This is a new start in FY 2020.

#### A. Mission Description and Budget Item Justification

This is a new start project starting in FY 2020. Project BU5 Standoff Activated Volcano Obstacle (SAVO) provides an interim Anti-Vehicle (AV) capability to address the Army's directed close tactical obstacle capability gap. FY 2020 funding resources the initiation of the SAVO program. 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.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: SAVO Rapid Prototyping	-	-	9.450	-	9.450
Description: Initiation of the SAVO system Rapid Prototyping phase.					
<b>FY 2020 Base Plans:</b> Performs SAVO system Rapid Prototyping phase to include; Initiation of new start effort, development of system design, conduct requirements review, development of test and evaluation hardware configurations and fabrication of prototype systems for early test and evaluation.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> The increase from FY 2019 to FY 2020 is \$9.450 million as this is a new start effort.					
Title: Engineering Support	-	-	0.350	-	0.350
Description: Provide Engineering Support.					
FY 2020 Base Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: Marc	h 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number</b> / PE 0603619A / Landmine Warfar Barrier - Adv Dev	/ <b>Name)</b> re and	<b>Project (N</b> BU5 / Star Adv Tech	umber/Nan doff Volcan	Imber/Name) doff Volcano Obstacle (		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Performs OGA and contract engineering support to the Integrated Product Te Prototyping effort.	eam supporting the Rapid						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase from FY 2019 to FY 2020 is \$0.350 million as this is a new star FY 2019.	t effort and there was no funding in						
Title: SAVO Management Services		-	-	1.433	-	1.433	
Description: Program Management and Support							
<i>FY 2020 Base Plans:</i> Performs program management of the SAVO program.							
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase from FY 2019 to FY 2020 is \$1.433 million as this is a new star FY 2019.	t effort and there was no funding in						
Title: SAVO Test & Evaluation		-	-	1.750	-	1.750	
Description: Provides support to Contractor/Government test activities.							
<b>FY 2020 Base Plans:</b> Performs test and evaluation activities such as development of test and evaluation initial testing on the prototype systems.	uation strategy and conduction of						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase from FY 2019 to FY 2020 is \$1.750 million as this is a new star FY 2019.	t effort and there was no funding in						
Accomplishm	ents/Planned Programs Subtotals	-	-	12.983	-	12.983	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>							

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0603619A I Landmine Warfare and	BU5 / Stan	doff Volcano Obstacle (SAVO)
	Barrier - Adv Dev	Adv Tech	

#### D. Acquisition Strategy

SAVO will utilize a Middle Tier of Acquisition for Rapid Prototyping and Fielding acquisition approach in accordance with Section 804 of the 2016 National Defense Authorization Act (NDAA). Development will utilize an Other Transaction Authority contract.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	<b>Project C</b>	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	/	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603619A I Landmine Warfare and Barrier - Adv DevBU5 I Standoff Volcano Obstacle (S Adv Tech												
Management Servic	es (\$ in N	lillions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
SAVO Program Management TDY and Support	MIPR	PM Close Combat Systems : Picatinny Arsenal, NJ	-	-		-		1.433	Jan 2020	-		1.433	0.000	1.433	-
		Subtotal	-	-		-		1.433		-		1.433	0.000	1.433	N/A
Product Developme	FY	2018	FY	2019	FY 2020 Base		FY 2	2020 CO	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
DOTC Manufacture Support	C/CPIF	To Be Determined : To Be Determined	-	-		-		6.450	Nov 2019	-		6.450	0.000	6.450	-
		Subtotal	-	-		-		6.450		-		6.450	0.000	6.450	N/A
Support (\$ in Millior	ıs)			FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
ARL HRED MANPRINT Support	MIPR	Army Research Laboratory (ARL) - HRED : Picatinny Arsenal, NJ	-	-		-		0.050	Jan 2020	-		0.050	0.000	0.050	-
Contract Test and Engineering Support	C/CPIF	To Be Determined : To Be Determined	-	-		-		0.300	Jan 2020	-		0.300	0.000	0.300	-
SAVO - ARDEC Engineering Support	TBD	ARDEC : Picatinny Arsenal, NJ	-	-		-		3.000	Jan 2020	-		3.000	0.000	3.000	-
		Subtotal	-	-		-		3.350		-		3.350	0.000	3.350	N/A
PE 0603619A: <i>Landrr</i> Army	nine Warfa	re and Barrier - Adv	' Dev		U	NCLASS Page 13	SIFIED of 25		R	-1 Line #	75				37

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army													Date: March 2019			
Appropriation/Budget ActivityR-1 Program Element (Num2040 / 4PE 0603619A / Landmine WaBarrier - Adv Dev									lumber/Na Warfare a	a <b>me)</b> and	Project BU5 / S Adv Tec	<b>(Number</b> tandoff Vo h	r/ <b>Name)</b> blcano Ob	stacle (S	AVO)	
Test and Evaluation	FY 2018 FY 2019			FY : Ba	FY 2020 FY 20 Base OC			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	
Other Government Agencies and Support Contractors	MIPR	Army Test & Evaluation Command (ATEC) : TBD	-	-		-		1.750	May 2020	-		1.750	0.000	1.750	-	
	·	Subtotal	-	-		-		1.750		-		1.750	0.000	1.750	N/A	
Prior Years FY 2018							FY 2020 FY 2 FY 2019 Base O(				2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
	_	Project Cost Totals	0.000 12.983			-		12.983	0.000	12.983	N/A					

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A													Da	te: N	Marc	h 20	)19				
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (PE 0603619A / Landmine Warfare andBU5 / StateBarrier - Adv DevAdv Tech								<b>st (Number/Name)</b> Standoff Volcano Obstacle (SAVO) ech											
Event News	FY 2018	FY 20	19	F	Y 2020			FY 20	21		FY	2022	2		FY	202	3		F	Y 20	24
Event Name	1 2 3 4	1 2 3	i 4	1	2 3	4	1	2 3	6 4	1	2	3	4	1	2	3	4	1	2	3	4
Rapid Prototyping Decision Review		4	1																		
OTA Rapid Prototyping																					
Focus Assesment				2																	
Design Review				3																	
User Jury					4																
Qualification Testing									I												
Operational Assesment								5													
SAVO Production Contract																					
Rapid Fielding Decision Review																					
Initial Operational Capability																					
Full Operational Capability																					8

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program</b> PE 0603619A <i>Barrier - Adv D</i>	<b>Element (Numbe</b> <i>I Landmine Warfa</i> Dev	r/Name) are and	<b>Project (Number/Name)</b> BU5 / Standoff Volcano Obstacle Adv Tech		
	Schedule Details	S				
		St	art	E	nd	
Events		Quarter	Year	Quarter	Year	
Rapid Prototyping Decision Review		3	2019	3	2019	
OTA Rapid Prototyping		1	2020	4	2021	
Focus Assesment		1	2020	1	2020	
Design Review		1	2020	1	2020	
User Jury		4	2020	4	2020	
Qualification Testing		1	2021	3	2021	
Operational Assesment		2	2021	2	2021	
SAVO Production Contract		4	2021	3	2024	
Rapid Fielding Decision Review		4	2021	4	2021	
Initial Operational Capability		4	2022	4	2022	
Full Operational Capability		4	2024	4	2024	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4		<b>R-1 Progra</b> PE 060361 <i>Barrier - A</i> d	<b>am Elemen</b> 9A / Landr dv Dev	<b>t (Number/</b> hine Warfare	<b>Project (Number/Name)</b> EK7 <i>I Area Denial Capability 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
EK7: Area Denial Capability Development	-	66.050	42.234	79.932	-	79.932	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

This project provides for the development of Terrain Shaping Obstacles.

Area Denial Capability Development will evaluate integrated technologies and prototype systems in a realistic operating environment to expedite technology transition for Terrain Shaping Obstacles. The obstacles will deny the enemy terrain and freedom of action while allowing friendly forces to maneuver freely within the same battlespace. Area Denial Capability Development provides controlled scalable effects against mounted enemy forces that disrupt, turn, fix, delay or block their ability to maneuver. Area Denial Capability Development enables the Combatant Commander to shape the battle space without exposing friendly forces to enemy engagement and to actively detect and engage the enemy at all operational ranges. Area Denial Capability Development, maintenance, repair, and product improvements.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: Area Denial Capability Development	34.230	25.583	59.976	-	59.976
<b>Description:</b> Develop and build system and sub-system level concepts that will be evaluated for affordability, feasibility, and technical maturity. Complete competitive development of systems and perform initiatives to mature technical feasibility and reduce risk.					
<b>FY 2019 Plans:</b> Will conduct analysis of munitions delivery system alternatives. Prepare for Milestone A decision to develop Terrain Shaping Obstacle munitions. Will award contract agreements to mature munitions technology and reduce program technical and cost risk.					
<i>FY 2020 Base Plans:</i> Conduct system level design, mature munitions technologies, mature obstacle delivery methods, integrate munitions into delivery system, mature system technology and reduce program technical and cost risk.					
FY 2019 to FY 2020 Increase/Decrease Statement: Funds were increased in FY 2020 to conduct Technology Maturation activities.					
Title: Engineering Support	10.283	12.165	12.766	-	12.766
FY 2019 to FY 2020 Increase/Decrease Statement:         Funds were increased in FY 2020 to conduct Technology Maturation activities.         Title: Engineering Support	10.283	12.165	12.766	-	12.766

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	h 2019		
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603619A <i>I Landmine Warfare</i> <i>Barrier - Adv Dev</i>	Name) e and	Project (Number/Name) EK7 / Area Denial Capability Development				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Description: Provide Engineering Support.							
<b>FY 2019 Plans:</b> Will provide engineering support to analyze munitions delivery system alternati to develop Terrain Shaping Obstacle munitions, and award contract agreement and reduce program technical and cost risk.	ves, achieve Milestone A decision ts to mature munitions technology						
<b>FY 2020 Base Plans:</b> Provide engineering support for system development, integration, contractor de performance modeling and simulation, and risk reduction efforts.	evelopmental testing, system						
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increase was attributable to revised engineering support plan.							
Title: Program Management and Oversight		1.537	2.738	4.890	-	4.890	
Description: Program Management and Support							
<b>FY 2019 Plans:</b> Will provide Program Management support to analyze munitions delivery syste A decision to develop Terrain Shaping Obstacle munitions, and award contract technology and reduce program technical and cost risk. Will conduct industry of Technology Maturation and Risk Reduction phase contracts/agreements to dev munitions.	m alternatives, achieve Milestone agreements to mature munitions engagements and award velop Terrain Shaping Obstacle						
<b>FY 2020 Base Plans:</b> Provide program management and oversight for system development, integratitesting, system performance modeling and simulation, and risk reduction effort planning, risk analysis, and program oversight.	on, contractor developmental s. Conduct long-range program						
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increase is attributable to assessment of PM support costs.							
<i>Title:</i> Test & Evaluation		-	0.200	2.300	-	2.300	
Description: Provides support to Contractor/Government test activities.							
FY 2019 Plans:							

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army							Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4	nent (Number ndmine Warfar	Der/Name)Project (Number/Name)rfare andEK7 I Area Denial Capability Deve									
B. Accomplishments/Planned Pro	grams (\$ in N	<u>/illions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Develop test and evaluation strateg	y for initial pro	totype syste	ms.								
FY 2020 Base Plans: Support contractor lead development engineering and manufacturing dev	ntal testing as elopment.	needed and	conduct a te	est to assess	s technology	readiness for					
FY 2019 to FY 2020 Increase/Dec FY 2020 increase was attributable t	r <b>ease Statem</b> o revised Test	e <b>nt:</b> and Evalua	tion plans.								
Title: FY 2018 Congressional Resc	ission						20.000	-	-	-	-
Title: FY 2019 SBIR / STTR Transf	ər						-	1.548	-	-	-
Description: FY 2019 SBIR / STTF	R Transfer										
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer											
FY 2019 to FY 2020 Increase/Deck FY 2019 SBIR / STTR Transfer	rease Statem	ent:									
			Accomplis	hments/Plar	nned Progra	ams Subtotals	66.050	42.234	79.932	-	79.932
C. Other Program Funding Summ	ary (\$ in Milli	ons <u>)</u>	FY 2020	FY 2020	FY 2020					Cost To	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	Base	000	Total	<u>FY 2021</u>	FY 2022	FY 2023	<u>FY 2024</u>	Complete	Total Cost
• 0604808A: <i>Landmine</i> Warfare/Barrier - Eng Dev	26.188	43.064	39.208	-	39.208	166.902	159.442	170.596	100.426	Continuing	Continuing
<u>Remarks</u>											

PE 0604808A Project 434 Anti-personnel Landmine Alternatives (NSD) is the engineering and manufacturing development follow-on to this funding line, and is a shared project line. The above profile represents the total program element, not only the follow-on activities of the program.

#### D. Acquisition Strategy

The Dominating Mobility Through Terrain Shaping and Engagement (DMTTS&E) Initial Capabilities Document (ICD) was approved by the Joint Requirements Oversight Council (JROC) on 3 October 2014. The DMTTS&E ICD documents Terrain Shaping Obstacle (TSO) capabilities at all operational ranges including those within lineof-sight and those that are beyond line-of-sight. The Army awarded four concept prototype contracts/agreements to develop representative prototypes (hardware and/ or models) which were used to assess the TSO concepts, technical risks, and costs of potential munitions systems and associated capabilities. The Army has awarded

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity	<b>R-1 Program Element (Number/Name)</b>	Project (N	umber/Name) Denial Canability Development
	Barrier - Adv Dev		

two initiatives to develop representative prototypes of top attack munitions to assess concept feasibility, maturity and technical risk. The Army intends to develop the TSO munitions system and associated capabilities. The TSO system will eventually be packaged into various delivery methods for employment at all operational ranges; however, the Army plans to initially develop and field the TSO capability at close operational ranges. The Army intends to competitively award up to two Technology Maturation and Risk Reduction (TMRR) contracts/agreements in FY 2019 to develop competing prototypes of the TSO munitions and associated capabilities, which includes close-range delivery mechanisms. As the munitions system matures, the items will be available for integration into additional delivery methods for employment across the entire range of operations.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Army	y								Date:	March 20	019				
Appropriation/Budget Activity 2040 / 4						<b>R-1 Pro</b> PE 060 <i>Barrier</i>	o <b>gram Ele</b> 3619A / L - Adv Dev	ement (N andmine '	warfare	<b>Project (Number/Name)</b> EK7 <i>I Area Denial Capability Development</i>								
Management Services (\$ in Millions)			FY 2018		FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 Total	]						
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Award Av Cost Date Cost D		Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract				
Program	MIPR	PM-CCS : Picatinny Arsenal, NJ	12.004	1.537	Jul 2018	2.433	Feb 2019	1.740	Nov 2019	-		1.740	Continuing	Continuing	-			
Scorpion Contract Closeout	MIPR	General Dynamics : TBD	-	-		0.305		-		-		-	0.000	0.305	-			
SBIR/STTR/FFRDC	MIPR	PM CCS : Picatinny Arsenal, NJ	-	-		-		3.150	Nov 2019	-		3.150	Continuing	Continuing	-			
FY 2018 Congressional Rescission	TBD	TBD : TBD	-	20.000		-		-		-		-	0.000	20.000	-			
		Subtotal	12.004	21.537		2.738		4.890		-		4.890	Continuing	Continuing	N/A			
Product Development (\$ in Millions)				FY 2	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2 Of	2020 CO	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 Development D	SS/CPFF	Northrop Grumman Systems Corporation : Redondo Beach, CA	6.973	0.430	Apr 2018	-		-		-		-	0.000	7.403	-			
Top Attack Prototype Development A	SS/CPFF	Orbital ATK : Plymouth, MN	7.962	0.422	Apr 2018	-		-		-		-	0.000	8.384	-			
Top Attack Prototype Development B	SS/CPFF	Textron Defense Systems : Wilmington, MA	11.569	0.949	Aug 2018	-		-		-		-	0.000	12.518	-			
Technology Maturation Risk Reduction (TMRR) Development A	C/TBD	TBD : TBD	-	-		11.183	Jun 2019	29.988	Feb 2020	-		29.988	Continuing	Continuing	-			
Technology Maturation Risk Reduction (TMRR) Development B	C/TBD	TBD : TBD	-	-		11.183	Jun 2019	29.988	Feb 2020	-		29.988	Continuing	Continuing	-			
Common Component Communications Study	SS/CPFF	NAL Research Corporation : Manassas, Virginia	-	3.454	Aug 2018	0.708	Feb 2019	-		-		-	0.000	4.162	-			

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	019					
Appropriation/Budget Activity 2040 / 4						<b>R-1 Pro</b> PE 060 <i>Barrier</i>	o <b>gram Ele</b> 3619A / L - Adv Dev	ement (N andmine	umber/N Warfare a	ame) and	<b>Project (Number/Name)</b> EK7 <i>I Area Denial Capability Development</i>								
Product Development (\$ in Millions)				FY 2018		FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	]						
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Award Cost Date		Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract				
Secure Communications Network	SS/CPFF	NGMS : Redondo Beach, CA	-	14.488	Aug 2018	-		-		-		-	0.000	14.488	-				
Secure Communications Network	SS/CPFF	Textron Defense Systems : Wilmington, MA	-	14.488	Aug 2018	-		-		-		-	0.000	14.488	-				
Prototype Manufacturing Support Contractor	C/CPIF	To Be Determined : To Be Determined	-	-		2.510	Jun 2019	-		-		-	0.000	2.510	-				
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.548		-		-		-	0.000	1.548	-				
		Subtotal	26.504	34.231		27.132		59.976		-		59.976	Continuing	Continuing	N/A				
Support (\$ in Millions)		ſ	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		Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract				
ARDEC Engineering Support	MIPR	ARDEC : Picatinny Arsenal, NJ	9.820	5.578	Mar 2018	7.673	Dec 2018	6.830	Dec 2019	-		6.830	Continuing	Continuing	-				
CERDEC Engineering Support	MIPR	CERDEC : Fort Belvoir, VA	1.059	0.889	Mar 2018	0.368	Jan 2019	0.745	Jan 2020	-		0.745	Continuing	Continuing	-				
Mitre Engineering Support (C4)	FFRDC	Mitre : McLean, VA	2.697	-		1.080	Aug 2019	1.112	Aug 2020	-		1.112	Continuing	Continuing	-				
Fibertek, INC. Operational Contractor Support	C/CPFF	FIBERTEK, INC. : Herndon, VA	0.601	0.130	Feb 2018	-		-		-		-	0.000	0.731	-				
General Program Support	C/FFP	Millennium Corporation : Picatinny Arsenal, NJ	0.023	0.425	Mar 2018	-		-		-		-	0.000	0.448	-				
General Program Support	C/FFP	To Be Determined : Picatinny Arsenal, NJ	-	-		0.329	May 2019	0.345	May 2020	-		0.345	0.000	0.674	-				
ARL Engineering Support	MIPR	ARMY RESEARCH LABORATORY (ARL) : Adelphi, MD	1.486	0.776	Aug 2018	0.682	Jan 2019	0.832	Jan 2020	-		0.832	Continuing	Continuing	-				

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	)19					
Appropriation/Budget Activity 2040 / 4							ogram Ele 3619A / L - Adv Dev	ement (N andmine	lumber/N Warfare	Project (Number/Name) EK7 / Area Denial Capability Development									
Support (\$ in Millions)				FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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				
Milestone Document Development Support	SS/CPAF	Booze Allen Hamilton : Picatinny Arsenal, NJ	-	2.484	Mar 2018	1.173	Feb 2019	-		-		-	0.514	4.171	-				
Milestone Document Development Support	C/CPAF	TBD : Picatinny Arsenal, NJ	-	-		-		2.102	Mar 2020	-		2.102	0.000	2.102	-				
NVESD Engineering Support	MIPR	NVESD : Fort Belvoir, VA	0.893	-		0.580	Jan 2019	0.600	Jan 2020	-		0.600	Continuing	Continuing	-				
Product Support Integration	SS/FFP	TBD : Picatinny Arsenal, NJ	-	-		0.200	Jan 2019	0.200	Jan 2020	-		0.200	Continuing	Continuing	-				
Air Worthiness Certification	MIPR	AMRDEC : Redstone Arsenal, AL	-	-		0.010	Dec 2018	-		-		-	0.000	0.010	-				
Integrated Logistics Support	MIPR	TACOM ILSC : Warren, MI	-	-		0.069	Dec 2018	-		-		-	0.000	0.069	-				
		Subtotal	16.579	10.282		12.164		12.766		-		12.766	Continuing	Continuing	N/A				
Test and Evaluation (	(\$ in Milli	ions)		FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	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				
Technology Readiness Evaluation Test	MIPR	TBD : TBD	-	-		-		2.300	Apr 2020	-		2.300	0.000	2.300	-				
Other Government Agency T&E Support	TBD	TBD : TBD	-	-		0.200		-		-		-	0.000	0.200	-				
		Subtotal	-	-		0.200		2.300		-		2.300	0.000	2.500	N/A				
Prio Year		Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract					
		Project Cost Totals	55.087	66.050		42.234		79.932		-		79.932	Continuing	Continuing	N/A				
Remarks																			

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army																	Da	te:	Mar	rch 2	019	)				
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)Project (IPE 0603619A / Landmine Warfare andEK7 / AreBarrier - Adv DevEK7 / Are										ct (N Area	(Number/Name) ea Denial Capability Development								
Event Neme	FY 2018 FY			FY 2	2019 FY 2020					FY 2021				FY 2022				FY 2023					FY 2024			
Event Name	1 2	3 4	1	2	3 4	4 1 2 3			4	1 2		2 3 4			2	3	4	1	2	3	3 4		1	2	3	4
Model and Simulation Development	M&S Dev																									
Materiel Solution Analysis	Materiel So	olution Analysis	3																							
Munitions Delivery System Analysis		Mu	nitions	Delivery	System Ar	nalysis																				
Milestone A - Terrain Shaping Obstacle (TSO) Munitions				м		Vunitio	ns																			
Technology Maturation and Risk Reduction Agreements Award(	s) - TSO M	lunitions		Co	ntract Awa	and (s) - '	тзо м	unitions																		
Technology Maturation and Risk Reduction (TMRR) - TSO Munit	ions				TMRR -	TSO N	Munition	15																		
Technology Readiness Evaluation Test							т	echnolgy	Rea	diness	Eval	uation Tes	t													
Milestone B - TSO Munitions											MS I	4 3 - тѕо м	unition	5												
Engineering and Manufacturing Development Contract Award(s	i) - TSO Mi	unitions								E		5 ward(s) -	тар м	lunitio	ns											
Engineering and Manufacturing Development - TSO Munitions												EMD - TS	O Mun	itions												
Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Marc	ו 2019																						
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Appropriation/Budget Activity 2040 / 4	<b>R-1 Program</b> PE 06036194 <i>Barrier - Adv</i>	Element (Number L'Landmine Warfa Dev	Project (Number/Nam EK7 / Area Denial Cap	<b>e)</b> ability Development																						
	Schedule Detai	ls																								
		Sta	art	En	d																					
Events		Quarter	Year	Quarter	Year																					
Area Denial Capability Development	Area Denial Capability Development																									
Model and Simulation Development		1	2016	4	2018																					
Concept Prototype Build		2	2016	4	2016																					
Concept Prototype Test and Evaluation		1	2017	1	2017																					
Analysis of Alternatives		1	2016	4	2016																					
Materiel Solution Analysis		1	2017	3	2019																					
Munitions Delivery System Analysis		4	2018	4	2019																					
Milestone A - Terrain Shaping Obstacle (TSO) Munitions		3	2019	3	2019																					
Technology Maturation and Risk Reduction Agreements Award(	s) - TSO Munitions	4	2019	4	2019																					
Technology Maturation and Risk Reduction (TMRR) - TSO Muni	itions	3	2019	3	2021																					
Technology Readiness Evaluation Test		4	2020	4	2020																					
Milestone B - TSO Munitions		3	2021	3	2021																					
Engineering and Manufacturing Development Contract Award(s)	3	2021	3	2021																						
Engineering and Manufacturing Development - TSO Munitions	3	2021	3	2024																						

Exhibit R-2, RDT&E Budget Item	Justificat	ion: PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	Appropriation/Budget Activity         2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced         Component Development & Prototypes (ACD&P)         Prior         FY 2020				<b>R-1 Program Element (Number/Name)</b> PE 0603627A <i>I Smoke, Obscurant and Target Defeating Sys-Adv Dev</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	8.920	20.674	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	29.594
E79: SMOKE/OBSCURANT SYSTEM	-	8.920	20.674	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	29.594

#### Note

The Screening Obscuration Module (SOM) program will transition from Engineering and Manufacturing Development (EMD) to the Production and Deployment phase in FY20.

#### A. Mission Description and Budget Item Justification

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

JUONS CC-0557 provides an enhanced early warning, detection, and identification of Chemical Warfare Agents and Toxic Industrial Materials (TIMs) to existing integrated base defense systems. These capabilities are in support of Operation Inherent Resolve and will be fully integrated into the Integrated Base Defense-Kits at 10 Forward Operating Bases in Iraq.

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Art	my			Date:	March 2019
Appropriation/Budget Activity		R-1 Program Ele	ement (Number/Name)		
2040: Research, Development, Test & Evaluation, Army I BA	4: Advanced	PE 0603627A / S	Smoke, Obscurant and `	Target Defeating Sys-A	dv Dev
Component Development & Prototypes (ACD&P)					
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	7.135	24.200	0.000	-	0.000
Current President's Budget	8.920	20.674	0.000	-	0.000
Total Adjustments	1.785	-3.526	0.000	-	0.000
<ul> <li>Congressional General Reductions</li> </ul>	-0.006	-0.026			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-3.500			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	2.070	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-0.279	-			

#### **Change Summary Explanation**

FY 2018 change is a result of a \$2.07M Congressional add to support JUONS CC-0557 efforts.

FY 2020 change for Screening Obscuration Module (SOM) program attributable to the transition from Engineering and Manufacturing Development (EMD) to the Production and Deployment phase in FY 2020.

Exhibit R-2A, RDT&E Project Ju	Date: Marc	h 2019										
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (NPE 0603627A / Smoke, Obscurant and Target Defeating Sys-Adv DevE79 / SMO					l <b>umber/Name)</b> DKE/OBSCURANT 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
E79: SMOKE/OBSCURANT SYSTEM	-	8.920	20.674	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	29.594
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

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

JUONS CC-0557 provides an enhanced early warning, detection, and identification of Chemical Warfare Agents and Toxic Industrial Materials (TIMs) to existing integrated base defense systems. These capabilities are in support of Operation Inherent Resolve and will be fully integrated into the Integrated Base Defense-Kits at 10 Forward Operating Bases in Iraq.

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: SOM: Product Development	4.529	2.283	-
<b>Description:</b> Provide Screening Obscuration Module (SOM) Development: Government and Contractor team will continue design and development of hardware in preparation for Government Development and User testing.			
FY 2019 Plans: Will continue development, incorporate changes from the DT test.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

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

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603627A <i>I Smoke, Obscurant and</i> <i>Target Defeating Sys-Adv Dev</i>	Projec E79 / S	ct (Number/N SMOKE/OBS	lame) CURANT SY	'STEM
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
Program transitioned to Production and Deployment Phase					
Title: SOM: Test, Evaluation & Other Government Agencies (OGA's)			1.496	2.465	-
<b>Description:</b> Provide Test and Evaluation of SOM systems (Developmental a survivability, and safety as a mounted and dismounted system).	nd User testing to ensure effectiveness, suitab	oility,			
<b>FY 2019 Plans:</b> Will continue test and evaluation planning, and conduct DT testing.					
FY 2019 to FY 2020 Increase/Decrease Statement: Program transitioned to Production and Deployment Phase.					
Title: SOM: Project Management			0.825	0.504	-
Description: Provide Project Management efforts.					
FY 2019 Plans: Will continue Government program management, systems engineering, and Ir	ntegrated Product Team (IPT) support.				
FY 2019 to FY 2020 Increase/Decrease Statement: Program transitioned to Production and Deployment Phase.					
Title: CBRN: Theater Chem Bio-Defense			-	14.600	-
Description: CBRN Theater Chemical and Biological Defense efforts.					
<i>FY 2019 Plans:</i> Begin and complete the integration, testing, and evaluation of multiple sensor 8th Army. Developmental and user testing to ensure suitability and safety of a in theater.	systems in the integrated early warning syster Il equipment in preparation for fielding of equip	n for oment			
FY 2019 to FY 2020 Increase/Decrease Statement: Program transitioned to Production and Deployment Phase.					
Title: JUONS CC-0557			2.070	-	-
Description: Chemical and Biological Stand-off Detection Compatibilities (JU	ONS CC-0557).				
Title: FY19 SBIR/STTR Transfer		-	0.822	-	

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

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603627A / Smoke, Obscurant and Target Defeating Sys-Adv Dev	Project (Number/N E79 / SMOKE/OBS	lame) SCURANT SY	(STEM
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Description: FY19 SBIR/STTR Transfer				
<b>FY 2019 Plans:</b> FY19 SBIR/STTR Transfer				
FY 2019 to FY 2020 Increase/Decrease Statement: FY19 SBIR/STTR Transfer realized in the year of execution				
	Accomplishments/Planned Programs Su	btotals 8.920	20.674	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>				
D. Acquisition Strategy Acquisition Strategy:				
Screening Obscuration Module (SOM): The SOM acquisition strategy production decision. A Full and Open Cost Plus Incentive Fee compe Price Incentive (Successive Targets) options for production were inclusive system integration, design for producibility and demonstration of intercent	r is a single-step System Integration and Developmen titive contract was awarded and will be used to develo ided in the contract. The acquisition strategy includes operability, safety, military utility and reliability.	t (SID) phase leading op the SOM during th system development	to a Milestor e SID phase. and demons	ne C Fixed stration, full
JUONS CC-0557: The acquisition strategy includes integration, demo Federal Acquisition Regulation based contract delivery order to rapidly	onstration and piloting the solution prior to fielding to the complete mission requirements.	he 10 FOB locations.	Leveraging	an existing
Chemical Biological Radiological and Nuclear (CBRN) Integrated Early rapid capability development, cyber security, qualification and perform 1QFY20 to support the deployment of the Full Operational Capability (	y Warning (IEW) ONS 17-22580: the \$14.6 million in nance test and evaluation (T&E) efforts. This funding v (FOC) in 2QFY20	Fiscal Year 2019 (FY will yield a Capability a	19), will addro and Limitatior	ess this n Report in
E. Performance Metrics				
N/A				

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	t Activity	1				<b>R-1 Pro</b> PE 060 <i>Target</i>	o <b>gram Ele</b> 3627A / S Defeating	e <b>ment (N</b> Smoke, C Sys-Adv	lumber/N bscurant Dev	<b>ame)</b> and	Project (Number/Name) E79 / SMOKE/OBSCURANT SYSTEM				
Management Service	s (\$ in M	illions)	ſ	FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
SOM-Project Management Personnel	MIPR	JPM NBC CA : Edgewood, MD	7.971	0.825	Nov 2017	0.504	Nov 2018	-		-		-	Continuing	Continuing	Continuing
JUONS CC-0557 Project Management Personnel	Various	JPM Guardian : Edgewood, MD	-	0.674	Apr 2018	-		-		-		-	0.000	0.674	-
CBRN-Theater Chem Bio Defense	TBD	JPEO-CBRND : APG	-	-		1.850	Feb 2019	-		-		-	0.000	1.850	-
		Subtotal	7.971	1.499		2.354		-		-		-	Continuing	Continuing	N/A
Product Development (\$ in Millions)			FY 2018		FY 2	2019	FY 2 Ba	020 FY se O		2020 CO	FY 2020 Total	]		<b>-</b>	
	Contract Method	Performing	Prior		Award		Award		Award		Award	Total	Cost To	Total	Target Value of
Cost Category Item	& Type	Activity & Location	Years	Cost	Date	Cost	Date	Cost	Date	Cost	Date	Cost	Complete	Cost	Contract
SOM Product Development	C/CPIF	L3 : Melbourne, FL	28.050	4.529	Feb 2018	2.283	Feb 2019	-		-		-	Continuing	Continuing	Continuing
CBRN-Theater Chem Bio Defense	C/Various	Vectrus : Reston, VA	-	-		6.750	Mar 2019	-		-		-	0.000	6.750	-
JUONS CC-0557 - Product Development	Option/ T&M	AMRDEC : Huntsville, AL	-	1.396	Aug 2018	-		-		-		-	0.000	1.396	-
CBRN-Theater Chem Bio Defense	MIPR	ECBC : APG	-	-		3.000	Feb 2019	-		-		-	0.000	3.000	-
		Subtotal	28.050	5.925		12.033		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions	5)			FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	Headquarters, Department of the	-	-		0.822	Jan 2019	-		-		-	0.000	0.822	-

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

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	y								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0603627A I Smoke, Obscurant and Target Defeating Sys-Adv DevProject (Number E79 I SMOKE/OE							NT SYSTI	EM
Support (\$ in Million	s)			FY 2018		FY 2019		FY 2 Ba	2020 ase	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 : Washington, DC													
		Subtotal	-	-		0.822		-		-		-	0.000	0.822	N/A
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 ase	FY	2020 CO	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
SOM Test, Evaluation & OGA's	MIPR	Various OGA : Various	2.263	1.496	Mar 2018	2.465	Nov 2018	-		-		-	Continuing	Continuing	Continuing
CBRN-Theater Chem Bio Defense	MIPR	Various OGAs : Various	-	-		3.000	Jan 2019	-		-		-	0.000	3.000	-
		Subtotal	2.263	1.496		5.465		-		-		-	Continuing	Continuing	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 ase	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	38.284	8.920		20.674		-		-		-	Continuing	Continuing	N/A

**Remarks** 

chibit R-4, RDT&E Schedule Profile: PB 2020 Army Da											Date: March 2019			
Appropriation/Budget Activity 2040 / 4		<b>R-1 P</b> PE 06 <i>Targe</i>	<b>rogram Elen</b> 603627A / Sm t Defeating S	n <b>ent (Nu</b> noke, Ob rys-Adv L	Number/Name) OKE/OBSCURANT SYSTEM									
Event Name	FY 2018	FY 20	19	FY 2020	4 1	FY 2021	1	FY 2022	F 1 2	<b>7 2023</b>	F 1 2	<b>7 2024</b>		
SOM Design and Fabrication														
SOM Developmental Testing #1														
SOM Developmental Testing #2														
SOM User Testing														
SOM MS C														
SOM Production Award														
SOM Production														
SOM FAT														
JUONS CC-0557 Development/Demonstration														
ONS 17-22580														
					I									

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mare	ch 2019		
ppropriation/Budget Activity 040 / 4	<b>R-1 Program</b> PE 0603627A <i>Target Defeati</i>	Element (Numbe I Smoke, Obscura ing Sys-Adv Dev	r/Name) ant and	Project (Number/Name) E79 / SMOKE/OBSCURANT SYSTEN			
	Schedule Detail	s					
		Sta	art	E	nd		
Events		Quarter	Year	Quarter	Year		
SOM Design and Fabrication		4	2016	2	2019		
SOM Developmental Testing #1		2	2018	4	2018		
SOM Developmental Testing #2		2	2019	2	2020		
SOM User Testing		1	2020	1	2020		
SOM MS C		3	2020	3	2020		
SOM Production Award		3	2020	3	2020		
SOM Production		3	2020	3	2022		
SOM FAT		1	2021	1	2021		
JUONS CC-0557 Development/Demonstration		2	2017	2	2019		
ONS 17-22580		1	2019	4	2019		

Exhibit R-2, RDT&E Budget Item	n Justificat	tion: PB 202	20 Army							Date: Marc	ch 2019				
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACL	ation, Army D&P)	I BA 4: Adv	anced	R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber 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			
Total Program Element	-	45.448	41.921	82.146	-	82.146	50.948	58.995	55.524	51.336	Continuing	Continuing			
694: Medium Caliber Ammunition	-	8.960	1.482	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.442			
BQ4: 155mm Artillery Propulsion XM654	-	0.000	0.000	7.200	-	7.200	0.000	0.000	0.000	0.000	0.000	7.200			
EB8: OWL for Small Caliber Ammunition	-	4.097	2.174	2.000	-	2.000	0.000	0.000	0.000	0.000	0.000	8.271			
EB9: Aviation Airborne Expandable Countermeasures	-	8.500	2.471	3.186	-	3.186	4.500	6.060	0.000	0.000	0.000	24.717			
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	0.000	3.755	6.821	-	6.821	0.000	0.000	0.000	0.000	0.000	10.576			
EC3: Ammunition Logistics Prototyping	-	1.677	1.313	1.525	-	1.525	1.715	2.170	1.800	1.836	0.000	12.036			
EL7: Reduced Range Ammunition	-	3.429	7.609	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.038			
EL8: LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER	-	2.870	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	2.870			
EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	-	0.000	0.000	4.250	-	4.250	0.000	0.000	0.000	0.000	0.000	4.250			
FA5: Assured Precision Weapons and Munitions	-	12.480	14.322	31.267	-	31.267	29.907	31.000	31.000	25.000	Continuing	Continuing			
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.960	4.941	25.897	-	25.897	14.826	19.765	22.724	24.500	Continuing	Continuing			
XT5: 30mm Anti-Personnel and Counter UAS	-	2.475	3.854	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.329			

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

#### Note

In FY 2020, Program Element 0603639A, Project BQ4, 155mm Artillery Propulsion XM654, will transition from Budget Activity 03, PE 0603004A, Project 232, Advanced Lethality & Survivability Demo. This Project is not a New Start.

In FY 2020, Program Element 0603639A, Project EU3, 50 Caliber All-Purpose Tactical Cartridge (APTC), is a New Start.

#### A. Mission Description and Budget Item Justification

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

Project 694, Medium Caliber Ammunition: Develop 30x113mm self-destructing airburst munitions and qualify 30x113mm linked ammunition for ground vehicles. Increase precision and lethality capability to defeat personnel and materiel targets as well as support the Joint Urgent Operational Need (JUON CC-0558) to counter the rapidly evolving threat of Unmanned Aerial Systems. This effort will qualify the links for use with existing M788 and M789 ammunition and develop self-destructing and airburst capable munitions fired from the Lightweight 30x113mm Link Fed Chain Gun. There is no funding requested in FY 2020.

Project BQ4, 155mm Artillery Propulsion XM654: The XM654E2 Supercharge is a unitary top-zone 155mm propelling charge optimized and required for use with 58caliber XM907E2 Extended Range Cannon with Slide-block breech for use with the XM1299 Extended Range Cannon Artillery (ERCA) Self-propelled Howitzer (SPH). It will achieve lethality overmatch at ranges of approximately 70km from XM907E2 Extended Range Cannon with developmental extended range projectiles, and will increase range with legacy projectiles by thirty percent. The XM654E2 Supercharge is composed of combustible cases with integral metal Stub Case utilizing existing electrically initiated Tank Primer and advanced artillery propellant. Knowledge points will determine compatibility with automated ammunition handling systems. FY 2020 funds will support design risk reduction and prototype maturation towards Engineering Manufacturing and Development (EMD) to support ERCA SPH Increment 2 to support of the Army's modernization priorities in support of the National Defense Strategy.

Project EB8, OWL for Small Caliber: 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 project's objective is to develop and field a full day/night tracer round to replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability. 7.62mm and 5.56mm are the immediate focus followed by a similar development strategy for .50 caliber cartridges. FY 2020 funding supports continued testing and evaluation of the 5.56mm OWL prototype solutions in order to mature the Technology Readiness Level (TRL).

Project EB9, Aviation Airborne Expandable Countermeasures: This project supports the advanced development activities and technology demonstrations of the Aviation Airborne Expendable Countermeasure (AAECM). These advanced decoys are necessary to address emerging threats and capabilities deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber Ammunition</i>	
(SAM) systems. These efforts will evaluate integrated technologies and counter help expedite technology transition from the laboratory to operational use by de complex Army aircraft platforms. These expendable countermeasures systems coordinated with the PEO Aviation and its platform program managers and with Need Statement (JUONS) CC-0558 Counter - Unmanned Aerial Systems (CU/ Radar Guided decoy. This decoy is designed to defeat specific threat types. De XM215 and RF Countermeasures (CM).	ermeasure prototype systems in realistic operating test en emonstrating component and subsystem maturity prior to s are an essential part of survivability equipment for Army h PM Aircraft Survivability Equipment (ASE) to address er AS). Continue to develop and prepare documentation for etails of their operation is classified. Conduct initial develo	vironments. Prototypes will integration into major and aircraft. Army RDT&E efforts are merging Joint Urgent Operational Milestone A decision for the opmental/operational testing on
Project EC2, The Advanced Armor-Piercing (ADVAP) project is a critical technic Capabilities Development Documents (CDD) and the Soldier Lethality Cross F requirements for new ammunition to support the rapid prototyping/developmen ADVAP ammunition is designed to provide overmatch capability to defeat advant nomenclature for the 7.62mm ADVAP is XM1158.	ology development in response to the 7.62mm and 5.56m unctional Team (SL CFT) Initial Capability Document (ICE It of the Next Generation Squad Weapons (NGSW) under anced light armored threats within typical machine gun en	nm Family of Ammunition D) which outlines the Section 804 Authority. New gagement ranges. The
The Next Generation Squad Weapons (NGSW) ammunition has a similar object split into two initial variants, the General Purpose (GP) and the Special Purpos the SP ammunition is XM1184. The overall objective of the ADVAP project is to machine gun and ADVAP ammunition in calibers below 7.62mm.	ctive to the 7.62mm ADVAP which is to defeat hard target e (SP). The nomenclature for the GP ammunition is XM1 to develop and Full Materiel Release (FMR) both 7.62mm	ts. The NGSW ammunition is 186 and the nomenclature for XM1158 cartridge for the M240
FY 2020 funding supports continuing rapid prototyping/development of the New prototypes and maturing prototypes to provide to the weapon system contractor conducting prototype testing. FY 2020 funding also supports conducting a Preprototype capacity to support planned weapon system testing.	t Generation Squad Weapons (NGSW) Special Purpose ors for performance evaluation, conducting a Critical Desig liminary Design Review (PDR) for the SP projectile and p	(SP) projectile, building gn Review (CDR), and erforming activities to increase
Project EC3, Ammunition Logistics Prototyping: This Project supports the future ammunition through the advanced development, integration, and demonstration effectiveness of ammunition operations, to include retrograde, while reducing t distribution, and management (strategic and tactical), prognostics, diagnostics, packaging and palletization. The efficient deployment and sustainment of reliable effectiveness of the ammunition logistics system to ensure the distribution of retesting and an operational demonstration for the environmental health monitori two prototype next generation temperature/humidity sensor with batch interrog reliability.	e force by improving the distribution, management, reliable on of logistics system enablers. These enablers will improv- he logistics footprint on the battlefield. Technology areas and asset visibility, explosives safety, and adaptive and ble ammunition is vital to success on the battlefield. This F eliable ammunition to the warfighter. FY 2020 funding will ing system. FY 2020 funding will also be used to continue ation and historical data retention capabilities, which will b	ility and survivability of ve the efficiency and addressed include handling, environmentally friendly Project enhances the operational be used to complete verification verification testing of a type be used for assessing munitions

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 I BA 4: Advanced	PE 0603639A I Tank and Medium Caliber Ammunition
Component Development & Prototypes (ACD&P)	
Project EL7, Reduced Range Ammunition: The small caliber Reduced Range	Ammunition (RRA) project is a critical technology development in response to the 7.62mm
and .50 callber Capabilities Development Documents (CDD). The overall obje	ctive of Reduced Range Ammunition is to provide training ammunition suitable for use
challenges on training ranges in range restricted areas. Reduce Range Amm	unition, will mitigate a training can on installations by providing a material solution that
meets training needs while shortening and condensing the surface danger zor	ne. 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. There is no funding requested in FY 2020.	
Project EL8, Lightweight Cartridge Case for Small Caliber: The Lightweight Sr	nall Caliber Ammunition (LSCA) Project is a critical technology development in response
The Lightweight Small Caliber Ammunition Project will develop and field 7.62	_SCA Project is to reduce the total Soldier load through reduction in annunition weight.
as the M80A1 and M62A1 cartridges. The Lightweight Small Caliber Ammunit	tion cartridge will be designed to be compatible with all Army 7.62mm weapon systems, but
optimized to work in the M240 Machine Gun. No funding requested in FY 2020	0.
Project EU3, .50 Caliber All-Purpose Tactical Cartridge (APTC): The All-Purpo	ose Tactical Cartridge (APTC) project is a critical technology development in response to
and improves current legacy 50 caliber ammunition. The All Purpose Tactical	Verall objective of All-Purpose Tactical Cartridge is to deliver a single round that replaces
work in the M2 Machine Guns, EY 2020 funding supports Technology Maturat	tion and Risk Reduction (TMRR) in preparation for a Technology Readiness Level (TRL) 6
conducting a Materiel Development Decision (MDD), and conducting Design V	Verification Tests.
Project FA5, The Assured Precision Weapons and Munitions (APWM) -FA5 P	roject is focused on advanced risk mitigation, technology integration, prototyping, and
product support to identify, evaluate, mature, test, and demonstrate various as	ssured precision prototype technologies in weapon and munitions components and
subsystems within a complex system of systems environment. The Assured P	recision weapons and Munitions Project reinforces the National Defense Strategy's major
near-neer adversaries as well as improving program performance and afforda	bility for multiple weapons and munitions Programs of Record (PoRs) via Joint Lethality
Positioning, Navigation and Timing (PNT) and Army M-Code GPS coordinated	d efforts. The Assured Precision Weapons and Munitions Project directly supports Army
Modernization Priorities in support of the National Defense Strategy. Funding	will support engagement by Weapons and Munitions PNT experts in the development,
evaluation, and technology delivery activities of the Air Force's M-Code GPS a	and Army's Assured PNT programs. Funding will also enable component and subsystem
architecture input essential for precision weapons and munitions operating in	a system of-systems environment, Army M-Code GPS technology integration and
evaluation, and maturation of alternative positioning, navigation and timing rel	ated technologies to enable informed Assured PNT related program of record milestone
Project FG1, Cannon-Delivered Area Effects Munitions (C-DAEM): The Canno	on-Delivered Area Effects Munitions (C-DAEM) Project is a two increment approach to
provide U.S. ground forces with the capability to engage area personnel throu	igh armored targets, while denying threat forces full operational freedom within the targeted
area. An Analysis of Alternatives (AoA) was completed in January 2018. The	purpose of the C-DAEM AoA was to inform acquisition and investment decisions by the

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

Army regarding replacement of the current stockpile of 155mm Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense policy compliant munitions and address anti-armor and extended range capability requirements identified in the C-DAEM Initial Capabilities Document (ICD). The Army validated a two increment solution for C-DAEM. Increment I will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. Increment II will destroy personnel, materiel, air defense artillery and rocket launchers. Increment I and II will be developed simultaneously. FY 2020 resources will fund the competitive demonstrations for Increment I, as well as early detailed design testing supporting the qualification of Increment II to support the Army's modernization priorities in support of the National Defense Strategy.

Project XT5, 30mm Anti-Personnel and Counter UAS: Lightweight 30x113mm (LW30) Airburst is a new capability identified as a Warfighter requirement in the Capability Production Document (CPD), AH-64E Helicopter, Increment 1, Version 6. The LW30 airburst cartridge improves the ability of the Warfighter to effectively engage antipersonnel/materiel targets due to increased lethality. Airburst capability provides the user with a much higher probability of achieving a first burst kill against enemy personnel targets in the open. The LW30 will retain its dual purpose warhead, allowing it to continue to defeat light armored threats through point detonation. The cartridge provides increased lethal effects against personnel and soft-skin vehicular targets increasing Soldier Survivability on the ground during troops in contact engagements and decreases the required number of rounds to reach the desired lethal effects. There is no funding requested in FY 2020.

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	41.452	41.974	43.272	-	43.272
Current President's Budget	45.448	41.921	82.146	-	82.146
Total Adjustments	3.996	-0.053	38.874	-	38.874
<ul> <li>Congressional General Reductions</li> </ul>	-0.026	-0.053			
<ul> <li>Congressional Directed Reductions</li> </ul>	-10.000	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
Congressional Adds	10.450	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	4.804	-			
SBIR/STTR Transfer	-1.232	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	38.874	-	38.874

#### **Change Summary Explanation**

FY 2020 increase of \$20.674 million to support the Army's modernization priorities in support of the National Defense Strategy.

FY 2018 Congressional increase of \$8.000 million to Project 694, Medium Caliber Ammunition.

FY 2018 Congressional increase of \$2.450 million to Project EB9, Aviation Airborne Expandable Countermeasures.

FY 2018 Congressional decrease of \$10.000 million to Project EU1, Enhanced Lethality Cannon Munitions.

	lustification	: PB 2020 A	Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	<b>am Elemen</b> 39A I Tank a on	umber/Name) ium Caliber 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
694: Medium Caliber Ammunition	-	8.960	1.482	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	10.442
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
<b>A. Mission Description and Bu</b> Develop 30x113mm self-destruc defeat personnel and materiel ta Systems. This effort will qualify the Lightweight 30x113mm Link Fee	idget Item J cting airburs argets as we the links for d Chain Gun	ustification t munitions a ll as suppor use with exis . There is n	and qualify 3 t the Joint U sting M788 o FY 2020	30x113mm Irgent Oper and M789 a request.	linked amm ational Nee ammunition	nunition for g d (JUON C and develo	ground vehic C-0558) to c p self-destru	cles. Increa counter the ucting and a	se precisior rapidly evol airburst cap	n and letha lving threat able munit	lity capability t of Unmanne ions fired from	to d Aerial n the
B. Accomplishments/Planned	Programs (	\$ in Million	<u>s)</u>						FY	2018	FY 2019	FY 2020
<i>Title:</i> Linked 30x113mm Ammur	nition Qualifi	cation and A	virburst Dev	elopment						8.960	1.435	-
	113mm amn	nunition and	develop se	lf-destructir	ig and airbu	urst capable	munitions.					
<i>FY 2019 Plans:</i> FY 2019 funds will be used to puevaluation, and to support the U airbursting munition.	urchase links rgent Materi	s and linked el Release (	ammunitior UMR) of the	necessary e 30x113mr	to conduct n self destr	weapon sysuct munition	stem integra	ation, testin lopment of	g and an			
<ul> <li>Description: Quality linked 30x<sup>4</sup></li> <li>FY 2019 Plans:</li> <li>FY 2019 funds will be used to puevaluation, and to support the U airbursting munition.</li> <li>FY 2019 to FY 2020 Increase/D Program will complete testing in</li> </ul>	urchase links rgent Materi <b>Decrease St</b> a FY 2019.	s and linked el Release ( atement:	ammunitior UMR) of the	i necessary 9 30x113mr	to conduct n self destr	weapon sysuct munition	stem integra is and deve	ation, testin lopment of	g and an			
<ul> <li><i>Description:</i> Quality linked 30x<sup>4</sup></li> <li><i>FY 2019 Plans:</i></li> <li>FY 2019 funds will be used to puevaluation, and to support the U airbursting munition.</li> <li><i>FY 2019 to FY 2020 Increase/D</i></li> <li>Program will complete testing in</li> <li><i>Title:</i> FY 2019 SBIR / STTR Transport</li> </ul>	urchase links rgent Materi Decrease Sta FY 2019.	s and linked el Release ( atement:	ammunitior UMR) of the	necessary 9 30x113mr	to conduct n self destr	weapon sysuct munition	stem integra is and deve	ation, testin lopment of	g and an	-	0.047	
<ul> <li><i>Description:</i> Quality linked 30x<sup>4</sup></li> <li><i>FY 2019 Plans:</i></li> <li>FY 2019 funds will be used to puevaluation, and to support the U airbursting munition.</li> <li><i>FY 2019 to FY 2020 Increase/D</i></li> <li>Program will complete testing in</li> <li><i>Title:</i> FY 2019 SBIR / STTR Transfer</li> <li>FY 2019 SBIR / STTR Transfer</li> </ul>	urchase links rgent Materi <b>Decrease St</b> a FY 2019. Insfer	s and linked el Release ( <b>atement:</b>	ammunitior UMR) of the	necessary a 30x113mr	to conduct n self destr	weapon system weapon system weapon system weapon system with the system weapon sys	stem integra	ation, testin lopment of	g and an	-	0.047	-
<ul> <li><i>Description:</i> Quality linked 30x<sup>4</sup></li> <li><i>FY 2019 Plans:</i></li> <li>FY 2019 funds will be used to puevaluation, and to support the U airbursting munition.</li> <li><i>FY 2019 to FY 2020 Increase/D</i></li> <li>Program will complete testing in</li> <li><i>Title:</i> FY 2019 SBIR / STTR Transfer</li> <li><i>FY 2019 to FY 2020 Increase/D</i></li> <li>FY 2019 SBIR / STTR Transfer</li> <li><i>FY 2019 SBIR / STTR Transfer</i></li> <li><i>FY 2019 SBIR / STTR Transfer</i></li> </ul>	urchase links rgent Materi Decrease Sta FY 2019. Insfer Decrease Sta	s and linked el Release ( atement: atement:	ammunitior UMR) of the	necessary a 30x113mr	to conduct n self destr	weapon sysuct munition	stem integra	ation, testing	g and an	-	0.047	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N 694 / Medi	umber/Name) ium Caliber Ammunition
C. Other Program Funding Summary (\$ in Millions) N/A			
Remarks			
<b>D. Acquisition Strategy</b> An other transaction agreement (OTA) contract will be used to purchase	e links for the 30x113mm ammunition. Linked ammu	nition delive	ries will be synchronized with test

An other transaction agreement (OTA) contract will be used to purchase links for the 30x113mm ammunition. Linked ammunition deliveries will be synchronized with test schedules for ammunition/weapon qualification and Remote Weapon Station (RWS)/vehicle system integration. Ammunition qualification tests and weapon qualification tests will be conducted in FY 2019. Purchase of linked M788 and M789 cartridges will transition to competitive procurement by FY 2020. Efforts to develop a self-destructing airburst capable munition and a guided 30x113mm munition will also be conducted.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603639A / Tank and Medium Caliber694 / Medium Caliber AmAmmunition694 / Medium Caliber Am								nunition	
Product Developme	nt (\$ in M	illions)		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
30x113mm Self Destruct and Airburst Ammo Development Contract	C/CPFF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	-	7.771	Aug 2018	0.635	Jan 2019	-		-		-	0.000	8.406	-
30x113mm Linked Ammo Development Contract	C/CPFF	Northrop Grumman Innovation Systems (NGIS) : Plymouth, MN	-	0.052	Aug 2018	-		-		-		-	0.000	0.052	-
30x113mm Ammo Fuze Development	C/CPFF	Electronics Development Corporation (EDC) : Columbia, MD	-	0.207	Jun 2018	-		-		-		-	0.000	0.207	-
Program Manager Maneuver Ammunition Systems (PM MAS)	MIPR	PM MAS : Picatinny, NJ	-	0.230	Oct 2017	-		-		-		-	0.000	0.230	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.047		-		-		-	0.000	0.047	-
		Subtotal	-	8.260		0.682		-		-		-	0.000	8.942	N/A
Support (\$ in Million	s)			FY	2018	FY 2019		FY 2020 Base		FY	2020 FY 2020 CO Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
30x113mm Ammo Armament Research Development and Engineering Center (ARDEC)	MIPR	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	-	-		0.200	Nov 2018	-		-		-	0.000	0.200	-
	- <b>L</b>	Subtotal	-	-		0.200		-		-		-	0.000	0.200	N/A
PE 06026204: Tank of	nd Modiu	n Colibor Ammuniti													
PE 0603639A: <i>Tank and Medium Caliber Ammunition</i> Army						Page 8 d	of 93		R	-1 Line #	77			66	

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19		
Appropriation/Budge 2040 / 4	Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)ProPE 0603639A / Tank and Medium Caliber694Ammunition694						Project (Number/Name) 694 / Medium Caliber Ammunition			
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	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	
Proximity Ammo Demonstration	MIPR	Aberdeen Testing Center (ATC) : Aberdeen, MD	-	-		0.300	Jul 2019	-		-		-	0.000	0.300	-	
Self Destruct Safety Certification Testing	MIPR	Yuma Test Center (YTC) : Aberdeen, MD	-	0.700	Dec 2018	-		-		-		-	0.000	0.700	-	
Self Destruct Ammo System Integration Testing	MIPR	Yuma Test Center (YTC) : Aberdeen, MD	-	-		0.300	Jun 2019	-		-		-	0.000	0.300	-	
		Subtotal	-	0.700		0.600		-		-		-	0.000	1.300	N/A	
Prior Years			Prior Years	FY	2018	FY 2019		FY 2020 F Base			2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals - 8.960											-	0.000	10.442	N/A	

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	۲m	/																		Da	te: I	Marc	h 20	19			
Appropriation/Budget Activity 2040 / 4	Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)Project (NPE 0603639A / Tank and Medium Caliber694 / MedAmmunition694 / Med								Number/Name) dium Caliber Ammunition											
Event Name		F١	2018			FY 2	019		FY	202	0		FY	202	1		FY	202	22		FY	202	3		FY 2	2024	L
Event Name	1	2	3	4	1	2	3 4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
30x113mm Ammo Development Contract Award			30x11	1 13mm	Amm	o Contrac	t Award																				
30x113mm Ammo Development				30×1	113mn	n Ammo E	Developm	ent																			
30x113mm Proximity Ammo Demonstration						3(	2 0x113mn	Prox A	Ammo I	Demo																	
30x113mm Self Destruct Safety Certification Test						30x113	3mm Self	Destruc	ct Safe	ty Cert	:																
30x113mm Self Destruct System Integration Testing							30×113	3mm Se	If Dest	ruct Int	egratic	in Testi	ing														
30x113mm Self Destruct Ammo Urgent Material Release							30x11:	3 3mm Se	elf Dest	ruct UN	ИR																

khibit R-4A, RDT&E Schedule Details: PB 2020 Army	Date: March 2019									
opropriation/Budget Activity 40 / 4	<b>R-1 Program I</b> PE 0603639A <i>Ammunition</i>	rogram Element (Number/Name)Project (Number/Na\$03639A I Tank and Medium Caliber694 I Medium Caliberunition694 I Medium Caliber								
	Schedule Details	3								
		Sta	art	E	nd					
Events		Quarter	Year	Quarter	Year					
30x113mm Ammo Development Contract Award		4	2018	4	2018					
30x113mm Ammo Development		4	2018	3	2019					
30x113mm Proximity Ammo Demonstration		4	2019	4	2019					
30x113mm Self Destruct Safety Certification Test		2	2019	3	2019					
30x113mm Self Destruct System Integration Testing		3	2019	4	2019					

4

30x113mm Self Destruct Ammo Urgent Material Release

2019

4

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060363 Ammunitio	<b>am Elemen</b> 39A I Tank a n	t (Number/ and Medium	<b>Project (N</b> BQ4 / 155/	Number/Name) 5mm Artillery Propulsion XM654						
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
BQ4: 155mm Artillery Propulsion XM654	-	0.000	0.000	7.200	-	7.200	0.000	0.000	0.000	0.000	0.000	7.200
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note												

In FY 2020, this Project will transition from Budget Activity 03, PE 0603004A, Project 232, Advanced Lethality & Survivability Demo. This Project is not a New Start.

#### A. Mission Description and Budget Item Justification

The XM654E2 Supercharge is a unitary top-zone 155mm propelling charge optimized and required for use with 58-caliber XM907E2 Extended Range Cannon with Slide-block breech for use with the XM1299 Extended Range Cannon Artillery (ERCA) Self-propelled Howitzer (SPH). It will achieve lethality overmatch at ranges of approximately 70km from XM907E2 Extended Range Cannon with developmental extended range projectiles, and will increase range with legacy projectiles by thirty percent. The XM654E2 Supercharge is composed of combustible cases with integral metal Stub Case utilizing existing electrically initiated Tank Primer and advanced artillery propellant. Knowledge points will determine compatibility with automated ammunition handling systems. FY 2020 funds will support design risk reduction and prototype maturation towards Engineering Manufacturing and Development (EMD) to support ERCA SPH Increment 2 and in support of the Army's modernization priorities in support of the National Defense Strategy.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: 155mm Artillery Propulsion XM654 Supercharge	-	-	7.200
<b>Description:</b> Unitary top-zone propelling charge for XM907E2 Extended Range Cannon with Slide-block breech for use with ERCA INC 2 to regain range overmatch for 155mm artillery.			
<b>FY 2020 Plans:</b> Perform charge establishment and charge uniformity in preparation for ballistic testing including preliminary blast overpressure and charge verification across operational temperatures. Perform packaging rough handling testing. Evaluate risk reduction activities prior to Milestone B.			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase in funds from FY 2019 to FY 2020 due to continuation of XM654E2 Supercharge efforts from Science & Technology (S&T) for risk reduction and prototype maturation. This Project is not a New Start.			
Accomplishments/Planned Programs Subtotals	-	-	7.200

Exhibit R-2A, RDT&E Project Jus	tification: PB	2020 Army							Date: Ma	rch 2019	
Appropriation/Budget Activity	ppropriation/Budget Activity							Project (N	Number/Na	me)	
2040 / 4	ΡΕ 06 <i>Αmmι</i>	03639A / Ta Inition	nk and Medi	ium Caliber	BQ4 / 155	5mm Artiller	y Propulsion	n XM654			
C. Other Program Funding Sumn	nary (\$ in Milli	ons <u>)</u>									
		-	FY 2020	<u>FY 2020</u>	<u>FY 2020</u>					Cost To	
Line Item	FY 2018	<u>FY 2019</u>	Base	000	Total	FY 2021	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<b>Complete</b>	<b>Total Cost</b>
<ul> <li>232: Advanced Lethality</li> <li>&amp; Survivability Demo</li> </ul>	-	0.000	-	-	-	-	0.000	169.605			

#### Remarks

In FY 2020, this Project will transition from Budget Activity 03, PE 0603004A, Project 232, Advanced Lethality & Survivability Demo. This Project is not a New Start. In FY 2021, this Project will transition to Budget Activity 05, PE 0604802A Project BQ3, 155mm Artillery Propulsion XM654. A Procurement Ammunition, Army funding line will be established in FY 2025.

#### D. Acquisition Strategy

The XM654E2 Supercharge Technology Maturation and Risk Reduction (TMRR) effort will consist of critical technology prototyping, testing, and demonstration. The Project will utilize the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) for the integration of components such as propellant, combustible case, igniter and stub case into developmental extended range projectiles and fuzes. After achieving Milestone B, the XM654E2 Supercharge Project will conduct competitive Engineering Manufacturing and Development (EMD) tasks aimed at meeting the validated requirement in preparation for Low Rate Initial Production (LRIP).

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Arm	У								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 <i>Ammur</i>	ogram Ele 3639A / 7 hition	e <b>ment (N</b> Fank and f	umber/Na Medium C	<b>ame)</b> Caliber	<b>Project</b> BQ4 / 1	55mm Ar	r/ <b>Name)</b> tillery Prop	oulsion X	M654
Management Service	es (\$ in M	lillions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	-		-		0.150	Oct 2019	-		0.150	0.000	0.150	-
	1	Subtotal	-	-		-		0.150		-		0.150	0.000	0.150	N/A
Remarks Program Management inclu Product Development	udes Super	charge travel and milest	one docum	entation sup	oport.			FY 2	2020	FY	2020	FY 2020	]		
				FY 2	2018	FY 2	2019	Ba	se	0	CO	Total			-
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Supercharge Prototype Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		-		1.339	Oct 2019	-		1.339	0.000	1.339	-
Developmental Projectile/ Fuze Hardware	MIPR	DoD Ordnance Technology Consortium (DOTC) : TBD	-	-		-		1.030	Oct 2019	-		1.030	0.000	1.030	-
		Subtotal	-	-		-		2.369		-		2.369	0.000	2.369	N/A
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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	Armament Research Development Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		4.281	Oct 2019	-		4.281	0.000	4.281	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	1				R-1 Pro PE 0603 Ammun	<b>gram El</b> 3639A / 7 <i>ition</i>	ement (N Fank and I	umber/Na Medium C	<b>ame)</b> Caliber	<b>Project</b> BQ4 / 1	(Numbei 55mm An	r/Name) tillery Prop	oulsion X	M654
Support (\$ in Millior	is)			FY	2018	FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		-		4.281		-		4.281	0.000	4.281	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total			
Cost Catagory Ham	Contract Method	Performing	Prior	EY 2	Award	FY 2	Award	Ba	Se Award	Cast	Award	Total	Cost To	Total	Target Value of
Supercharge Prototype Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-	Date	-	Date	0.400	Oct 2019	-	Date	0.400	0.000	0.400	-
		Subtotal	-	-		-		0.400		-		0.400	0.000	0.400	N/A
			Prior Years	FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		7.200		-		7.200	0.000	7.200	N/A
						·			•						

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 /																Da	te: I	Marc	h 20	19								
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 40 / 4							<b>R-1</b> PE ( <i>Amn</i>	Prog 06030 nunit	gram 639/ tion	• Ele	emen Tank a	t (Nu and N	ımb ⁄ledi	er/N um	lame Calik	e) ber	P B	<b>Proje</b> 3Q4	ect (I / 155	Num 5mm	<b>ber/</b> Artii	Nam llery	ie) Prop	oulsio	n XI	M654	
E		FY	201	8		FY	20 <sup>.</sup>	19		FY	202	20		FY	202	1		FY	202	22		FY	202	23		FY	2024	٦
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4	4
Supercharge Prototyping									Proto	typing																		
Supercharge Prototype Testing										esting																		

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date:	March 2019
ppropriation/Budget Activity 040 / 4	<b>R-1 Program Element (Numbe</b> PE 0603639A <i>I Tank and Mediu</i> <i>Ammunition</i>	<b>r/Name)</b> m Caliber	Project (Number BQ4 / 155mm Art	/ <b>Name)</b> Illery Propulsion XM654
	Schedule Details			
	St	art		End
Events	Quarter	Year	Quarter	Year
Supercharge Prototyping	1	2020	4	2020
Supercharge Prototype Testing	1	2020	4	2020

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060363 Ammunitio	<b>am Elemen</b> 39A / Tank a n	t (Number/ and Medium	Name) Caliber	Project (N EB8 / OWL	umber/Nan . for Small (	<b>1e)</b> Caliber Amm	nunition			
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
EB8: OWL for Small Caliber Ammunition	-	4.097	2.174	2.000	-	2.000	0.000	0.000	0.000	0.000	0.000	8.271
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

The small caliber One Way Luminescence (OWL) technology applies to multiple calibers. In FY 2019, Budget Activity 4 (BA4) Program Element (PE) 0603639A, Project EB8, 7.62mm OWL transitions to Budget Activity 5 (BA5) PE 0604802A, Project EP4, 7.62mm OWL. In FY 2021, BA4 PE 0603639A, Project EB8, 5.56mm OWL transitions to BA5 PE 0604802A, Project EP4, 5.56mm OWL

#### 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 project's objective is to develop and field a full day/night tracer round to replace the current pyrotechnic cartridges with trace cartridges that are only visible to the shooter and soldiers in close proximity, increasing soldier survivability. 7.62mm and 5.56mm are the immediate focus followed by a similar development strategy for .50 caliber cartridges. FY 2020 funding supports continued testing and evaluation of the 5.56mm OWL prototype solutions in order to mature the Technology Readiness Level (TRL).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Technology Maturation and Risk Reduction (TMRR)	4.097	2.104	2.000
<b>Description:</b> One Way Luminescence (OWL) will develop and demonstrate a full day/night tracer technology that eliminates the shortcomings of current legacy tracers.			
<i>FY 2019 Plans:</i> FY 2019 efforts will continue activities to mature 5.56mm Technology Readiness Level (TRL). The 5.56mm efforts include development, procurement, and testing of multiple competing prototype solutions to reduce risk in meeting user requirements. Funding will also support exploring implementation of OWL technology in .50 Caliber and other small caliber ammunition.			
FY 2020 Plans: FY 2020 efforts will continue activities to mature 5.56mm Technology Readiness Level (TRL). Plans include testing 5.56mm prototype solutions in preparation for TRL 6. Evaluate .50 Caliber and other small caliber ammunition OWL technology/prototype ammunition and mature TRLs.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> PE 06 <i>Amm</i> u	rogram Eler 03639A / Ta unition	nent (Numb nk and Medi	er/Name) ium Caliber	Projec EB8 /	ct (Number/N OWL for Sma	<b>lame)</b> all Caliber Arr	munition
B. Accomplishments/Planned Prog	rams (\$ in N	<u>/lillions)</u>						Γ	FY 2018	FY 2019	FY 2020
Technology maturation of the 5.56mr 5.56mm and other small caliber OWL	n OWL starte technology.	ed in FY 201	8. The FY 2	020 funding	furthers the	planned dev	elopment of t	the			
Title: FY 2019 SBIR / STTR Transfe	ſ								-	0.070	-
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer											
FY 2019 to FY 2020 Increase/Decre FY 2019 SBIR / STTR Transfer	ease Statem	ent:									
				Accor	nplishment	s/Planned P	rograms Su	btotals	4.097	2.174	2.000
C. Other Program Funding Summa	ry (\$ in Milli	<u>ons)</u>	EV 0000		E)/ 0000					0	
Line Itom	EV 2018	EV 2010	FY 2020 Baso	<u>FY 2020</u>	<u>FY 2020</u> Total	EV 2021	EV 2022	EV 202	03 EV 202	<u>Cost Io</u> 4 Complete	Total Cost
• EP4: One-Way Luminescence for Small Caliber Ammo	<u>- 1 2010</u> -	6.077	8.547	-	8.547	12.391	5.387	6.50	)0 3.00	0 0.000	41.902
Remarks											

Budget Activity 5 (BA5) Program Element (PE) 0604802A, Project EP4

#### D. Acquisition Strategy

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

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	roject C	ost Analysis: PB 2					Date:	March 20	19						
Appropriation/Budge 2040 / 4	t Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Fank and	umber/Na Medium C	<b>ame)</b> Caliber	Project EB8 / C	(Number WL for Si	r/Name) mall Calib	er Ammu	inition
Product Developmen	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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	Program Manager Maneuver Ammunition Systems (PM MAS) : Picatinny. NJ	0.370	0.022	Oct 2017	-		-		-		-	0.600	0.992	-
Physical Optics Corporation	C/FFP	Physical Optics Corporation : Torrance, CA	1.080	-		-		-		-		-	0.000	1.080	-
Battelle Memorial Institute	C/FFP	Battelle Memorial Institute : Columbus, OH	0.716	-		-		-		-		-	0.000	0.716	-
Tooling	Option/ FFP	SAVIT Corporation : Rockaway, NJ	0.209	0.392	Oct 2017	-		-		-		-	0.000	0.601	-
Tooling Development	Option/ CPFF	JAK Tool Engineering Solutions : Cranbury, NJ	-	-		0.800	Feb 2019	0.250	Feb 2020	-		0.250	0.000	1.050	Continuing
Prototype Development Contract 1	Option/ CPFF	General Dynamics : Florham Park, NJ	-	0.515	Jul 2018	-		0.400	Feb 2020	-		0.400	0.000	0.915	Continuing
Prototype Development Contract 2	Option/ CPFF	Nammo Tally : Mesa, AZ	-	0.515	Jul 2018	-		0.400	Feb 2020	-		0.400	0.000	0.915	Continuing
Projectile Development	MIPR	Armament Research Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	0.125	Oct 2017	-		-		-		-	0.000	0.125	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.070		-		-		-	0.000	0.070	-
		Subtotal	2.375	1.569		0.870		1.050		-		1.050	0.600	6.464	N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / T hition	ement (N Tank and I	umber/N Medium (	<b>ame)</b> Caliber	Project EB8 / C	(Number WL for Si	r/ <b>Name)</b> mall Calib	er Ammu	nition
Support (\$ in Million	s)		ſ	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	3.269	2.203	Oct 2017	1.254	Oct 2018	0.575	Oct 2019	_		0.575	2.498	9.799	Continuing
		Subtotal	3.269	2.203		1.254		0.575		-		0.575	2.498	9.799	N/A
Test and Evaluation	est and Evaluation (\$ in Millions)				2018	FY 2	2019	FY 2 Ba	2020 Ase	FY 2	2020 CO	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 Lab (ARL)	MIPR	Army Research Lab (ARL) : Aberdeen, MD	0.278	-		0.030	Oct 2018	0.040	Oct 2019	-		0.040	1.500	1.848	Continuing
Army Corps of Engineers	MIPR	Army Corps of Engineers : Vicksburg, MO	0.313	0.075	Apr 2018	-		0.035	Oct 2019	-		0.035	1.500	1.923	Continuing
Night Vision Labs (NVL)	MIPR	Night Vision Labs (NVL) : Fort Belvoir, VA	0.040	-		-		-		-		-	0.000	0.040	-
US Army Aberdeen Test Center (ATC)	MIPR	US Army Aberdeen Test Center (ATC) : Aberdeen, MD	0.101	-		-		-		-		-	0.000	0.101	-
Army Joint Munitions Command	MIPR	Army Joint Munitions Command : Rock Island, IL	0.154	0.050	Oct 2017	0.020	Oct 2018	0.050	Oct 2019	-		0.050	0.000	0.274	-
Naval Air Warfare Center	MIPR	Naval Air Warfare Center : Patuxent River, MD	0.137	-		-		-		-		-	0.000	0.137	-
Prototype testing	Option/ FFP	Double B Enterprises : Malvern, IA	-	0.200	Jan 2018	-		0.250	Feb 2020	-		0.250	0.000	0.450	Continuing
	<u>.</u>	Subtotal	1.023	0.325		0.050		0.375		-		0.375	3.000	4.773	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	020 Army	/					Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4			R-1 Program E PE 0603639A / Ammunition	lement (Number/N Tank and Medium	<b>lame)</b> Caliber	Project ( EB8 / OV	Number /L for Sr	/ <b>Name)</b> nall Calibo	er Ammu	nition
	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2 OC	020 :O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	6.667	4.097	2.174	2.000	-		2.000	6.098	21.036	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 /	Arm	ıy																				Da	ate:	Mar	ch 2	019	)			
Appropriation/Budget Activity 2040 / 4	ctivity									R-1 Program Element (Number/Name)FPE 0603639A / Tank and Medium CaliberEAmmunitionE											Project (Number/Name) EB8 / OWL for Small Caliber Ammunition									
Event Name		F	Y 2	018		=Y 2	019	19		FY 2020				FY 2021				FY 2022			2 FY 2023					F	Y 2	024	24	
	1	1	2	3 4	1		2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	6 4		1	2	3	4
7.62mm Multiple Concept Design Evaluation	7.6	2mm N	Multip	le Conce	pt Desi	ign E	Evaluat	tion																						
7.62mm Milestone B (MS-B)					7.62	mm N	WS-B																							
7.62mm Transitions from BA04 EB8 to BA05 EP4				7.0	52mm i	BA04	4 to B/	A05 TI	ransitio	on																				
7.62mm Engineering and Manufacturing Development (EMD)					7.	.62m	m EM	D																						
7.62mm Design Verification Test						ļ	7.62m	nm DV	т																					
7.62mm Preliminary Design Review (PDR)							7	5 7.62m	ım PDf	२																				
7.62mm User Assessment								7	.62mn	n User	r Asse	ssmer	nt																	
7.62mm Pre-Production Qualification Test (PPQT)								7	.62mn	n PPC	ΣТ																			
7.62mm Critical Design Review (CDR)											7.62	2mm C	DR																	
7.62mm Development Test & Evaluation (DT&E)												7.62	mm DT	8.E																
7.62mm Production Qualification Test (PQT)													7.62	mm PQ	т															
7.62mm Live Fire Test and Evaluation (LFT&E)													7.62	mm LF	T&E															
7.62mm Milestone C																	10. 7.62m	n MS-C	c											



Exhibit R-4, RDT&E Schedule Profile: PB 2020 /	Arm	/																				Da	ate:	Ма	rch 2	201	9				
Appropriation/Budget Activity 2040 / 4	dget Activity									R-1 Program Element (Number/Name)Project (NPE 0603639A / Tank and Medium CaliberEB8 / OWAmmunition												Num /L fo	umber/Name) L for Small Caliber Ammunition								
<b>-</b>	Event Name FY 2018 FY 201								19 FY 2020 FY 2021 FY 2022									22	2 FY 2023 FY 2024												
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2		3	4	1	2	3	4	1	2	2	3	4	1	2	3	4	
5.56mm Production Qualification Testing (PQT)																									5.8	56mm					
5.56mm Live-Fire Test and Evaluation (LFT&E)																									5.8	56mm	n LFT&	E			
5.56mm Milestone C (MS-C)																													5.5	13. 6mm I	
.50 caliber Concept Design Evaluation									.50	caliber	Conce	ept De	sign E	valua	tion																
													1				1					1				I					

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		·		Date: Mar	rch 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program E</b> PE 0603639A / Ammunition	lement (Numbo Tank and Media	e <b>r/Name)</b> um Caliber	Project (Number/Name) EB8 / OWL for Small Caliber Ammunit					
	Schedule Details								
	Γ	S	tart	E	End				
Events		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				
5.56 Cavity Design Test		1	2020	3	2020				
5.56 Technology Readiness Level 6		4	2020	4	2020				
5.56mm Milestone B (MS-B)		1	2021	1	2021				
5.56mm Transitions from BA04 EB8 to BA05 EP4		1	2021	1	2021				
5.56mm Engineering and Manufacturing Development (EMD)		1	2021	3	2024				
5.56mm Design Verification Test		4	2021	4	2021				
xhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019							
---	--	------------------------------------	-----------------------------	---	----------------------------------	--			
oppropriation/Budget Activity 040 / 4	<b>R-1 Program</b> PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	<b>r/Name)</b> m Caliber	Project (Number/Na EB8 / OWL for Small	<b>me)</b> Caliber Ammunition				
		St	art		End				
Events		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				
.50 caliber Concept Design Evaluation		1	2020	3	2020				

## <u>Note</u>

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.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army         Date:												
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060363 Ammunitio	a <b>m Element</b> 9A / Tank a n	: <b>(Number</b> /l nd Medium	Project (N EB9 / Aviat Counterme	Number/Name) iation Airborne Expandable neasures						
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2023	FY 2024	Cost To Complete	Total Cost	
EB9: Aviation Airborne Expandable Countermeasures	-	8.500	2.471	3.186	-	3.186	4.500	6.060	0.000	0.000	0.000	24.717
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### A. Mission Description and Budget Item Justification

This project supports the advanced development activities and technology demonstrations of the Aviation Airborne Expendable Countermeasure (AAECM). These advanced decoys are necessary to address emerging threats and capabilities deficiencies in Army aircraft protection and the safety of its aircrews against advanced Man-Portable Air Defense Systems (MANPADS) and shoulder launched Surface-to-Air Missiles (SAM) systems. These efforts will evaluate integrated technologies and countermeasure prototype systems in realistic operating test environments. Prototypes will help expedite technology transition from the laboratory to operational use by demonstrating component and subsystem maturity prior to integration into major and complex Army aircraft platforms. These expendable countermeasures systems are an essential part of survivability equipment for Army aircraft. Army RDT&E efforts are coordinated with the PEO Aviation and its platform PMs with PM Aircraft Survivability Equipment (ASE) to address emerging Joint Urgent Operational Need Statement (JUONS) CC-0558 Counter - Unmanned Aerial Systems (CUAS). Continue to develop and prepare documentation for Milestone A decision for the Radar Guided decoy. This decoy is designed to defeat specific threat types. Details of their operation is classified. Conduct initial developmental/operational testing on XM215 and RF Countermeasures (CM).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Expendable Countermeasures to Guided Missile Threats	8.500	2.392	3.186
<b>Description:</b> This program will develop expendable countermeasure (CM) decoys which will protect Army aircraft from surface-to-air missiles.			
<b>FY 2019 Plans:</b> Conduct demonstration efforts and flight testing on XM215 Countermeasures (CM) and Radio Frequency (RF) CM based on modeling and simulation efforts. Conduct flight testing for both XM215 and RF Passive countermeasure solutions.			
FY 2020 Plans: Conduct optimization for the XM215 during Technology Maturation & Risk Reduction (TMRR), System Requirements Review (SRR) and flight testing. Continue maturing prototype design and technology and Pre-Engineering and Manufacturing Development (EMD) review. Prepare Initial documentation to support Milestone B for RF Countermeasures. Conduct Pre-EMD review and Preliminary Design Review (PDR) for RF Countermeasures.			
FY 2019 to FY 2020 Increase/Decrease Statement: Funding is increasing commensurate with additional support and analysis required as the program progresses.			
<i>Title:</i> FY 2019 SBIR / STTR Transfer	-	0.079	-

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army							Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 P</b> I PE 06 <i>Amm</i> L	rogram Eler 03639A / Ta Inition	nent (Numb nk and Medi	Projec EB9 / A Counte	Project (Number/Name) EB9 / Aviation Airborne Expandable Countermeasures						
B. Accomplishments/Planned Pro	<u>grams (\$ in N</u>	<u>/lillions)</u>							FY 2018	FY 2019	FY 2020
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer											
FY 2019 to FY 2020 Increase/Decr FY 2019 SBIR / STTR Transfer	ease Statem	ent:									
				Accor	nplishment	s/Planned P	rograms Su	btotals	8.500	2.471	3.186
C. Other Program Funding Summ	ary (\$ in Milli	<u>ons)</u>									
			FY 2020	FY 2020	FY 2020					<u>Cost To</u>	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	Base	<u>000</u>	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	FY 202	<u>3 FY 202</u>	4 Complete	<u>Total Cost</u>
<ul> <li>EP7: Aviation Airborne</li> </ul>	-	7.213	4.920	-	4.920	4.480	8.250	-	-	0.000	24.863
Expendable Countermeasures											
<u>Remarks</u>											

#### <u>....</u>

## D. Acquisition Strategy

A Technical Development Strategy (TDS) for the development and production of Flare, Aircraft: Countermeasure XM215 and Radar Frequency (RF) Decoys under the Aviation Airborne Expendable Countermeasure (AAECM) program for the United States (U.S.) Army will be used. Prototyping contracts will be awarded competitively under the Department of Defense (DoD) Ordnance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) contract mechanism.

## E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	020 Arm	у							_	Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	<b>y</b>		R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Tank and	l <b>umber/N</b> a Medium C	<b>ame)</b> Caliber	Project EB9 / A Counter	(Number viation Air measure	r <b>/Name)</b> rborne Ex <sub>l</sub> s	pandable			
Management Service	es (\$ in M	lillions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	0.455	-		-		-		-		-	0.000	0.455	-
		Subtotal	0.455	-		-		-		-		-	0.000	0.455	N/A
Product Development (\$ in Millions)				FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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 Development XM215 (1)	C/FFP	ACC : Picatinny Arsenal	2.046	0.592	Oct 2018	-		1.450	May 2020	-		1.450	0.000	4.088	-
Prototype Development XM215 (2)	C/FFP	ACC : Picatinny Arsenal	-	0.412	Oct 2018	-		-		-		-	0.000	0.412	-
Prototype Development XM215 (3)	C/FFP	ACC : Picatinny Arsenal	-	0.515	Aug 2018	-		-		-		-	0.000	0.515	-
Prototype Development XM215 (4)	C/FFP	ACC : Picatinny Arsenal	-	0.206	Oct 2018	-		-		-		-	0.000	0.206	-
Prototype Development XM215 (5)	C/FFP	ACC : Picatinny Arsenal	-	0.250	Jan 2019	-		-		-		-	0.000	0.250	-
Prototype Development RF	C/FFP	ACC : Picatinny Arsenal	-	0.773	Sep 2018	1.300	Jun 2019	-		-		-	0.000	2.073	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.079		-		-		-	0.000	0.079	-
		Subtotal	2.046	2.748		1.379		1.450		-		1.450	0.000	7.623	N/A
Support (\$ in Millions	5)			FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	1.719	0.468	Sep 2018	-		0.280	Dec 2019	-		0.280	0.000	2.467	-

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

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activit	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N ank and	umber/Na Medium C	<b>ame)</b> Caliber	Project EB9 / A Counter	(Number viation Air rmeasure	r/ <b>Name)</b> rborne Ex <sub>l</sub> s	oandable	
Support (\$ in Million	s)		ſ	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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 RF	MIPR	ARDEC : Picatinny Arsenal	-	0.650	Sep 2018	-		0.456	Dec 2019	-		0.456	0.000	1.106	-
HILT T-SPIL	MIPR	TBB : China Lake CA	-	0.300		-		-		-		-	0.000	0.300	-
		Subtotal	1.719	1.418		-		0.736		-		0.736	0.000	3.873	N/A
Test and Evaluation (\$ in Millions)				FY	2018	FY	2019	FY 2020 Base		FY 2	020 FY 2020 CO Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Flight Test and Evaluation XM215	MIPR	TBD : TBD	0.950	1.782	Feb 2019	1.092	Apr 2019	-		-		-	0.000	3.824	-
Modeling & Simulation	MIPR	ARDEC : Picatinny Arsenal	-	1.072	Jun 2018	-		-		-		-	0.000	1.072	-
AOA Development	MIPR	AMSAA : APG, MD	0.261	-		-		-		-		-	0.000	0.261	-
AOA Development	MIPR	TRAC : Ft Leavenworth, KS	0.550	-		-		-		-		-	0.000	0.550	-
Flight Test and Evaluation RF	MIPR	PAX River : PAX River	-	0.705	Jun 2018	-		1.000	Apr 2020	-		1.000	0.000	1.705	-
Modeling & Simulation RF	MIPR	AFRL : AFRL	-	0.550		-		-		-		-	0.000	0.550	-
Modeling & Simulation RF	MIPR	ARDEC : Picatinney Arsenal	-	0.225	Aug 2018	-		-		-		-	0.000	0.225	-
		Subtotal	1.761	4.334		1.092		1.000		-		1.000	0.000	8.187	N/A
			Prior Years	FY	2018	FY :	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	5.981	8.500		2.471		3.186		-		3.186	0.000	20.138	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy																				Da	ate	: Ma	arch	201	19			
opropriation/Budget Activity 140 / 4						F F	<b>R-1 F</b> PE 00 A <i>mm</i>	<b>Prog</b> 6036 <i>uniti</i>	ram 639A ion	Ele \/7	emer ank a	nt (N and I	lum Me	nbei diur	<b>r/Na</b> n C	i <b>me</b> alib	) er	P E C	<b>roje</b> B9 I coun	e <b>ct (</b> Avi tern	Num atior neas	nbe n Al sure	er/Na irbo es	ame rne	<b>e)</b> Exp	oand	dabl	e	
		FY 20	18		FY	2019	9		FY	202	20		F	Y 20	021			FY	202	22	Τ	F	Y 2	023			F١	( 20	24
Event Name	1	2 3	6 4	1	2	3	4	1	2	3	4	1	2	! :	3	4	1	2	3	4	1	:	2	3	4	1	2	3	4
Materiel Development Documentation and Decision for XM215																													
Analysis of Alternatives			I																										
Demonstration Contract Preparation XM215																													
Milestone A XM215				2																									
Demonstration Down Select XM215						4																							
Prototyping XM215																													
Testing Efforts (Stability/Heat/Cold) XM 215																													
Flight Testing XM 215																													
Milestone B XM215											6																		
Demonstration Contract Preparation RF Countermeasure																													
Milestone A RF Countermeasure				3																									
Contract Award RF Countermeasure																													
Demonstrations RF Countermeasure																													

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army								Date: March 20	19
Appropriation/Budget Activity 2040 / 4		<b>R-1 F</b> PE 0 <i>Amm</i>	Program Elemer 603639A / Tank a nunition	nt (Numbe and Mediu	r <b>/Name)</b> n Calibe	r EB9 I Avia Counterm	<b>Number/Name)</b> ation Airborne Ex aeasures	pandable		
					1	1				1
Event Name	FY	2018	FY 20	019	FY 2020	FY 2	021	FY 2022	FY 2023	FY 2024
Prototype Development RF Countermeasure	1 2	3 4	1 2 3	3 4	1 2 3 4	1 2	3 4	1   2   3   4	1 2 3 4	1 2 3 4
Flight Testing RF Countermeasure										
Data Analysis RF Countermeasure										
Milestone B RF Countermeasure					5					

whibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Marc	h 2019	
opropriation/Budget Activity 40 / 4	<b>R-1 Program Element (Numl</b> PE 0603639A / Tank and Mea Ammunition	<b>Project (Number/Name)</b> EB9 <i>I Aviation Airborne Expandable</i> <i>Countermeasures</i>			
	Schedule Details				
		Start	Er	nd	
Events	Quarter	Year	Quarter	Year	
Materiel Development Documentation and Decision for XM215 CM	2	2016	2	2018	
Analysis of Alternatives	3	2017	3	2018	
Demonstration Contract Preparation XM215	4	2018	4	2018	
Milestone A XM215	1	2019	1	2019	
Demonstration Down Select XM215	3	2019	3	2019	
Prototyping XM215	1	2019	2	2020	
Testing Efforts (Stability/Heat/Cold) XM 215	2	2019	4	2020	
Flight Testing XM 215	3	2020	3	2020	
Milestone B XM215	4	2020	4	2020	
Demonstration Contract Preparation RF Countermeasure	4	2018	4	2018	
Milestone A RF Countermeasure	1	2019	1	2019	
Contract Award RF Countermeasure	1	2019	1	2019	
Demonstrations RF Countermeasure	1	2019	2	2019	
Prototype Development RF Countermeasure	3	2019	4	2019	
Flight Testing RF Countermeasure	4	2019	4	2019	
Data Analysis RF Countermeasure	4	2019	3	2020	

Milestone B RF Countermeasure

2020

3

3

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019												
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060363 Ammunitio	a <b>m Elemen</b> 9A / Tank a n	t (Number/ nd Medium	Project (N EC2 / Adv Small Cal /	Number/Name) v Armor-Piercing (ADVAP) for I Ammo						
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2023	FY 2024	Cost To Complete	Total Cost	
EC2: Adv Armor-Piercing (ADVAP) for Small Cal Ammo	-	0.000	3.755	6.821	-	6.821	0.000	0.000	0.000	0.000	0.000	10.576
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

The small caliber Advanced Armor-Piercing (ADVAP) technology has been under development since 2015 and applies to multiple calibers of ammunition. In FY 2017, the funding transitioned from Budget Activity (BA) 04 Program Element (PE) 0603639A, Project EC2 to BA 05, PE 0604802A, Project EP5, Adv Armor-Piercing (ADVAP) for Small Cal Ammo to continue the development of ADVAP 7.62mm ammunition. A follow-on effort to support ADVAP ammunition calibers below 7.62mm commences in FY 2019 under the BA 4, PE 0603639A, Project EC2 Adv Armor-Piercing (ADVAP) Small Cal Ammo. In FY 2021, PE 0603639A, Project EC2, ADVAP will be realigned to PE 0604601 Project EV9 prior to the PB 2021 submission to continue development efforts on ADVAP ammunition in calibers below 7.62mm. The effort is not a new start.

## A. Mission Description and Budget Item Justification

The Advanced Armor-Piercing (ADVAP) project is a critical technology development in response to the 7.62mm and 5.56mm Family of Ammunition Capabilities Development Documents (CDD) and the Soldier Lethality Cross Functional Team (SL CFT) Initial Capability Document (ICD) which outlines the requirements for new ammunition to support the rapid prototyping/development of the Next Generation Squad Weapons (NGSW) under Section 804 Authority. New ADVAP ammunition is designed to provide overmatch capability to defeat advanced light armored threats within typical machine gun engagement ranges. The nomenclature for the 7.62mm ADVAP is XM1158.

The Next Generation Squad Weapons (NGSW) ammunition has a similar objective to the 7.62mm ADVAP which is to defeat hard targets. The NGSW ammunition is split into two initial variants, the General Purpose (GP) and the Special Purpose (SP). The nomenclature for the GP ammunition is XM1186 and the nomenclature for the SP ammunition is XM1184. The overall objective of the ADVAP project is to develop and Full Materiel Release (FMR) both 7.62mm XM1158 cartridge for the M240 machine gun and ADVAP ammunition in calibers below 7.62mm.

FY 2020 funding supports continuing rapid prototyping/development of the Next Generation Squad Weapons (NGSW) Special Purpose (SP) 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 funding also supports conducting a Preliminary Design Review (PDR) for the SP projectile and performing activities to increase prototype capacity to support planned weapon system testing.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Small Caliber Ammunition Rapid Prototyping	-	3.634	6.821

Exhibit R-2A, RDT&E Project Justif	ication: PB	2020 Army							Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> I PE 06 <i>Ammu</i>	rogram Eler 03639A / Ta unition	nent (Numb nk and Medi	<b>er/Name)</b> um Caliber	Project EC2 / A Small (	t <b>(Number/I</b> Adv Armor-F Cal Ammo	Name) Piercing (ADVA	\P) for
B. Accomplishments/Planned Prog	rams (\$ in N	<u>//illions)</u>							FY 2018	FY 2019	FY 2020
<b>Description:</b> Develop, demonstrate, overmatch capability versus a broad	and qualify s spectrum of	small caliber hard targets	ADVAP car	tridges that o	can defeat th	ireat targets	and provide				
<b>FY 2019 Plans:</b> FY 2019 efforts will be focused on rapprojectile to include building and eval (TRL), conducting a GP Preliminary I Generation Squad Weapon system d	oid prototypin uating projec Design Revie evelopment.	ng/developm ctile prototyp ew (PDR), ar	nent of the G les to refine nd preparing	eneral Purp concepts an for insertion	ose (GP) and d mature the n into the rap	d Special Pu Technology id prototypin	rpose (SP) Readiness g for the Ne	Level xt			
FY 2020 Plans: FY 2020 efforts are focused on contin prototypes to provide to the weapon s and conducting prototype testing. Als activities to increase prototype capac	nuing rapid p system contr so, conductir ity to suppor	rototyping/d actors for pe ng a Prelimir t planned we	evelopment erformance e hary Design l eapon syster	of the SP province evaluation, co Review (PDF m testing beg	ojectile, build onducting a R) for the SF ginning in FN	ding prototyp Critical Desig Pprojectile and 7 2021 and F	es and matu gn Review ( nd performin FY 2022.	uring CDR), Ig			
FY 2019 to FY 2020 Increase/Decre FY 2019 to FY 2020 increase needed	ase Statem I to fund plar	<b>ent:</b> nned rapid p	rototyping ad	ctivities for b	oth the GP a	and SP amm	unition.				
Title: FY 2019 SBIR / STTR Transfer									-	0.121	-
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer											
FY 2019 to FY 2020 Increase/Decre FY 2019 SBIR / STTR Transfer	ase Statem	ent:									
				Accor	nplishment	s/Planned P	rograms Sເ	ubtotals	-	3.755	6.821
C. Other Program Funding Summa	ry (\$ in Milli	ons)									
			FY 2020	FY 2020	FY 2020					<u>Cost To</u>	
Line Item	FY 2018	FY 2019	Base	<u>000</u>	Total	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 202:</u>	<u> FY 202</u>	4 Complete	Total Cost
• EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo	13.318	10.748	0.000	-	0.000	-	-	-	-	0.000	30.000
• FL4: Small Caliber Ammo for Next Gen Squad Weapons	-	-	22.880	-	22.880	30.630	28.750	25.000	) 11.75	0 0.000	119.010
PE 0603639A: Tank and Medium Cali	ber Ammuni	tion		UNCLAS	SIFIED						Q <i>A</i>

Exhibit R-2A, RDT&E Project J	ustification: PB	2020 Army					Date: March 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Pr</b> PE 06 <i>Ammu</i>	rogram Eler 03639A / Ta Inition	nent (Numb nk and Medi	e <b>r/Name)</b> ium Caliber	<b>Project (I</b> EC2 / Adv Small Cal	<b>Project (Number/Name)</b> EC2 I Adv Armor-Piercing (ADVAP) for Small Cal Ammo					
C. Other Program Funding Sur	<u>nmary (\$ in Milli</u>	ons <u>)</u>									
	FY 2020	FY 2020	FY 2020					Cost To			
Line Item FY 2018 FY 2019 Base					<u>Total</u>	<u>FY 2021</u>	FY 2024 Complete Total Cost				
Demerike											

#### <u>Remarks</u>

These funding lines support Engineering & Manufacturing Development (EMD) activities for the 7.62mm ADVAP ammunition and rapid prototyping/development of General Purpose (GP) and Special Purpose (SP) ammunition for the Next Generation Squad Weapon (NGSW) systems. Other Program Funding in Budget Activity 05 (BA05) PE 0604802A, Project EP5 and Budget Activity 05 (BA05) PE 0604802A, Project FL4.

## D. Acquisition Strategy

The ADVAP ammunition programs will use a Government developed design and manufacturing process. Multiple component contracts will be awarded to purchase raw materials and equipment. In FY 2016, the ADVAP effort accomplished design optimization, manufactured prototypes, and demonstrated TRL 6 for XM1158. Milestone (MS) B occurred in 1st Quarter FY 2017 leading to fabrication and testing of qualification hardware for the 7.62mm cartridge. Follow-on developmental efforts for the ADVAP ammunition calibers below 7.62mm will utilize rapid prototyping acquisition strategy under Section 804 Authority. 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.

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2				Date: March 2019										
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (NPE 0603639A / Tank and Medium CaliberEC2 / AdvAmmunitionSmall Cal							( <b>Number/Name)</b> Iv Armor-Piercing (ADVAP) for al Ammo			
Product Developmer	nt (\$ in M	illions)		FY	2018	FY	2019	FY 2020 Base		FY	2020 CO	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	0.658	-		-		-		-		-	0.600	1.258	-	
Prototype Manufacturing	C/FFP	Jet Industrial : New Jersey	1.039	-		-		-		-		-	2.600	3.639	-	
Phase 1 Propellant Development	C/FFP	ATK : Virginia	0.141	-		-		-		-		-	0.000	0.141	-	
Projectile Development	Option/ CPFF	Northrop Grumman Innovation Systems : Independence, MO	-	-		2.825	Jan 2019	3.200	Jan 2020	-		3.200	Continuing	Continuing	Continuing	
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.121		-		-		-	0.000	0.121	-	
		Subtotal	1.838	-		2.946		3.200		-		3.200	Continuing	Continuing	N/A	
Support (\$ in Million	s)			FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	6.387	-		0.659	Oct 2018	1.921	Oct 2019	-		1.921	Continuing	Continuing	Continuing	
Army Research Lab (ARL)	MIPR	Aberdeen : Maryland	1.000	-		-		1.000	Oct 2019	-		1.000	Continuing	Continuing	Continuing	
		Subtotal	7.387	-		0.659		2.921		-		2.921	Continuing	Continuing	N/A	
Test and Evaluation	(\$ in Milli	ions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2 Of	2020 CO	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 Lab (ARL)	MIPR	Aberdeen : Maryland	3.200	-		0.150	Oct 2018	0.500	Oct 2019	-		0.500	Continuing	Continuing	Continuing	
U.S. Army Aberdeen Test Center	TBD	Aberdeen : Maryland	-	-		-		0.200	Oct 2019	-		0.200	Continuing	Continuing	Continuing	

Exhibit R-3, RDT&E	nibit R-3, RDT&E Project Cost Analysis: PB 2020 Army											Date: March 2019				
Appropriation/Budget Activity 2040 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>					Project (Number/Name) EC2 I Adv Armor-Piercing (ADVA Small Cal Ammo			(ADVAP)	for	
Test and Evaluation (\$ in Millions)				FY 2	2018	FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
		Subtotal	3.200	-		0.150		0.700		-		0.700	Continuing	Continuing	N/A	
	Prior Years FY 2018		2018	FY 2019		FY 2020 Base		FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract			
Project Cost Totals 12.425 -						3.755 6.821 -				6.821	Continuing	Continuing	N/A			

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army				Date: March 2019				
Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06 <i>Amm</i>	rogram Elemer 03639A / Tank a unition	( <b>Number/Name)</b> Iv Armor-Piercing (ADVAP) for al Ammo				
Event Name	FY 2018	FY 20	019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	
Event Hane	1 2 3 4	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 Rapid Prototyping		NGSW Ammo F	RP.						
NGSW Ammo Initital Product Review 1 (IPR 1) Special Purpose		NGSW Amr	no IPR 1 SF	5					
NGSW Ammo Preliminary Design Review General Purpose (PD	R-GP)	NO	2 3SW Ammo	PDR-GP					
NGSW Ammo Initital Product Review 2 (IPR 2) Special Purpose			NGSW A	nmo IPR 2 SP					
NGSW Ammo Preliminary Design Review Special Purpose (PD	R-SP)			NGSW Ammo PDR-S	sP				
NGSW Ammo Critical Design Review General Purpose (CDR-G	P)			NGSW Ammo	CDR-GP				
NGSW Ammo Prototype Test 1				NGSW Ar	mmo PT1				
NGSW Ammo Initital Product Review 3 (IPR 3) Special Purpose				6 NGSW	Ammo IPR 3 SP				
NGSW Ammo Full Materiel Release (FMR) Transitions from BAC	4 EC2 to BA05 FL4			N	SSW Ammo FMR BA04 to	BA05 Transition			
NGSW Ammo Critical Design Review Special Purpose (CDR-SF	)				NGSW Ammo CDR-S	P			
NGSW Ammo Prototype Test 2					NGSW Ammo PT	12			
NGSW Ammo Urgent Materiel Release General Purpose (UMR	GP)					9 NGSW	Ammo UMR GP		
NGSW Ammo Urgent Materiel Release Special Purpose (UMR S	P)						Ammo UMR SP		

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A										Date: March 2019							
ppropriation/Budget Activity )40 / 4					<b>R-1</b> PE ( <i>Amr</i>	<b>Prog</b> 06036 muniti	ram I 639A ion	Elemei I Tank	n <b>t (Nu</b> and M	I <b>mber</b> Iediur	/ <b>Name</b> n Calib	<b>e)</b> Der	Project (N EC2 / Adv Small Cal	(Number/Name) dv Armor-Piercing (ADVAP) for al Ammo			
				51/ 0/									<b>EV 0000</b>	<b>EV 0000</b>	EX 000 4		
Event Name	1	2 3 4	4 1	2 3	3 4	3 4 1 2		3 4	1	2 3	3 4	1	<b>FY 2022</b> 2 3 4	<b>FY 2023</b>	<b>FY 2024</b>		
NGSW Ammo Rapid Fielding		· ·						·		·	·		 N	SSW Ammo RF			
NGSW Ammo Production Qualification Testing Special Purpose	(PQT S	P)												NGSW Ammo PQT SP			
NGSW Ammo Full Materiel Release (FMR)															NGSW Ammo FMR		

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army	A-4A, RDT&E Schedule Details: PB 2020 Army ation/Budget Activity R-1 Program Element (Num PE 0603639A I Tank and Med Ammunition Schedule Details Ut Amme Denid Detatation						
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Eleme</b> PE 0603639A / Tank Ammunition	nt (Number and Mediur	r <b>/Name)</b> n Caliber	Project (Number/Name) EC2 I Adv Armor-Piercing (ADVAP) fo Small Cal Ammo			
5	Schedule Details						
		Sta	nrt	E	End		
Events	Q	uarter	Year	Quarter	Year		
NGSW Ammo Rapid Prototyping		1	2019	2	2024		
NGSW Ammo Initital Product Review 1 (IPR 1) Special Purpose		2	2019	2	2019		
NGSW Ammo Preliminary Design Review General Purpose (PDR-GP)		3	2019	3	2019		
NGSW Ammo Initital Product Review 2 (IPR 2) Special Purpose		4	2019	4	2019		
NGSW Ammo Preliminary Design Review Special Purpose (PDR-SP)		2	2020	2	2020		
NGSW Ammo Critical Design Review General Purpose (CDR-GP)		3	2020	3	2020		
NGSW Ammo Prototype Test 1		3	2020	4	2020		

NGSW Ammo Critical Design Review General Purpose (CDR-GP)	3	2020	3	2020
NGSW Ammo Prototype Test 1	3	2020	4	2020
NGSW Ammo Initital Product Review 3 (IPR 3) Special Purpose	4	2020	4	2020
NGSW Ammo Full Materiel Release (FMR) Transitions from BA04 EC2 to BA05 FL4	2	2021	2	2021
NGSW Ammo Critical Design Review Special Purpose (CDR-SP)	2	2021	2	2021
NGSW Ammo Prototype Test 2	2	2021	3	2021
NGSW Ammo Urgent Materiel Release General Purpose (UMR GP)	4	2022	4	2022
NGSW Ammo Urgent Materiel Release Special Purpose (UMR SP)	4	2022	4	2022
NGSW Ammo Rapid Fielding	4	2022	1	2026
NGSW Ammo Production Qualification Testing Special Purpose (PQT SP)	1	2023	2	2023
NGSW Ammo Full Materiel Release (FMR)	2	2024	2	2024

Exhibit R-2A, RDT&E Project Ju	iibit R-2A, RDT&E Project Justification: PB 2020 Army											
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0603639A / Tank and Medium CaliberEC3 / Ammunition Logistics PrAmmunitionAmmunition							typing			
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
EC3: Ammunition Logistics Prototyping	-	1.677	1.313	1.525	-	1.525	1.715	2.170	1.800	1.836	0.000	12.036
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 complete verification testing and an operational demonstration for the environmental health monitoring system. FY 2020 funding will also be used to continue verification testing of a type two prototype next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Munitions Health and Inventory Monitoring Systems	1.177	0.856	1.025
<b>Description:</b> Performance and reliability of certain munitions can be degraded by the environmental exposure history they experience during their lifetime. This Project will develop simple to complex environmental health and inventory monitoring systems to improve reliability and asset visibility and enable effective Condition Based Management for Ammunition.			
<b>FY 2019 Plans:</b> Complete verification testing and an operational demonstration for the environmental health monitoring system. Continue verification testing of a next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities, which will be used for assessing munitions reliability.			
<i>FY 2020 Plans:</i> Conduct an extended operational demonstration of the environmental health monitoring system to enable condition based management of ammunition. Continue verification testing of a type II prototype next generation temperature/humidity sensor with batch interrogation and historical data retention capabilities for the assessment of munition reliability and complete an operational demonstration of the type I prototype. Complete operational demonstration of the low cost thermal indicator, which provides passive lifetime temperature exposure sensing.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	<b>Project (Number/Name)</b> EC3 <i>I Ammunition Logistics Prototyping</i>				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020		
FY 2020 funding is slightly higher than FY 2019 due to an anticipated	increase in labor and material costs.					
Title: Munitions Containerization Systems		0.500	0.415	0.500		
<b>Description:</b> For each family of munitions containers, optimize protocombat unit load quantity, sustainability/recyclability, Insensitive Mun reconfiguration, unitization, and standardized interfaces. This will impenvironmental and operational impacts.	type container systems for automation compatibility, itions/explosives safety, environmental protection, load prove ammunition distribution efficiency while minimizing					
<b>FY 2019 Plans:</b> Perform design verification prototype testing and award contract to preparation for qualification testing with 5.56 mm ammunition.	oduce production representative polymer containers in					
<b>FY 2020 Plans:</b> Perform qualification testing of production representative rectangular Perform advanced development and prototype demonstration of the penvironment.	polymer container for family of 5.56 mm ammunition. plastic cylindrical container in a realistic operating					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 funding is slightly higher than FY 2019 due to anticipated inc	creases in labor and material costs.					
Title: FY2019 SBIR/STTR Transfer		-	0.042	-		
Description: FY 2019 SBIR/STTR Transfer						
<b>FY 2019 Plans:</b> FY 2019 SBIR/STTR Transfer						
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR Transfer						
	Accomplishments/Planned Programs Subto	tals 1.677	1.313	1.525		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber	Project (N EC3 / Amn	umber/Name) nunition Logistics Prototyping
	Ammunition		

## D. Acquisition Strategy

Munitions Health Monitoring and Munitions Containerization systems will be developed through government and industry prototype efforts. In FY 2020, a Technology Readiness Assessment will be conducted to measure the progress of the designs.

## E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Ammun	<b>gram Ele</b> 3639A / 7 iition	ement (N ank and	umber/Na Medium C	a <b>me)</b> Caliber	Project EC3 / A	(Numbe mmunitio	r/ <b>Name)</b> n Logistics	s Prototy	oing
Product Developmer	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
Contract - Low Cost Thermal Indicator	C/FFP	Innosense : Torrance, CA	1.630	0.509		0.200		0.200	Dec 2019	-		0.200	0.000	2.539	-
Contract - RRAPDS	C/FFP	Phase IV : Boulder, CO	1.053	0.099	Sep 2018	0.400	Jun 2019	-		-		-	0.000	1.552	-
Contract-Plastic Cylindrical Container	C/FFP	SAVIT : Rockaway, NJ	0.550	0.097	Sep 2018	0.150		0.275	Mar 2020	-		0.275	0.000	1.072	-
Contract-Insensitve Munitions	C/TBD	TBD : TBD	0.576	-		-		-		-		-	0.000	0.576	-
Next Generation Temperature Humidity Indicator	C/FFP	AGM : Tuscon, AZ	0.200	0.206	May 2018	0.050		0.400	Dec 2019	-		0.400	0.000	0.856	-
	Subtotal 4.009 0.911							0.875		-		0.875	0.000	6.595	N/A
Support (\$ in Millions)			FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	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
	MIDD	Picatinny Arsenal :	2 827	0 766	May 2018	0.513	Doc 2018	0.400	Dec 2010		Duto	0.400	0.000	4 506	Contract
		NJ	2.027	0.700	Way 2010	0.515	Dec 2010	0.400	Dec 2019	-		0.400	0.000	4.500	-
		Subtotal	2.827	0.766		0.513		0.400		-		0.400	0.000	4.506	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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 Proving Ground	MIPR	Yuma : AZ	0.086	-		-		-		-		-	0.000	0.086	-
Test and Eval	MIPR	TBD : TBD	0.150	-		-		0.250	Mar 2020	-		0.250	0.000	0.400	-
		Subtotal	0.236	-		-		0.250		-		0.250	0.000	0.486	N/A
PE 0603639A: <i>Tank ar</i>	nd Mediur	n Caliber Ammunitio	on		UN	ICLASS	SIFIED								404
Army						Page 46 of 93 R-1 Line #77							104		

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	020 Army								Date: March 2019			
Appropriation/Budget Activity 2040 / 4					<b>gram El</b> 3639A / 1 ition	ement (Number/N Tank and Medium (	Project (Number/Name) EC3 I Ammunition Logistics Prototyping					
Prior Years FY 2018					019	FY 2020 Base	FY 2 OC	020 O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals 7.072 1.677						1.525	-		1.525	0.000	11.587	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy					Date: March 20	19	
Appropriation/Budget Activity 2040 / 4		R-1 PE ( <i>Amr</i>	Program Elemer 0603639A / Tank a munition	Project (N EC3 / Am	Number/Name) nmunition Logistics Prototyping			
			1	1 1		1	1	
Event Name	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	
Advanced Concept Development-Munitions Health Monitoring-1	RRAPDS-Phase 1							
Advanced Concept Development-Munitions Health Monitoring-1	A			RRAPDS-Phase 2				
Advanced Concept Development-Munitions Health Monitoring-2	Low Cost Thermal Indicat	pr						
Advanced Concept Development-Munitions Containerization-1	Mur	itions Containerization-F	lastic Cylindrical Container					
Advanced Concept Development-Munitions Containerization-1A			Munitions Containerizatio	n-Plastic Rectangular Containe	≥r			
Advanced Concept Development-Munitions Health Monitoring-3	Next Concertion Toront	ture // Institution Conserve						
	Next Generation Tempera	tule/humidity sensor						
				· · · · ·				

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army	Date: March 2019		
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N EC3 / Amn	umber/Name) nunition Logistics Prototyping

## Schedule Details

	St	tart	End		
Events	Quarter	Year	Quarter	Year	
Advanced Concept Development-Munitions Health Monitoring-1	2	2015	4	2020	
Advanced Concept Development-Munitions Health Monitoring-1A	1	2021	4	2023	
Advanced Concept Development-Munitions Health Monitoring-2	2	2015	4	2022	
Advanced Concept Development-Munitions Containerization-1	4	2018	4	2021	
Advanced Concept Development-Munitions Containerization-1A	1	2020	4	2021	
Advanced Concept Development-Insensitive Munitions	1	2016	4	2017	
Advanced Concept Development-Munitions Health Monitoring-3	3	2017	4	2023	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060363 Ammunitio	<b>am Elemen</b> 39A I Tank a n	t (Number/ and Medium	Name) Caliber	<b>Project (N</b> EL7 / Redu	umber/Nan uced Range	ne) Ammunitior	ז
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
EL7: Reduced Range Ammunition	-	3.429	7.609	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.038
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

The small caliber Reduced Range Ammunition (RRA) technology applies to multiple calibers. As the technology matures in FY 2019, Program Element (PE) 0603639A, Project EL7, Reduced Range Ammunition for the 7.62mm variant transitions to PE 0604802A, Project EP3, Reduced Range Ammunition - Small Caliber. In FY 2020, the .50 Caliber variant will transition from PE 0603639A, Project EL7 to PE 0604802A, Project EP3.

### 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. There is no funding requested in FY 2020.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Technology Maturation and Risk Reduction (TMRR)	3.429	7.331	-
<b>Description:</b> Develop, demonstrate, and qualify small caliber 7.62mm and .50 caliber ammunition that will provide a reduced range training capability to the M240 and M2 gunners.			
<i>FY 2019 Plans:</i> FY 2019 primary activities will focus on further assessment of .50 Cal prototypes including leveraging lessons learned from the USMC prototypes, Technology Readiness Level (TRL) 6 assessment, conducting System Readiness Review (SRR), preparation activities for Preliminary Design Review (PDR), preparing documentation for the .50 Milestone B, and preparing contract documentation for the Engineering and Manufacturing Development (EMD) contract.			
FY 2019 to FY 2020 Increase/Decrease Statement: Effort transitions from Program Element (PE) 0603639A, Project EL7 to PE 0604802A, Project EP3 in FY 2020.			
Title: FY 2019 SBIR / STTR Transfer	-	0.278	-
FY 2019 Plans:			

Exhibit R-2A, RDT&E Project Just	tification: PB	2020 Army							Date: March 2019		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Program Element (Number/Name)PE 0603639A / Tank and Medium CaliberEL7AmmunitionAmmunition					Project (Number/Name) EL7 / Reduced Range Ammunition				
<b>B. Accomplishments/Planned Pro</b> FY 2019 SBIR / STTR Transfer	ograms (\$ in I	<u>Millions)</u>							FY 2018	FY 2019	FY 2020
FY 2019 to FY 2020 Increase/Dec. FY 2019 SBIR / STTR Transfer	rease Statem	ent:									
				Accon	nplishments	s/Planned P	rograms Su	btotals	3.429	7.609	-
C. Other Program Funding Summ	<u>ary (\$ in Milli</u> <u>FY 2018</u>	<u>ons)</u> <u>FY 2019</u>	FY 2020 Base	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u> 8 276	FY 2021	FY 2022	FY 2023	5 FY 202	<u>Cost To</u> 4 <u>Complete</u>	Total Cost
Ammunition - Small Caliber	-	2.470	0.370	-	0.370	15.000	15.250	13.200	, -	0.000	54.296

#### <u>Remarks</u>

The 7.62mm effort under Budget Activity 04 Element (PE) 0603639A, Project EL7, Reduced Range Ammunition (RRA), transitions in FY 2019 to Budget Activity 05 PE 0604802A, Project EP3. PE 0604802A, Project EP3, RRA funding continues the development work of 7.62mm and supports Engineering and Manufacturing Development (EMD) beginning in FY 2019. The funding line also continues development work on the .50 Caliber variant which transitions from PE 0603639A, Project EL7 to PE 0604802A, Project EP3 in FY 2020.

### D. Acquisition Strategy

After 7.62mm Milestone (MS) B in FY 2019, the Government intends to award Engineering and Manufacturing Development (EMD) contracts. The Government will then award 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 program 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

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	19			
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Ammur	ogram Ele 3639A / 7 hition	ement (N Fank and	l <b>umber/N</b> Medium (	<b>ame)</b> Caliber	Project EL7 / R	(Number educed R	r/ <b>Name)</b> Pange Ami	nunition			
Product Developmer	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 O	2020 CO	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	0.060	0.160	Oct 2017	-		-		-		-	0.000	0.220	-		
Prototype	C/FFP	PTI : Clifton, NJ	0.157	-		-		-		-		-	0.000	0.157	-		
Hardware	C/Various	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, New Jersey	0.112	-		-		-		-		-	0.000	0.112	-		
Prototype Development	Option/ FFP	Booz Allen Hamilton : Dover, NJ	-	0.312	Dec 2017	-		-		-		-	0.000	0.312	-		
Development Contract # 1	C/FFP	To Be Determined : To Be Determined	-	-		1.500	Jan 2019	-		-		-	0.000	1.500	-		
Development Contract # 2	C/FFP	To Be Determined : To Be Determined	-	-		1.500	Jan 2019	-		-		-	0.000	1.500	-		
Development Contract # 3	C/FFP	To Be Determined : To Be Determined	-	-		1.500	Jan 2019	-		-		-	0.000	1.500	-		
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.278		-		-		-	0.000	0.278	-		
		Subtotal	0.329	0.472		4.778		-		-		-	0.000	5.579	N/A		
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 O	2020 CO	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	0.666	2.467	Oct 2017	1.631	Oct 2018	-		-		-	0.000	4.764	-		
Army Research Lab (ARL)	MIPR	Aberdeen Proving Ground : Maryland	0.180	0.250	Mar 2018	0.800	Oct 2018	-		-		-	0.000	1.230	-		
		Subtotal	0.846	2.717		2.431		-		-		-	0.000	5.994	N/A		

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 060 Ammun	R-1 Program Element (Number/Name)Project (PE 0603639A / Tank and Medium CaliberEL7 / RefAmmunition					(Number educed R	r/ <b>Name)</b> ange Amn	nunition	
Test and Evaluation	(\$ in Milli	ons)	ſ	FY 2018		FY 2019		FY 2 Ba	020 se	FY 2020 OCO		020 FY 2020 O Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
US Army Aberdeen Test Center (ATC)	MIPR	Aberdeen Proving Ground : Maryland	0.139	0.188	Jun 2018	0.200	Oct 2018	-		-		-	0.000	0.527	-
Engineering Tests	MIPR	US Army Test Center (ATC) : Yuma, AZ	-	-		0.200	Oct 2018	-		-		-	0.000	0.200	-
Prototype testing	C/FFP	Double B Enterprises : Malvern, OH	-	0.052	May 2018	-		-		-		-	0.000	0.052	-
		Subtotal	0.139	0.240		0.400		-		-		-	0.000	0.779	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	020 se	FY 2 OC	:020 :O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	3.429		7.609		-		-		-	0.000	12.352	N/A			

**Remarks** 





Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019		
Appropriation/Budget Activity 2040 / 4	R-1 Program PE 0603639A Ammunition	Element (Number I Tank and Media	e <b>r/Name)</b> um Caliber	Project (Number/Name) EL7 / Reduced Range Ammunition			
	Schedule Detail	S					
		S	tart	E	ind		
Events		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	4	2020		
7.62mm Developmental Test and Evaluation (DT&E)		4	2020	1	2021		
7.62mm Critical Design Review (CDR)		2	2021	2	2021		
7.62mm Production Qualification Test (PQT)		4	2021	2	2022		
7.62mm Milestone C (MS C)		2	2022	2	2022		
.50 Caliber Project Starts on BA04 EL7		1	2018	1	2018		
.50 Caliber Multiple Concept Design Evaluations		1	2018	1	2020		
.50 Caliber Materiel Development Decision (MDD)		2	2018	2	2018		
.50 Caliber Design Verification Test (DVT)		2	2019	3	2019		
.50 Caliber Milestone B (MS B)		1	2020	1	2020		
.50 Caliber Transitions from BA04 EL7 to BA05 EP3		1	2020	1	2020		
.50 Caliber Engineering and Manufacturing Development (EMD)		1	2020	2	2023		
.50 Caliber Preliminary Design Review (PDR)		4	2020	4	2020		
.50 Caliber Pre-Production Qualification Test (PPQT)		4	2020	2	2021		
.50 Caliber Critical Design Review (CDR)		4	2021	4	2021		
.50 Caliber Production Qualification Test (PQT)		1	2022	3	2022		

Exh	ibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	h 2019	
<b>App</b> 204	oropriation/Budget Activity 0 / 4	<b>R-1 Program</b> PE 0603639A <i>Ammunition</i>	Element (Number I Tank and Medium	r/ <b>Name)</b> n Caliber	Project (Number/Name) EL7 / Reduced Range Ammunition		
			Sta	rt	Er	nd	
	Events		Quarter	Year	Quarter	Year	
	.50 Caliber Milestone C (MS C)		2	2023	2	2023	

## Note

As the technology matures, the Reduced Range Ammunition (RRA) projects transition from Budget Activity 04 (BA04) PE 0603639A, Project EL7 to Budget Activity 05 (BA05) PE 0604802A, Project EP3.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Prog PE 06036 Ammuniti	<b>ram Eleme</b> i 339A I Tank ion	nt (Number and Medium	/ <b>Name)</b> n Caliber	Project ( EL8 / L/G FOR SM/	Number/Na HTWEIGH ALL CALIBE	I <b>me)</b> T CARTRID ER	GE CASE
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
EL8: LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER	-	2.870	0.000	0.000	-	0.000	0.000	0.000	0.00	0 0.00	0 0.000	2.870
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
<b>A. Mission Description and Bud</b> The Lightweight Small Caliber Ar (CDD). The goal of the LSCA Pro cartridges that will provide the sa weapon systems, but optimized to	l <b>get Item J</b> nmunition ( oject is to re me capabil o work in th	ustification LSCA) Proje educe the to ties as the I e M240 Ma	<u>e</u> ct is a crition tal Soldier M80A1 and chine Gun.	cal technolo load throug M62A1 cai No funding	ogy develo h reductior rtridges. T g requeste	pment in res n in ammuni he LSCA ca d in FY 2020	ponse to the tion weight. rtridge will b ).	e 7.62mm C The LSCA be designed	Capabilities Project wi to be com	Developme I develop a patible with	ent Docume nd field 7.62 all Army 7.6	nts 2mm LSCA 52mm
B. Accomplishments/Planned P	rograms (	in Million	s <u>)</u>						F	Y 2018	FY 2019	FY 2020
Title: 7.62mm Technology Matura	ation & Risk	Reduction	(TMRR) for	r Lightweigł	nt Small Ca	aliber Ammu	nition (LSC/	۹)		2.870	-	-
<b>Description:</b> Develop, demonstration provide 10 to 50% ammunition we	ate, and qua	alify a Lightv ıs.	weight Sma	ll Caliber A	mmunition	(LSCA) 7.62	2mm capabi	ility that will				
					Accompl	ishments/P	lanned Pro	grams Sub	totals	2.870	-	-
C. Other Program Funding Sum	mary (\$ in	<u>Millions)</u>	FY	<u>2020 FY</u>	<u>2020</u> <u>F</u>	Y 2020					<u>Cost To</u>	
Line Item	<u>FY 20</u>	<b>)18 FY 2</b>	019 I	Base	<u>000</u>	Total F	F 720	FY 2022	FY 2023	FY 2024	Complete	Total Cost
Remarks	0.0	12.	J91 C	5.525	-	0.525	5.729	0.592	0.413	2.909	Continuing	Continuing
The funding lines continue work of FY 2019.	on the 7.62	mm ammun	ition which	transitions t	to Budget <i>i</i>	Activity 07, F	Program Ele	ment 06071	I31A, Proje	ect ER6, Dir	ect Fire Tec	hnology in
PE 0603639A: Tank and Medium	Caliber Am	munition		UN	CLASSI	FIED						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0603639A I Tank and Medium Caliber	EL8 / LIGH	ITWEIGHT CARTRIDGE CASE
	Ammunition	FOR SMAL	LL CALIBER

## D. Acquisition Strategy

Multiphase development contracts. Phase I and Phase II include development and evaluation of multiple designs/concepts. The Government intends to down-select to one design for Phase III in FY 2019 to manufacture test hardware to support Validation Testing planned for FY 2020. Low Rate Initial Production award will occur in FY 2021.

## E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	19		
Appropriation/Budget Activity 2040 / 4						R-1 Pro PE 060 Ammur	ogram El 03639A / 7 nition	ement (N Tank and	l <b>umber/N</b> Medium (	<b>ame)</b> Caliber	Project (Number/Name) EL8 I LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER					
Product Development (\$ in Millions)		FY 2018		FY 2019		FY 2020 Base		FY	2020 CO	)20 FY 2020 O Total						
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Program Manager Maneuver Ammunition Systems (PM MAS)	Various	Picatinny Arsenal : New Jersey	0.251	0.230	Oct 2017	-		-		-		-	0.000	0.481	Continuing	
Lightweight Case Phase 1 Development Contract	C/FFP	Orbital ATK : Missouri	0.636	-		-		-		-		-	0.000	0.636	Continuing	
Lightweight Case Phase 2 Development Contract	C/CPFF	PCP Ammunition : Vero Beach, FL	-	0.685	Sep 2018	-		-		-		-	0.000	0.685	Continuing	
Research	MIPR	United States Military Academy : New York	0.150	-		-		-		-		-	0.000	0.150	Continuing	
Phase 2 Case Development	C/FP	Nammo Talley : Mesa, Arizona	0.783	-		-		-		-		-	0.000	0.783	Continuing	
Modeling & Simulation	Option/ CPFF	Concurrent Technologies Corporation (CTC) : New Jersey	0.261	0.180	Apr 2018	-		-		-		-	0.000	0.441	Continuing	
Lightweight Case Manufacturing Evaluation	SS/FP	Orbital ATK : Plymouth, Minnesota	0.316	-		-		-		-		-	0.000	0.316	Continuing	
Lightweight case manufacturing evaluation	SS/FFP	Northrop Grumman Innovation Systems : Independence, MO	-	0.016	Feb 2018	-		-		-		-	0.000	0.016	Continuing	
Lightweight ammuntion links development	Option/ CPFF	Northrop Grumman Innovation Systems : Independence, MO	-	0.309	Sep 2018	-		-		-		-	0.000	0.309	Continuing	
	·	Subtotal	2.397	1.420		-		-		-		-	0.000	3.817	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	0.660	1.375	Oct 2017	-		-		-		-	0.000	2.035	Continuing	

xhibit R-3, RDT&E Project Cost Analysis: P	3 2020 Arm	у								Date:	March 20	19		
Appropriation/Budget Activity 2040 / 4					ogram Ele 3639A / 7 hition	ement (N Tank and I	umber/Na Medium C	<b>ame)</b> Caliber	<b>Project (Number/Name)</b> EL8 I LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER					
Support (\$ in Millions)		FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	FY 2020 Total				
Contract Method Performing Cost Category Item & Type Activity & Location	Prior n Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Subto	<b>al</b> 0.660	1.375		-		-		-		-	0.000	2.035	N/A	
Test and Evaluation (\$ in Millions)		FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total				
Contract Method Performing Cost Category Item & Type Activity & Locatio	Prior n Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
S Army Aberdeen Test enter (ATC) MIPR Aberdeen Proving Ground : Maryland	0.039	-		-		-		-		-	0.000	0.039	Continuing	
emperature testing MIPR Armament Researce Engineering Center New Jersey	h : 0.010	-		-		-		-		-	0.000	0.010	Continuing	
rmy Joint Munitions command Testing MIPR Army Joint Munition Command : Illinois	s _	0.075	Jun 2018	-		-		-		-	0.000	0.075	Continuing	
Subto	<b>al</b> 0.049	0.075		-		-		-		-	0.000	0.124	N/A	
	Prior Years	FY 2	2018	FY 2019		FY 2020 2019 Base		)20 FY 2 e O(		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Tota	<b>Is</b> 3.106	2.870		0.000		-		-		-	0.000	5.976	N/A	

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army									Dat	t <b>e:</b> Ma	arch 20	19			
Appropriation/Budget Activity 2040 / 4	<b>R-1 P</b> PE 06 <i>Amm</i>	rograr 603639 <i>unition</i>	n Elemer A I Tank a	nt (Nur and Me	nber/Nai edium Ca	<b>Project (Number/Name)</b> EL8 <i>I LIGHTWEIGHT CARTRIDGE CASE</i> FOR SMALL CALIBER										
Event Name	FY 2018 FY 201		019	F١	( 2020	F	Y 2021		FY 2022		FY 2023		F	Y 202	2024	
	1 2 3 4	1 2 3	3 4	1 2	3 4	1	2 3 4	1	2 3 4	1	2	3 4	1 :	2 3	4	
7.62mm Phase II	7.62mm Phase II															
7.62mm Systems Requirement Review (SRR) 7.62mm	1 Systems Requirement Rev	view (SRR)														
7.62mm Lightweight Ammo Transitions from BA04 EL8 to BA07	ER6 7.62mm	2 LSCA BA04 to	BA07 Tran	sition												
Down Select to 7.62mm Phase III	Down	3 Select to 7.62mm	n Phase III													
7.62mm Phase III		7.62mm Ph	ase III													
7.62mm Preliminary Design Review (PDR)		7.62mm Prelimin	nary Design	Review (F	PDR)											
7.62mm Preliminary Validation Testing			7.62m	n Pre-Valid	ation Testing											
7.62mm Critical Design Review (CDR)				7.62m	5 m Critical Desi	ign Review	v (CDR)									
7.62mm Validation Testing						7.62	mm Validation	Testing								
7.62mm Limited User Evaluation (LUE)						7.62	mm Limited U	ser Evalua	tion (LUE)							
7.62mm Engineering Change Proposal							7.62mm Engi	neering Ch	ange Proposal							
7.62mm Low Rate Initial Production (LRIP) Award							7.62r	nm LRIP A	ward							
						1		1					1			
Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Da	te: March	2019										
--	---	-----------------------------	--	--	-----------	------										
Appropriation/Budget Activity 2040 / 4	R-1 Program Elen PE 0603639A / Tai Ammunition	nent (Numbe nk and Mediu	Project (Numl EL8 / LIGHTW FOR SMALL (	lumber/Name) HTWEIGHT CARTRIDGE CAS LL CALIBER												
	Schedule Details															
		St	art		End	I										
Events		Quarter	Year	Quar	ter	Year										
7.62mm Source Selection Evaluation		2	2017	4		2017										
7.62mm Phase II		4	2017	4		2018										
7.62mm Systems Requirement Review (SRR)		1	2018	1		2018										
7.62mm Lightweight Ammo Transitions from BA04 EL8 to B	A07 ER6	1	2019	1		2019										
Down Select to 7.62mm Phase III		1	2019	1		2019										
7.62mm Phase III		1	2019	2		2021										
7.62mm Preliminary Design Review (PDR)		2	2019	2		2019										
7.62mm Preliminary Validation Testing		4	2019	1		2020										
7.62mm Critical Design Review (CDR)		3	2020	3		2020										
7.62mm Validation Testing		1	2021	3		2021										
7.62mm Limited User Evaluation (LUE)		1	2021	2		2021										
7.62mm Engineering Change Proposal		3	2021	3		2021										
7.62mm Low Rate Initial Production (LRIP) Award		4	2021	4		2021										

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2020 A	vrmy							Date: Marc	ch 2019			
Appropriation/Budget Activity 2040 / 4	oropriation/Budget Activity 0 / 4					R-1 Program Element (Number/Name)PPE 0603639A / Tank and Medium CaliberEAmmunitionC					<b>Project (Number/Name)</b> EU3 I .50 Caliber All-Purpose Tactical Cartridge (APTC)			
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		
EU3: .50 Caliber All-Purpose Tactical Cartridge (APTC)	-	0.000	0.000	4.250	-	4.250	0.000	0.000	0.000	0.000	0.000	4.250		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

#### Note

The small caliber All-Purpose Tactical Cartridge (APTC) Project is a new start in FY 2020. In FY 2021, the project will transition to Budget Activity 05 (BA05) Program Element (PE) 0604802A, Project EU5, .50 Caliber All-Purpose Tactical Cartridge (APTC) to continue development work and support Engineering and Manufacturing Development (EMD).

### A. Mission Description and Budget Item Justification

The All-Purpose Tactical Cartridge (APTC) project is a critical technology development in response to the .50 caliber Munitions Capabilities Development Documents (CDD). The overall objective of All-Purpose Tactical Cartridge is to deliver a single round that replaces and improves current legacy .50 caliber ammunition. The All-Purpose Tactical Cartridge will be compatible with all Army .50 caliber weapons but specifically optimized to work in the M2 Machine Guns. FY 2020 funding supports Technology Maturation and Risk Reduction (TMRR) in preparation for a Technology Readiness Level (TRL) 6, conducting a Materiel Development Decision (MDD), and conducting Design Verification Tests.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Technology Maturation and Risk Reduction (TMRR)	-	-	4.250
<b>Description:</b> Develop, demonstrate, and qualify new .50 Caliber ammunition to replace and/or improve current legacy .50 Caliber variants.			
<b>FY 2020 Plans:</b> Build, evaluate, and refine .50 Caliber APTC concepts/prototypes and perform Milestone B preparation activities. Evaluate M8 Armor Piercing Incendiary (API), M20 API Trace, M903 Saboted Light Armor Penetrator (SLAP), and M962 SLAP Trace ammunition for improvements that would satisfy the .50 APTC requirement.			
FY 2019 to FY 2020 Increase/Decrease Statement: Project is a new start beginning in FY 2020.			
Accomplishments/Planned Programs Subtotals	-	-	4.250

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army							Date: March 2019			
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)Project (PE 0603639A / Tank and Medium CaliberEU3 / .50					Number/Name) Caliber All-Purpose Tactical		
	Ammu	Ammunition Cartrid					e (APTC)					
C. Other Program Funding Summa	ary (\$ in Milli	ons <u>)</u>										
			FY 2020	FY 2020	FY 2020					<u>Cost To</u>		
Line Item	<u>FY 2018</u>	FY 2019	Base	000	<u>Total</u>	<u>FY 2021</u>	FY 2022	FY 2023	FY 2024	<b>Complete</b>	Total Cost	
• EU5: .50 Caliber All-Purpose	-	-	0.000	-	0.000	8.500	9.400	-	-	0.000	17.900	
Tactical cartridge (APTC)												

#### Remarks

The effort under Budget Activity 04, Program Element (PE) 0603639A, Project EU3, .50 Caliber APTC, transitions in FY 2021 to Budget Activity 05, PE 0604802A, Project EU5. PE 0604802A, Project EU5 .50 Caliber APTC. Funding continues the development work and supports Engineering and Manufacturing Development (EMD) beginning in FY 2021.

### D. Acquisition Strategy

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

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	У								Date:	March 20	019	
Appropriation/Budg 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 060 <i>Ammur</i>	ogram El 3639A / T hition	ement (N Tank and	lumber/N Medium (	<b>ame)</b> Caliber	Project EU3 / . Cartridg	t <b>(Numbe</b> 50 Caliber ge (APTC,	<b>r/Name)</b> <sup>r</sup> All-Purpo )	ose Tactic	al
Product Developme	nt (\$ in M	illions)		FY	2018	FY 2	FY 2019		FY 2020 Base		2020 CO	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 Development	C/CPFF	To be Determined : To be Determined	-	-		-		2.500	Jan 2020	-		2.500	Continuing	Continuing	Continuing
		Subtotal	-	-		-		2.500		-		2.500	Continuing	Continuing	N/A
Support (\$ in Millior	ıs)			FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY	2020 CO	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	MIPR	Armament Research Development and Engineering Center (ARDEC) : New Jersey	-	-		-		1.000	Oct 2019	-		1.000	Continuing	Continuing	Continuing
		Subtotal	-	-		-		1.000		-		1.000	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	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
Verification Testing	MIPR	Army Research Lab (ARL) : Maryland	-	-		-		0.750	Jan 2020	-		0.750	Continuing	Continuing	Continuing
		Subtotal	-	-		-		0.750		-		0.750	Continuing	Continuing	N/A
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		4.250		-		4.250	Continuing	Continuing	N/A
<u>Remarks</u>				<u> </u>	<u> </u>		<u> </u>	1.200		<u> </u>	1				

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 /	Army									Date: March 20	)19	
Appropriation/Budget Activity 2040 / 4			R-1 Pro PE 060 Ammur	ogram 3639A hition	Elemen A / Tank a	t (N 50 ( ge ()	Number/Name) Caliber All-Purpose Tactical APTC)					
Event Name	FY 2018	FY 20	019 FY 2020			F	Y 2021	FY 2022	2	FY 2023	F	Y 2024
	1 2 3 4	1 2 3	3 4 1	1 2	3 4	1 2	3 4	1 2 3	4	1 2 3 4	1 2	2 3 4
APTC Materiel Development Decision (MDD)				MDD								
APTC Advanced Concept Development				APTC A	dvanced Con	cept Devel	opment					
APTC Prototype Development & Evaluation				APTC P	rototype Deve	elopment 8	Evaluation					
APTC Design Verification Test (DVT) 1				API	TC DVT 1							
APTC Preliminary Design Review (PDR)					2 APT	C PDR						
APTC Milestone B						APTC M	SB					
APTC Transitions from BA04 EU3 to BA05 EU5					A	4 PTC BA04	to BA05 Trans	ition				
APTC Engineering & Manufacturing Development (EMD)						APT	IC EMD					
APTC Pre-Production Qualification Testing (PPQT)							APTO					
APTC Critical Design Review (CDR)								APTC CDR				
APTC Design Verification Test (DVT) 2						A	PTC DVT 2					
APTC Production Qualification Testing (PQT)								APTC	РQТ			
APTC Milestone C (MS C)									4	APTC MS C		

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Da	ate: March	ı 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program B</b> PE 0603639A <i>Ammunition</i>	Element (Numbe Tank and Mediu	Project (Num EU3 I .50 Call Cartridge (AP	Number/Name) Caliber All-Purpose Tactical (APTC)		
	Schedule Details	6				
	ſ	Si	tart		En	d
Events		Quarter	Year	Qua	rter	Year
APTC Materiel Development Decision (MDD)		1	2020	1	1	2020
APTC Advanced Concept Development		1	2020	1	1	2021
APTC Prototype Development & Evaluation		1	2020	1	1	2021
APTC Design Verification Test (DVT) 1		2	2020	3	3	2020
APTC Preliminary Design Review (PDR)		4	2020	2	4	2020
APTC Milestone B		1	2021	1	1	2021
APTC Transitions from BA04 EU3 to BA05 EU5		1	2021	1	1	2021
APTC Engineering & Manufacturing Development (EMD)		2	2021	4	4	2022
APTC Pre-Production Qualification Testing (PPQT)		4	2021	4	4	2021
APTC Critical Design Review (CDR)		2	2022	2	2	2022
APTC Design Verification Test (DVT) 2		2	2021	3	3	2021
APTC Production Qualification Testing (PQT)		3	2022	4	4	2022
APTC Milestone C (MS C)		1	2023		1	2023

Exhibit R-2A, RDT&E Project Ju	nibit R-2A, RDT&E Project Justification: PB 2020 Army										h 2019	
Appropriation/Budget Activity     R-1 Progr.       2040 / 4     PE 060363       Ammunition						-1 Program Element (Number/Name)Project (Number/Name)E 0603639A / Tank and Medium CaliberFA5 / Assured Precision WeaponsmmunitionMunitions						s and
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
FA5: Assured Precision Weapons and Munitions	-	12.480	14.322	31.267	-	31.267	29.907	31.000	31.000	25.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### A. Mission Description and Budget Item Justification

The Assured Precision Weapons and Munitions (APWM) -FA5 Project is focused on advanced risk mitigation, technology integration, prototyping, and product support to identify, evaluate, mature, test, and demonstrate various assured precision prototype technologies in weapon and munitions components and subsystems within a complex system of systems environment. The Assured Precision Weapons and Munitions Project reinforces the National Defense Strategy's major lines of effort through technology development and prototyping that increase lethality and ensure future combat overmatch success of the Joint Force against peer/near-peer adversaries as well as improving program performance and affordability for multiple weapons and munitions Programs of Record (PoRs) via Joint Lethality Positioning, Navigation and Timing (PNT) and Army M-Code GPS coordinated efforts. The Assured Precision Weapons and Munitions Project directly supports Army Modernization Priorities in support of the National Defense Strategy. Funding will support engagement by Weapons and Munitions PNT experts in the development, evaluation, and technology delivery activities of the Air Force's M-Code GPS and Army's Assured PNT programs. Funding will also enable component and subsystem architecture input essential for precision weapons and munitions operating in a system of-systems environment, Army M-Code GPS technology integration and evaluation, and maturation of alternative positioning, navigation and timing related technologies to enable informed Assured PNT related program of record milestone and Army cross-functional modernization decisions.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<i>Title:</i> Assured Precision Weapons and Munitions Integrated Product Support - Joint Lethality PNT SME WIPT & Program Management	2.380	2.255	3.574
<b>Description:</b> Provide assured precision weapons and munitions technical subject matter expertise and support to the Joint oversight board for assured precision weapons and munitions. Provide overall APWM Project Program Management support.			
<i>FY 2019 Plans:</i> The subject matter experts will continue coordinating with and supporting the development and technology delivery activities of the Air Force?s Military GPS User Equipment (MGUE) Program and the Army?s Assured Positioning, Navigation and Timing (A-PNT) program including participation in design reviews, evaluation and formal feedback on technology and systems requirements and performance, component and subsystem architecture input essential for precision weapons and munitions operating in a system-of-systems environment, and configuration management of the evolving Joint Common GPS Specification and Interface Control Document for Precision Guided Munitions (PGMs). Specific support focus includes requirements for Military GPS User Equipment (MGUE) Increment 2 (aka Next Generation) and alternative Positioning, Navigation and Timing (PNT) technology maturity.			

Chibit R-2A, RDT&E Project Justification: PB 2020 Army       Date: March 2019										
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	<b>Proje</b> FA5 / <i>Muniti</i>	roject (Number/Name) A5 / Assured Precision Weapons and Junitions							
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020					
The subject matter experts will continue coordinating with and supporting the d Air Force?s Military GPS User Equipment (MGUE) program and the Army?s As program including participation in design reviews, evaluation and formal feedba performance, component and subsystem architecture input essential for preciss of-systems environment, and configuration management of the evolving Joint C Document for Precision Guided Munitions (PGMs). Specific support focus inclu (MGUE) Increment 2 and alternative Positioning, Navigation and Timing (PNT)	of the IT) and cem- trol ment									
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase is due to scope of work and ramp up of Military GPS User Equipment equities affecting the lethality community. Additional subject matter support (SM and requirements for development of these Assured Positioning, Navigation and within Lethality Programs of Record (PoRs). Additional program management as scope and funding starting in FY 2020.	(MGUE) Increment 2 and alternative PNT rela ME) support is required to initialize the framework and Timing (A-PNT) technologies to be demonst support required to manage increased project	ted ork rated								
Title: Assured PNT related Integration Risk Mitigation - Implement Zero-Age-or	f-Data (ZAOD)		0.500	-	-					
<b>Description:</b> Mature and test Zero-Age-of-Data (ZAOD) for improved measure provided to Users.	ement accuracy of Network Assisted GPS data									
Title: Assured PNT related Integration Risk Mitigation - A-PNT for Family of Sc	atterable Mines (FASCAM) Replacement		-	0.767	2.081					
<b>Description:</b> Evaluate, mature and test Assured-Position, Navigation, and Tim terrain shaping enabling technologies.	ing (A-PNT) system/subsystem components f	or								
<b>FY 2019 Plans:</b> Initiate analysis and evaluation of various assured precision prototype technoloc technologies to support the program of record in their Analysis of Alternatives ( <b>FY 2020 Plans:</b> Down-select assured precision technologies including alternative Positioning, N terrain shaping Program of Record (PoR) communication capabilities through r corresponding technology demonstrations	ogies for future terrain shaping enabling AoA). Navigation and Timing (PNT) technologies for t modeling and simulation based verification to in	uture nitiate								
FY 2019 to FY 2020 Increase/Decrease Statement:										
		·	·	·						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N FA5 / Assu Munitions	u <b>mber/N</b> red Pred	lame) cision Weapor	ns and
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2018	FY 2019	FY 2020
Additional funding is required to support increasing level of work involved in evaluation and Timing (A-PNT) technologies for down selection.	aluating and maturing Assured Positioning,				
Title: Assured PNT related Integration Risk Mitigation - Network Assisted A-PN	IT (NA2) for Weapons & Munitions Phase 1		4.200	6.300	-
<b>Description:</b> Evaluate, mature and demonstrate technologies for modifying Ne data exchange that support Alternative Positioning, Navigation and Timing (PN	etwork Assisted GPS (NA GPS) and associated NT) and M-Code for Weapons and Munitions.	Ł			
<b>FY 2019 Plans:</b> Software development and test for an initial updated Network Assisted GPS pr Navigation and Timing (PNT) and M-Code in Phase 1.	rototype that incorporates Alternative Positioni	ng,			
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to Phase 1 of Network Assisted Assured-PNT (NA2) for Weapor technologies down selected for future implementation in Phase 2 upgrades.	ns and Munitions will be completed and				
Title: Assured PNT related Integration Risk Mitigation - NA2 for Weapons and	Munitions Phase 2		-	-	5.672
<b>Description:</b> Perform Network Assisted Assured-PNT (NA2) systems of system qualification integration risk reduction activities. Improve initial prototype NA2 c subsequent transition to corresponding program of records. Inform future Navi Positioning, Navigation and Timing (PNT) related weapons and munitions platfer	ms capability integration and pre-system apability and initiate improved prototype for gational Warfare (NAVWAR) and alternative orm dependencies.				
<i>FY 2020 Plans:</i> Include down-selected alternative Positioning, Navigation and Timing (PNT) tee PNT phase 1 prototype into improved phase 2 Network Assisted Assured-PNT Network Assisted Assured-PNT systems of systems capability integration and activities and finalize prototype software solutions.	chnologies from initial Network Assisted Assur system of system prototype solution. Perform pre-system qualification integration risk reduct	ed- on			
FY 2019 to FY 2020 Increase/Decrease Statement: Phase 2 of Network Assisted Assured-PNT for Weapons and Munitions begins builds upon the results and technology down-selects of Network Assisted Assu	in FY 2020 and will take two years. This effor red-PNT Phase 1.	t			
Title: Assured PNT related Integration Risk Mitigation - NA2 for Guided Rocket	t/Missile Launcher Systems		-	-	3.000
<b>Description:</b> Perform software development and prototyping activities to demo for Rocket/Missile artillery launcher systems. Integrate and demonstrate upgrad Assisted Assured-PNT systems of systems networked capability to reduce sub	onstrate Network Assisted Assured-PNT capab ded artillery launcher system into the Network sequent program of record fielding risks.	ility			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019									
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N FA5 / Ass Munitions	c <b>t (Number/Name)</b> Assured Precision Weapons and ons						
B. Accomplishments/Planned Programs (\$ in Millions)		F	<b>⁄ 2018</b>	FY 2019	FY 2020				
<b>FY 2020 Plans:</b> Conduct requirements refinement activities and initiate software development a Assisted Assured-PNT (NA2) capability for Rocket/Missile artillery launcher systems.	ork ies								
FY 2019 to FY 2020 Increase/Decrease Statement: Effort starts in FY 2020 and will take two years. Effort leverages results of Network									
Title: Assured PNT related Weapons & Munitions Prototyping - A-PNT upgrade	es for PGM Fuze Setter		3.500	2.137	-				
<b>Description:</b> Develop, prototype, and evaluate required emerging Assured-PN Guided Munition (PGM) Fuze Setter needed to enable continued performance operational threat environment.	T technology enhancements to the Precision Precision Guided Munitions in a realistic								
<b>FY 2019 Plans:</b> Software development, integration and test for an upgraded Precision Guided N to enable continued performance of Precision Guided Munitions in a threat envin FY 2020.	Munition (PGM) Fuze Setter incorporates M-Co ironment. Program transitions to program of r	ode ecord							
FY 2019 to FY 2020 Increase/Decrease Statement: Prototyping effort will be completed. Program transitions to program of record i	n FY 2020.								
Title: Assured PNT related Weapons & Munitions Prototyping - A-PNT upgrade	es for Towed Howitzer Platforms		1.100	0.472	-				
<b>Description:</b> Prototype and evaluate Military GPS User Equipment (MGUE) In M777A2 and M119A3 Towed Howitzer Platforms and evaluate technologies for Munitions.	crement 1 (M-Code) GPS receiver cards in the providing Assured-PNT to Precision Guided	)							
<b>FY 2019 Plans:</b> Update GPS receiver interfaces on fire platforms, integrate and test prototype N interoperability, and assess corresponding performance impacts.	Military GPS User Equipment (MGUE) Inc 1 ca	rds							
FY 2019 to FY 2020 Increase/Decrease Statement: Demonstration of prototype Military GPS User Equipment (MGUE) Inc 1 cards	ł.								
Title: Assured PNT related Weapons & Munitions Prototyping - Alternative Nav	igation Technologies (AltNav) Phase 1		0.800	1.866	-				
<b>Description:</b> Develop, prototype, and evaluate non-Global Positioning System prototype systems for indirect fires, including Long Range Precision Fires.	Radio Frequency (Non-GPS RF) Navigation								

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	<b>Proje</b> FA5 / <i>Muniti</i>	ct (Number/I Assured Pred ons	lame) cision Weapo	ons and
B. Accomplishments/Planned Programs (\$ in Millions)		[	FY 2018	FY 2019	FY 2020
<b>FY 2019 Plans:</b> Prototyping and evaluation of non-Global Positioning System Radio Frequence a modeling and simulation environment that can meet current navigation and GPS degraded environment.	cy (Non-GPS RF) Navigation prototype systems timing requirements without access to GPS or	s in in a			
FY 2019 to FY 2020 Increase/Decrease Statement: Initial Phase 1 demonstrations of non-Global Positioning System Radio Frequenvironment will be completed.	uency (Non-GPS RF) in modeling and simulatio	n			
Title: Assured PNT related Weapons & Munitions Prototyping - AltNav Techn	nologies (AltNav) Phase 2		-	-	5.140
<b>Description:</b> Design and develop a prototype Alternative Navigation (AltNav) guided munition applications. Demonstrate and conduct performance assess support Artillery integration efforts as well as inform future Space-based PNT	) hardware and software capability for precision ments of potential hardware and software soluti related alternatives for the Land Combat doma	ons to in.			
<b>FY 2020 Plans:</b> Design and develop an Alternative Navigation (AltNav) capable hardware and (PGM) applications to demonstrate and quantify AltNav performance. Perform prototype to conduct a ride-along performance evaluation of AltNav in a PGM	d software prototype for Precision Guided Munit n integration efforts with the hardware and softv l environment.	ion vare			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> AltNav Phase 2 begins in FY20 will take two years. This prototyping effort bu AltNav Phase 1.	ilds upon the modeling and simulation results c	f			
Title: Assured PNT related Weapons & Munitions Prototyping - Location Azin	nuth Determinations System (LADS)		-	-	1.400
<b>Description:</b> Development and integration of prototype LADS to demonstrate M777A2 and M119A3 Howitzer Platforms.	e an assured weapon survey capability within th	е			
FY 2020 Plans:					
Development and integration of prototype LADS into the M777A2 and M119A	A3 Howitzer Platforms.				
FY 2019 to FY 2020 Increase/Decrease Statement: This effort begins in FY20.					
Title: Army M-Code Technology Integration and Evaluation			-	-	9.200
<b>Description:</b> Provide technical assessment, coordination, and engineering su integration, and evaluation of Air Force?s Military GPS User Equipment (MGU	upport related to the development, prototyping, JE) technology deliverables across all Army				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	<b>Projec</b> FA5 / <i>Muniti</i>	ect (Number/Name) Assured Precision Weapons and tions				
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2018	FY 2019	FY 2020		
Weapons and Munitions, including participation in design reviews, testing, evalu component-level, card-level, sub-system-level, and systems-level requirements inform M-Code GPS related Army cross-functional modernization decisions for threat system-of-systems environment as well as identifying complementary PN sufficient to enable Combat Overmatch.	uation, and formal feedback on technology, and performance. Reduce risk, support, and weapons and munitions operating in a peer/n NT solutions when M-Code GPS is not solely	ear					
<b>FY 2020 Plans:</b> Establish an Army M-Code GPS Weapons and Munitions Integrated Product Te and representation of requirement and performance based needs for Army Wea s Military GPS User Equipment (MGUE) technology investments, including low Land Combat applications. Establish a centralized Army evaluation and experi of M-Code GPS focused weapon and munition platform capabilities operating in environment.	eam (IPT). Initiate the definition, documentati apons and Munitions to influence the Air Force power and high performance cross-functional mentation mechanism to assess the effective n a peer/near PNT threat system-of-systems	on, e? ness					
FY 2019 to FY 2020 Increase/Decrease Statement: This effort begins in FY20.							
<i>Title:</i> MGUE Inc 2 with PGK AJ			-	-	1.200		
<b>Description:</b> Influence next generation Military GPS User Equipment (MGUE) needs and requirements are met with the Air Force's next generation MGUE. In Precision Guidance Kit - Anti Jam (PGK-AJ) to verify and validate needs and re	development to ensure precision guided muni ntegrate and test next generation MGUE into t equirements are met by next generation MGUI	tion he Ξ.					
<i>FY 2020 Plans:</i> Finalize next generation Precision Guided Munition (PGM) Military GPS User E document for use by the MGUE program. Attend technical interchange meeting to meet Precision Guided Munitions needs and requirements for next generation activities of MGUE vendor designs.	quipment (MGUE) technical requirements gs with MGUE vendors to influence MGUE de n performance. Perform risk reduction analys	signs s and					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> This effort is a new start in FY 2020. FY 2020 is the fiscal year in which the Mili start significant design work to meet the requirements of the MGUE Precision G document.	tary GPS User Equipment (MGUE) developer Guided Munitions (PGM) technical requiremen	s will ts					
Title: FY 2019 SBIR/STTR Transfer			-	0.525	-		
Description: FY 2019 SBIR/STTR Transfer							

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	larch 2019		
Appropriation/Budget Activity 2040 / 4	<b>Proje</b> FA5 / <i>Muniti</i>	ject (Number/Name) 51 Assured Precision Weapons and nitions				
B. Accomplishments/Planned Programs (\$ in Millions)		[	FY 2018	FY 2019	FY 2020	
<i>FY 2019 Plans:</i> FY 2019 SBIR/STTR Transfer						
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR Transfer						
	Accomplishments/Planned Programs Sub	totals	12.480	14.322	31.267	
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A						

Remarks

### D. Acquisition Strategy

Acquisition Strategy: The Assured Precision Weapons and Munitions Project will utilize a combination of the Defense Ordinance Technology Consortium (DOTC) Section 845 Other Transaction Authority (OTA) contract mechanism and In-House government development and engineering capabilities to obtain prototypes and demonstrate/evaluate the maturity and integration risk of the M-Code GPS on Precision Munitions and Weapons as well as other alternative PNT related capabilities.

#### E. Performance Metrics

N/A

Appropriation/Budget Acti 2040 / 4	vitv		Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army											Date: March 2019						
					R-1 Pro PE 060 Ammur	ogram Ele 3639A / T hition	ement (N ank and l	umber/Na Medium C	a <b>me)</b> aliber	Project FA5 / A Munitio	(Number ssured Pr ns	r/ <b>Name)</b> recision W	/eapons a	and						
Product Development (\$ in	Millions)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total								
Contra Metho Cost Category Item & Ty	act od Perfor pe Activity &	rming Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract					
PGM MGUE AS Risk MIP Reduction	DoD Ordna Technolog R Consortiun - TBD,Vari Various	ance y n (DOTC) ous :	7.785	-		-		-		-		-	0.000	7.785	-					
Assured PNT related Weapons Integration Risk MIP Mitigation	DoD Ordna Technolog R Consortiun - TBD,Vari Various	ance y n (DOTC) ous :	-	3.265	Dec 2017	3.585	Dec 2018	4.453	Dec 2019	-		4.453	Continuing	Continuing	Continuing					
Assured PNT related Weapons Integration MIP Prototyping	DoD Ordna Technolog R Consortiun - TBD, Var Various	ance y n (DOTC) ious :	-	2.000	Dec 2017	2.000	Dec 2018	1.400	Dec 2019	-		1.400	Continuing	Continuing	Continuing					
Assured PNT related Munitions Integration Risk MIP Mitigation	DoD Ordna Technolog R Consortiun - TBD,Vari Various	ance y n (DOTC) ous :	-	2.500	Dec 2017	2.500	Dec 2018	4.700	Dec 2019	-		4.700	Continuing	Continuing	Continuing					
Assured PNT related Munitions Integration MIP Prototyping	R Consortiun - TBD,Vario Various	ance y n (DOTC) ous :	-	2.000	Dec 2017	2.000	Dec 2018	4.740	Dec 2019	-		4.740	Continuing	Continuing	Continuing					
Army M-Code Technology Integration and Evaluation MIP	R Various : V	′arious	-	-		-		6.650	Dec 2019	-		6.650	Continuing	Continuing	Continuing					
		Subtotal	7.785	9.765		10.085		21.943		-		21.943	Continuing	Continuing	N/A					

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	¥ Activity	1				R-1 Pro PE 060 Ammur	ogram Ele 3639A / Ta hition	ment (N ank and i	umber/Na Medium C	a <b>me)</b> Caliber	Project FA5 / A Munitio	: <b>(Numbe</b> i ssured Pr ns	r/ <b>Name)</b> recision N	/eapons a	and
Support (\$ in Million	s)			FY :	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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	Various	Joint Program Executive Office Armaments and Ammunition (JPEO A&A) : Picatinny Arsenal, NJ	0.508	0.505	Dec 2017	1.180	Dec 2018	1.269	Dec 2019	-		1.269	Continuing	Continuing	Continuing
Assured Precision Weapons and Munitions IPT Support	MIPR	Various : Various	1.106	1.755	Dec 2017	1.075	Dec 2018	2.305	Dec 2019	-		2.305	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	0.380	0.455	Dec 2017	0.657	Dec 2018	1.200	Dec 2019	-		1.200	Continuing	Continuing	Continuing
Assured Technologies Engineering Support	MIPR	Communication Electronics Research,Development and Engineering Center (CERDEC) : Aberdeen Proving Ground, MD	.t	-		0.800	Dec 2018	0.800	Dec 2019	-		0.800	Continuing	Continuing	Continuing
Army M-Code Technology Integration and Evaluation Support	MIPR	Various : Various	-	-		_		2.550	Dec 2019	-		2.550	Continuing	Continuing	Continuing
MGUE Inc 2 for PGK AJ Engineering Support	MIPR	Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ	-	-		-		1.200	Dec 2019	-		1.200	Continuing	Continuing	Continuing
FY 2019 SBIR/STTR Transfer	Various	Various : Various	-	-		0.525		_		-		-	Continuing	Continuing	Continuing
		Subtotal	1.994	2.715		4.237		9.324		-		9.324	Continuing	Continuing	N/A

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

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Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	2020 Army	y								Date:	March 20	019	
Appropriation/Budget Activity 2040 / 4						R-1 Pro PE 060 Ammur	ogram El 3639A / T hition	ement (N Tank and	lumber/N Medium (	<b>ame)</b> Caliber	Project FA5 / As Munition	(Number ssured Pr ns	r/ <b>Name)</b> recision W	/eapons a	Ind
Support (\$ in Million		FY 2	FY 2018		FY 2019		FY 2020 Base		2020 CO	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
Assured Precision Weapon	is and Munit	ions IPT support increas	ses by \$0.70	05 million d	ue to increa	sed project	scope in F	Y 2020.				-			
			Prior Years	FY 2	FY 2018		2019	FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals         9.779         12.480						14.322 31.267 -						31.267	Continuing	Continuing	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy						Date: March 20	19
Appropriation/Budget Activity 2040 / 4		 	<b>R-1 Pr</b> PE 06 A <i>mmu</i>	r <b>ogram Elemen</b> 03639A / Tank a Inition	Number/Name) sured Precision Weapons and			
Event Name	FY 2018	FY 201	9	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
Integrated Product Support - Joint Lethality PNT SME WIPT & Pr								
Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD								
Integration Risk Mitigation - Family of Scatterable Mines (FASCA	M) Replacement							
Integration Risk Mitigation - NA2 for Weapons & Munitions Phas								
Integration Risk Mitigation - NA2 for Weapons & Munitions Phase	e 2							
Integration Risk Mitigation - NA2 for Rocket/Missile Launcher								
Integration Risk Mitigation - Fire System-of-Systems APNT relate	d C2 & AS							
Integration Risk Mitigation - Next Generation PNT Technologies	Phase 1							
Weapons & Munitions Prototyping - APNT upgrades for PGM Fu								
Weapons & Munitions Prototyping - APNT upgrades for Towed H								
Weapons & Munitions Prototyping - Alternative Navigation Tech								
Weapons & Munitions Prototyping - Alternative Navigation Tech	nologies Phase 2							
Weapons & Munitions Prototyping - Location Azimuth Determina	itions System (LADS)							
1					I			1]

Exhibit R-4, RDT&E Schedule Profile: PB 2020									Date: March 2019								
Appropriation/Budget Activity 1040 / 4							R-1 Program Element (Number/Name)ProjecPE 0603639A / Tank and Medium CaliberFA5 / AAmmunitionMunitic								(Number/Name) ssured Precision Weapons and as		
E	F١	Y 201	9		FY	2020	Т	FY 2021		FY 2022	FY 2023	FY 2024					
Event Name	1	2	3 4	1	2	3	4	1	2	3	4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4	
Weapons & Munitions Prototyping - Next Generation PNT Tech	nolo	gies P	hase 1														
Army M-Code Technology Integration and Evaluation																	
MGUE INC 2 for PGK AJ																	
													1		1	1	

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	Project (N FA5 / Assu Munitions	umber/Name) Ired Precision Weapons and

# Schedule Details

	St	tart	Er	d
Events	Quarter	Year	Quarter	Year
Integrated Product Support - Joint Lethality PNT SME WIPT & Program Management	1	2017	4	2028
Integration Risk Mitigation - Implement Zero-Age-of-Data (ZAOD)	1	2018	4	2018
Integration Risk Mitigation - Family of Scatterable Mines (FASCAM) Replacement	1	2019	4	2020
Integration Risk Mitigation - NA2 for Weapons & Munitions Phase 1	1	2018	4	2019
Integration Risk Mitigation - NA2 for Weapons & Munitions Phase 2	1	2020	4	2021
Integration Risk Mitigation - NA2 for Rocket/Missile Launcher	1	2020	4	2021
Integration Risk Mitigation - Fire System-of-Systems APNT related C2 & AS	1	2021	4	2022
Integration Risk Mitigation - Next Generation PNT Technologies Phase 1	1	2023	4	2024
Weapons & Munitions Prototyping - APNT upgrades for PGM Fuze Setter	1	2018	4	2019
Weapons & Munitions Prototyping - APNT upgrades for Towed Howitzer Platforms	1	2018	4	2019
Weapons & Munitions Prototyping - Alternative Navigation Technologies Phase 1	1	2018	4	2019
Weapons & Munitions Prototyping - Alternative Navigation Technologies Phase 2	1	2020	4	2021
Weapons & Munitions Prototyping - Location Azimuth Determinations System (LADS)	1	2020	4	2020
Weapons & Munitions Prototyping - Next Generation PNT Technologies Phase 1	1	2022	4	2023
Army M-Code Technology Integration and Evaluation	1	2020	4	2028
MGUE INC 2 for PGK AJ	1	2020	4	2027

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4	iation/Budget Activity R-1 Program Element (Number/Name) PE 0603639A / Tank and Medium Caliber Ammunition FG1 / Cannon-Delivered Area Effect Munitions (C-DAEM) Cost To							ects				
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
FG1: Cannon-Delivered Area Effects Munitions (C-DAEM)	-	0.960	4.941	25.897	-	25.897	14.826	19.765	22.724	24.500	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

FY 2020 funding increase supports the Army's modernization priorities and development efforts to replace the current 155mm Dual Purpose Improved Conventional Munitions (DPICM) stockpile with DoD policy compliant munitions in support of the National Defense Strategy.

### A. Mission Description and Budget Item Justification

The Cannon-Delivered Area Effects Munitions (C-DAEM) Project is a two increment approach to provide U.S. ground forces with the capability to engage area personnel through armored targets, while denying threat forces full operational freedom within the targeted area. An Analysis of Alternatives (AoA) was completed in January 2018. The purpose of the C-DAEM AoA was to inform acquisition and investment decisions by the Army regarding replacement of the current stockpile of 155mm Dual Purpose Improved Conventional Munitions (DPICM) with DoD policy compliant munitions and address anti-armor and extended range capability requirements identified in the C-DAEM Initial Capabilities Document (ICD). The Army validated a two increment solution for C-DAEM. Increment I will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. Increment II will destroy personnel, materiel, air defense artillery and rocket launchers. Increment I and II will be developed simultaneously. FY 2020 resources will fund the competitive demonstrations for Increment I, as well as early detailed design testing supporting the qualification of Increment II to support the Army's modernization priorities in support of the National Defense Strategy.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: C-DAEM Analysis of Alternatives (AoA), Capability Development Document (CDD), & Milestone A Support	0.960	1.960	-
<b>Description:</b> The purpose of the C-DAEM Alternatives of Analysis (AoA) was to inform acquisition and investment decisions by Army leadership to replace the current stockpile of 155mm Dual Purpose Improved Conventional Munitions (DPICM) with Department of Defense policy compliant munitions and address anti-armor and extended range capability requirements identified in the C-DAEM Initial Capabilities Document (ICD).			
<b>FY 2019 Plans:</b> FY 2019 supports the preparation and release of a Request for Proposals (RFP) for technologies and capabilities identified through the Analysis of Alternatives (AoA), as well as the development of the Capabilities Development Document (CDD) for each technology.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date:	March 2019	
Appropriation/Budget Activity 2040 / 4	<b>Project (Numbe</b> FG1 / Cannon-D Munitions (C-DA	r/ <b>Name)</b> elivered Area E EM)	Effects	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Decrease in funding due to achieved knowledge points of research a and II.	nd development efforts in support of C-DAEM Increment	sl		
Title: C-DAEM Increment I		-	-	17.000
Description: C-DAEM Increment I will destroy infantry fighting vehic	les, self-propelled howitzers, and tanks.			
<b>FY 2020 Plans:</b> FY 2020 will support a competitive demonstration phase to identify the armored targets.	ne most promising candidate(s) that address medium to I	neavy		
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase in funding in FY 2020 is based on the AoA and C-DAEM str solution.	rategy per the April 2018 AROC decision for a two incren	nent		
Title: C-DAEM Increment II		-	2.800	8.897
Description: C-DAEM Increment II will destroy personnel, materiel,	air defense artillery and rocket launchers.			
<b>FY 2019 Plans:</b> FY2019 funds will be used to purchase prototypes to support Increm	ent II TMRR phase testing.			
<i>FY 2020 Plans:</i> FY 2020 funds will support the early design testing of candidates the the personnel to medium armored target set.	Alternative of Analysis (AoA) had recommended addres	sing		
FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funding to cover Increment II prototype hardware and dea	sign testing.			
Title: FY 2019 SBIR / STTR Transfer		-	0.181	-
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer				
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer				
	Accomplishments/Planned Programs Sub	otals 0.96	0 4.941	25.897
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A <i>I Tank and Medium Caliber</i> <i>Ammunition</i>	<b>Project (N</b> FG1 / Canr Munitions (	u <b>mber/Name)</b> non-Delivered Area Effects ′C-DAEM)

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

### <u>Remarks</u>

In FY 2021, this Project will transition to Budget Activity 05, PE 0604802A Project FJ4, Cannon-Delivered Area Effects Munitions (C-DAEM). A Procurement Ammunition, Army C-DAEM funding line will be established in FY 2023.

### D. Acquisition Strategy

C-DAEM will employ an evolutionary acquisition approach to efficiently transition the unique ammunition products as they become available. The Analysis of Alternatives (AoA) completed on 31 January 2018 qualified a dramatic enhancement of operational Fires effectiveness, efficiency, and maneuver support when cannon artillery was equipped with a dedicated extended range, anti-armor projectile. In FY 2019, C-DAEM is reducing risk by beginning prototype testing and evaluation in parallel to decomposing the AoA results into selection criteria. C-DAEM will use the selection criteria to sponsor a competitive demonstration for this first increment (medium to heavy armor) to streamline the acquisition process by leveraging Section 815 of the National Defense Authorization Act (NDAA) for FY 2016. C-DAEM will use the Defense Ordnance Technology Consortium (DOTC) Other Transaction Agreement (OTA) to commission the demonstration phase in FY 2020. For following increments to address personnel to medium armored targets, C-DAEM will use DOTC OTA to execute risk reduction testing in FY 2020 in parallel to the Increment I demonstrations. C-DAEM will then be in position to proceed to qualification testing of the next promising candidates to update plans for the next capability.

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у						Date: March 2019					
Appropriation/Budge 2040 / 4	propriation/Budget Activity 10 / 4						ogram Ele 3639A / 7 hition	ement (N Tank and	l <b>umber/N</b> a Medium C	<b>ame)</b> Caliber	Project FG1 / C Munition	<b>(Numbe</b> Cannon-De ns (C-DAl	r/ <b>Name)</b> elivered A EM)	rea Effec	ts
Management Service	es (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Award Cost Date		Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	Various	Office of the Project Manager (PM) Combat Ammunition Systems (CAS) : Picatinny Arsenal, NJ	-	0.410	May 2018	0.935	Nov 2018	0.935	Nov 2019	-		0.935	Continuing	Continuing	Continuing
	1	Subtotal	-	0.410		0.935		0.935		-		0.935	Continuing	Continuing	N/A
Remarks Program Management incl Product Developmen	udes C-DAE	M travel and milestone	documenta	tion suppor	t.			FY	2020	FY	2020	FY 2020	]		
	Controot			FY 2	2018	FY 2	2019	Ba	ase	0	CO	Total			Torrat
Cost Category Item	Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Value of Contract
Increment I TMRR Phase	MIPR	DoD Ordnance Technology Consorium (DOTC) : TBD	-	-		-		17.000	Dec 2019	-		17.000	Continuing	Continuing	Continuing
Increment II Prototype Hardware	MIPR	DoD Ordnance Technology Consorium (DOTC) : TBD	-	_		2.400	Feb 2019	4.164	Dec 2019	-		4.164	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.181		-		-		-	0.000	0.181	-
		Subtotal	-	-		2.581		21.164		-		21.164	Continuing	Continuing	N/A
Support (\$ in Millions)			FY	2018	FY 2	2019	FY 2 Ba	2020 1se	FY 2	2020 CO	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	Armamemt Resarch Development Engineering Center	-	0.550	May 2018	1.025	Nov 2018	1.798	Oct 2019	-		1.798	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	)19	
Appropriation/Budg 2040 / 4	et Activity	1		R-1 Pro PE 060 Ammur	ogram Ele 3639A / Tr iition	<b>t (Number/Name)</b> Cannon-Delivered Area Effects ons (C-DAEM)									
Support (\$ in Millior	ıs)			FY 2	2018	FY 2	2019	FY 2020 Base		FY 2	2020 CO	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
		(ARDEC) : Picatinny Arsenal, NJ													
		Subtotal	-	0.550		1.025		1.798		-		1.798	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
Increment II Testing	MIPR	Army Test & Evaluation Command (ATEC) : Yuma, AZ	-	-		0.400	Feb 2019	2.000	Mar 2020	-		2.000	Continuing	Continuing	Continuing
		Subtotal	-	-		0.400		2.000		-		2.000	Continuing	Continuing	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY : O	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	0.960		4.941		25.897		-		25.897	Continuing	Continuing	N/A
				-		-									

#### Remarks

Increment I will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. Increment II will destroy personnel, materiel, air defense artillery and rocket launchers.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army								Date: March 20	19			
Appropriation/Budget Activity 2040 / 4	propriation/Budget Activity 40 / 4							e) Project (P per FG1 / Car Munitions	<b>t (Number/Name)</b> Cannon-Delivered Area Effects ons (C-DAEM)				
Event Name	FY 2018	FY 20	19	FY 20	020	FY 2	021	FY 2022	FY 2023	FY 2024			
Increment I Milestone A	1 2 3 4	1 2 3 1	3 4	1 2	3 4	1 2	3 4	1 2 3 4	1 2 3 4	1 2 3 4			
Increment I TMRR Competitive Demonstration / EMD	,	IS-A											
Increment I Preliminary Design Review (PDR)					2								
Increment I Milestone B					1 Dix		5 MS-B						
Increment I Critical Design Review (CDR)													
Increment I Milestone C										9 MS-C			
Increment II Prototyping		Prototyp	oing										
Increment II Early Design Testing and Live Fire Demonstration			Early De	esian Testina s	and Live F	re Demonstratio	n						
Increment II Preliminary Design Review (PDR)					3 PDR								
Increment II Milestone B						A MS-B							
Increment II Production Qualification Testing (PQT)						PQT							
Increment II Critical Design Review (CDR)													
Increment II Milestone C										8 MS-C			

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019		
Appropriation/Budget Activity 040 / 4	<b>R-1 Program I</b> PE 0603639A <i>Ammunition</i>	Element (Numbe I Tank and Mediu	r <b>/Name)</b> m Caliber	Project (Number/Name) FG1 / Cannon-Delivered Area Effe Munitions (C-DAEM)			
	Schedule Details	6					
	ſ	St	art	E	nd		
Events		Quarter	Year	Quarter	Year		
Increment I Milestone A	1	2019	1	2019			
Increment I TMRR Competitive Demonstration / EMD		1	2019	3	2024		
Increment I Preliminary Design Review (PDR)		4	2020	4	2020		
Increment I Milestone B		4	2021	4	2021		
Increment I Critical Design Review (CDR)		2	2022	2	2022		
Increment I Milestone C		4	2024	4	2024		
Increment II Prototyping		2	2019	4	2019		
Increment II Early Design Testing and Live Fire Demonstration		4	2019	4	2020		
Increment II Preliminary Design Review (PDR)		4	2020	4	2020		
Increment II Milestone B		1	2021	1	2021		
Increment II Production Qualification Testing (PQT)		1	2021	1	2024		
Increment II Critical Design Review (CDR)		2	2022	2	2022		
Increment II Milestone C	2	2024	2	2024			

### <u>Note</u>

C-DAEM Increments I and II will be pursued simultaneously. Increment I will destroy infantry fighting vehicles, self-propelled howitzers, and tanks. Increment II will destroy personnel, materiel, air defense artillery and rocket launchers.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	Army							Date: Mai	rch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 060363 Ammunitic	r <b>am Elemen</b> 39A / Tank a on	umber/Na m Anti-Per	<b>me)</b> sonnel and	Counter			
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
XT5: 30mm Anti-Personnel and Counter UAS	-	2.475	3.854	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.329
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Airburst capability provides the us dual purpose warhead, allowing it and soft-skin vehicular targets inc reach the desired lethal effects.	ser with a n t to continu creasing Sc There is no	cartridge Im nuch higher e to defeat l oldier Surviv funding req	proves the probability ight armore ability on th uested in F	of achieving of achieving ed threats th e ground di Y 2020.	e warrighter g a first burs hrough poin uring troops	to effective st kill agains t detonation s in contact o	ity engage a at enemy pe . The cartric engagemen	rsonnel targ Ige provide ts and decr	gets in the c s increased eases the re	pen. The L lethal effect equired nut	W30 will ret W30 will ret ts against p mber of rour	a lethality. ain its personnel lids to
B. Accomplishments/Planned P	rograms (	\$ in Million	<u>s)</u>						FY	2018	FY 2019	FY 2020
<i>Title:</i> Technology Maturation and	Risk Redu	ction (TMR	२)							2.475	3.730	-
Description: Demonstrating Tech	nnology Re	adiness Lev	el 6 and ac	hieving pre	-Milestone	(MS) B appi	roval.					
FY 2019 Plans: FY 2019 activities include continu 6 demonstration of the ability to se weapon system. Vendors will cont integration into the M789 round. T with the demonstration of a proxin	ing activitie elect airbur tinue to dev The main ef nity airburs	es to reduce st or point d velop the cri ffort in FY 20 t round firec	risk and ma etonating (I tical techno 019 will focu I from a gro	ature techno PD) functior plogies to be us on ammu ound mounte	ology with a nality when e designed unition and ed weapon.	a goal of a T fired from a and tested a system integ	echnology I M230 grou at the sub-sy gration whic	Readiness I nd mounteo ystem level h will culmi	Level d for nate			
FY 2019 to FY 2020 Increase/De Decrease in funding due to compl	ecrease Sta letion of Te	<b>atement:</b> chnology M	aturation ar	nd Risk Rec	luction proje	ect in FY 20	19.					
Title: FY 2019 SBIR / STTR Tran	sfer									-	0.124	-
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer												
FY 2019 to FY 2020 Increase/De FY 2019 SBIR / STTR Transfer	ecrease Sta	atement:										
					Accompli	shments/Pl	anned Prog	grams Sub	totals	2.475	3.854	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603639A / Tank and Medium Caliber Ammunition	Project (N XT5 / 30m UAS	umber/Name) m Anti-Personnel and Counter
C. Other Program Funding Summary (\$ in Millions) N/A Remarks			

### D. Acquisition Strategy

The development of the Lightweight 30mm (LW30, 30mmx113mm) Airburst cartridge during the Technology Maturation and Risk Reduction (TMRR) phase will occur via an Other Transaction Authority (OTA) award and a Technology Readiness Level (TRL) 6. The TMRR effort will consist of critical technology prototyping, testing, and demonstrating in the relevant environment.

## E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2								Date:	March 20	19			
Appropriation/Budg 2040 / 4	et Activity	1				R-1 Pro PE 060 <i>Ammur</i>	ogram Ele 3639A / 7 hition	ement (N Tank and	lumber/N Medium (	<b>ame)</b> Caliber	Project XT5 / 3 UAS	: <b>(Numbe</b> 0mm Anti	r/Name) -Personne	l and Co	unter
Product Developme	nt (\$ in M	illions)		FY :	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
30mm Prototype Design	C/CPFF	General Dynamics : Marion, IL	-	2.475	Jul 2018	2.630	Jan 2019	-		-		-	0.000	5.105	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.124		-		-		-	0.000	0.124	-
		Subtotal	-	2.475		2.754		-		-		-	0.000	5.229	N/A
Support (\$ in Million	is)			FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	Armament Research Development and Engineering Center (ARDEC) : Picatinny, NJ	-	-		0.350	Dec 2018	-		-		-	0.000	0.350	-
		Subtotal	-	-		0.350		-		-		-	0.000	0.350	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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 Readiness Level 6 (TRL6) Demonstration	MIPR	Aberdeen Test Center (ATC) : Aberdeen, MD	-	-		0.750	Aug 2019	-		-		-	0.000	0.750	-
		Subtotal	-	-		0.750		-		-		-	0.000	0.750	N/A
			Prior Years	FY	2018	FY	2019	FY : Ba	2020 ase	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	2.475		3.854		-		-		-	0.000	6.329	N/A
<u>Remarks</u>															

nibit R-4, RDT&E Schedule Profile: PB 2020 Army																							Dat	te: N	/larc	h 20	19			
Appropriation/Budget Activity 2040 / 4	propriation/Budget Activity 40 / 4						R-1 Program Element (Number/Name)ProjectPE 0603639A / Tank and Medium CaliberXT5 / 30AmmunitionUAS									<b>t (N</b> 80m	t (Number/Name) 0mm Anti-Personnel and Counter													
Event News		FY	201	8		FY	( 20	19		F	Y 2	020			FY	202	21		F	-Y 2	2022			FY	202	23		FY	20	24
Event Name	1	2	3	4	1	2	3	4	1	2		3 4	4	1	2	3	4	1		2	3	4	1	2	3	4	1	2	3	4
Technology Maturation and Risk Reduction (TMRR)	TMRF	२																												
Contract Award			Cor	ntract /	Award																									
30mm Prototype Development				30mm	Prote	otype I	Devel	lopmen	t																					
Technology Readiness Level (TRL) 6 Demonstration								TR	L6 De	mo																				
									-1				1														1			

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Mar	ch 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Numbe</b> PE 0603639A <i>I Tank and Mediu</i> <i>Ammunition</i>	Project (Number/Na XT5 / 30mm Anti-Per UAS	me) sonnel and Counter	
So	chedule Details			
	S	art	E	Ind
Events	Quarter	Year	Quarter	Year
Technology Maturation and Risk Reduction (TMRR)	1	2018	4	2019
Contract Award	4	2018	4	2018
30mm Prototype Development	4	2018	4	2019
Technology Readiness Level (TRL) 6 Demonstration	4	2019	4	2019

Exhibit R-2, RDT&E Budget Item	I Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	ch 2019					
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	ppropriation/Budget Activity         040: Research, Development, Test & Evaluation, Army I BA 4: Advanced         component Development & Prototypes (ACD&P)         Prior       FY 2020					R-1 Program Element (Number/Name) PE 0603645A / Armored System Modernization - Adv 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	-	41.431	84.297	157.656	-	157.656	151.624	172.864	50.703	44.700	0.000	703.275				
EV7: Combat Vehicle Prototyping	157.656	-	157.656	151.624	172.864	50.703	44.700	0.000	703.275							

### A. Mission Description and Budget Item Justification

Next Generation Combat Vehicle (NGCV) Prototyping provides focused investment for the development of combat vehicles for future battlefields. The purpose of this Program Element's (PE) funding is to integrate the next generation of technology enabled capabilities developed in the Science and Technology (S&T) portfolio to demonstrate new capabilities to meet emerging military needs, provide hardware for Soldier operational experiment/feedback, determine integration potential across the current Army portfolio of ground vehicles, and develop platform level prototypes. The primary efforts in this line include maturing and experimenting with Manned Un-Manned Teaming (in conjunction with Robotic Combat Vehicle) and maturing and experimenting with a variety of technologies that could potentially be added to the Optionally Manned Fighting Vehicle (OMFV) or legacy combat vehicles (such as Abrams and Bradley) in future incremental upgrades.

Prototyping allows for aggressive innovation (provides a bridge from S&T investment to vehicle integration and operational use), informs requirements through User Evaluations, ensures requirements are met, mitigates capability gaps and reduces integration risks. The strategy for NGCV will be to focus on delivering incremental experimental prototypes to the warfighter to demonstrate Manned Un-Manned Teaming (MUM-T) in conjunction with Robotic Combat Vehicles (RCV), to integrate technologies to maintain overmatch while demonstrating crew task reductions through crew augmentation enabled by optimized Warfighter Machine Interface (WMI) and sensor fusion.

Additionally, funding will support concept development, trade studies, technical/operational/affordability analyses to assess future concepts and designs for the Next Generation Tank (NGT). The analysis of these concepts will assist in targeting and maturing the correct S&T technologies to provide the next generation capabilities to the warfighter. This funding will also support the integration of a powertrain system in a high fidelity and realistic operating environment to buy back lost mobility due to increased combat vehicle platform weight. The effort will be focused on maturation of the engine and transmission for production. In addition, this funding will support technology maturation, integration risk reduction, and qualification of key lethality/weapon system and sensor technologies to support current and future increments of the Optionally Manned Fighting Vehicle (OMFV).

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Ar	Da	Date: March 2019			
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)		<b>R-1 Program El</b> PE 0603645A / A			
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	32.739	119.395	64.986	-	64.986
Current President's Budget	41.431	84.297	157.656	-	157.656
Total Adjustments	8.692	-35.098	92.670	-	92.670
<ul> <li>Congressional General Reductions</li> </ul>	-0.027	-0.098			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-40.000			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	10.000	5.000			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-1.281	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	92.670	-	92.670

## Change Summary Explanation

FY 2020 funding increase is to support experimental prototyping.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army						Date: March 2019						
Appropriation/Budget Activity       R-1 Program Element (Number/Name)         2040 / 4       PE 0603645A / Armored System         Modernization - Adv Dev       Modernization - Adv Dev				Project (Number/Name) EV7 / Combat Vehicle 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
EV7: Combat Vehicle Prototyping	-	41.431	84.297	157.656	-	157.656	151.624	172.864	50.703	44.700	0.000	703.275
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### <u>Note</u>

This program supports the Cross Functional Team (CFT).

#### A. Mission Description and Budget Item Justification

Next Generation Combat Vehicle Prototyping provides focused investment for the development of combat vehicles for future battlefields. The purpose of this Program Element's (PE) funding is to integrate the next generation of technology enabled capabilities developed in the Science and Technology (S&T) portfolio to demonstrate new capabilities to meet emerging military needs, provide hardware for Soldier operational experiment/feedback, determine integration potential across the current Army portfolio of ground vehicles, and develop platform level prototypes. The primary efforts in this line include maturing and experimenting with Manned Un-Manned Teaming (in conjunction with Robotic Combat Vehicle) and maturing and experimenting with a variety of technologies that could potentially be added to the Optionally Manned Fighting Vehicle (OMFV) or legacy combat vehicles (such as Abrams and Bradley) in future incremental upgrades.

Prototyping allows for aggressive innovation (provides a bridge from S&T investment to vehicle integration and operational use), informs requirements through User Evaluations, ensures requirements are met, mitigates capability gaps and reduces integration risks. The strategy for NGCV will be to focus on delivering incremental experimental prototypes to the warfighter to demonstrate Manned Un-Manned Teaming (MUM-T) in conjunction with Robotic Combat Vehicles (RCV), to integrate technologies to maintain overmatch while demonstrating crew task reductions through crew augmentation enabled by optimized Warfighter Machine Interface (WMI) and sensor fusion.

Additionally, funding will support concept development, trade studies, technical/operational/affordability analyses to assess future concepts and designs for Next Generation Tank (NGT). The analysis of these concepts will assist in targeting and maturing the correct S&T technologies to provide the next generation capabilities to the war fighter. This funding will also support the integration of a powertrain system in a high fidelity and realistic operating environment to buy back lost mobility due to increased combat vehicle platform weight. The effort will be focused on maturation of the engine and transmission for production. In addition, this funding will support technology maturation, integration risk reduction, and qualification of key lethality/weapon system and sensor technologies to support current and future increments of the Optionally Manned Fighting Vehicle (OMFV).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Government Engineering & Program Management	14.854	18.760	9.550
<b>Description:</b> This effort conducts system level ground vehicle advanced concepting, prototyping and demonstration. This effort will partner government organic capabilities and Industry for an iterative process to develop combat vehicle concepts and			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019					
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A <i>I Armored System</i> <i>Modernization - Adv Dev</i>	Project (Number/Name) EV7 / Combat Vehicle Prototyping			ng
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2018	FY 2019	FY 2020
prototypes in order to inform and stabilize future capability requirements, perfor and update operational concepts, and reduce future acquisition risk. Activity will series of subsystem demonstrators building off of previous investment in groun programs along with advanced technologies from Industry and Academia.	rmance characteristics, and affordability, evalu Il include the integration and demonstration of d combat acquisition and science and technol	iate a ogy			
<b>FY 2019 Plans:</b> Analyzed results of completed experimental demonstrations in support of next a autonomous) to include the Mission Enabling Technologies - Demonstrator (ME Fighting Vehicle (IFV) and split-squad operations and applying lessons learned designs for integration of the S&T developed advanced ground vehicle subsyst prototype. Continued to conduct soldier-in-the-loop virtual simulations of future capabilities and conduct system level performance trades. Analyzed system co in preparation for procurement prior to system build and physical integration. C accelerated for delivery by FY 2020. Initiated work on data fusion technology b identification and tracking, surveillance, and autonomous control.	generation combat vehicles (both manned and ET-D) demonstration of closed hatch Infantry I to mature the system level concepts and tem technologies into a system level experime combat vehicle concepts to assess next gene oncepts and designs to identify long-lead hardw Current prototype build by TARDEC will be based on multiple sensor inputs for use in targe	ntal ration vare et			
<i>FY 2020 Plans:</i> Will continue Government program management that will cover the costs of government, training, supplies, equipment and facilities to manage the experimental program management of MET-D Phase I cost and schedule during the Performance Test schedule and performance as the project transitions from the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement of MET-D Phase II cost, schedule and performance during the design to build phromanagement phroman	vernment and direct support contractor salarie prototyping program. This will also continue st and Soldier Experiment; MET-D Phase II co nase and prepares for the test phase; and beg esign phase to enable long lead procurement.	s, st, ins			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Program Management will decrease in FY 2020 due to the acceleration of the 0 management costs to PE 0605625A.	OMFV competition and shifting of program				
Title: Test & Evaluation			7.981	8.000	2.480
<b>Description:</b> Test and Evaluation activities includes contractor and governmendevelopment. Contractor prove-out testing will be conducted using U.S. Army to prototype vehicles will evaluate vehicle performance and include user evaluation	nt testing as well as test documentation est facilities. Government development testing on.	of			
<b>FY 2019 Plans:</b> Test & Evaluation included but not limited to safety, integration, and demonstra <b>FY 2020 Plans:</b>	ition.				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603645A <i>I Armored System</i> <i>Modernization - Adv Dev</i>	Project (Number/Name) EV7 / Combat Vehicle Prototyping					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020			
Will complete MET-D Phase I performance and user evaluation; gather and report. Will further the development and refinement of the MET-D Phase II procedures to support Phase II integration, safety, and demonstration testing	d analyze all data; and develop and deliver final te I Test and Evaluation Master Plan (TEMP) and te ng set to begin in FY 2021.	est st					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Test & Evaluation has decreased in FY 2020 due to acceleration of MET-D 2019.	) Phase I test and evaluation, which now begins ir	1 FY					
Title: Other Support Costs		15.596	-	-			
<b>Description:</b> Funding provided support software development, integration electronics architecture subsystems.	and support services, hardware, and vehicle						
<i>Title:</i> Modeling & Simulation		3.000	1.834	4.360			
<b>Description:</b> The modeling and simulation effort is to assess operational n Maneuver Battle lab at Fort Benning and One Semi-Automated Forces (Or underpinnings to support development of requirements.	needs and operational employment by using the neSAF) modeling. Results provide the analytical						
<i>FY 2019 Plans:</i> Continued to assess operational needs and operational employment throug Battle lab at Fort Benning and One Semi-Automated Forces (OneSAF) mo to support the development of requirements for future systems. The mode technology proto-type demonstrations and user evaluations will provide the development and refinement of requirements.	gh modeling and simulation by using the Maneuve odeling. Modeling and simulation results will contin ling and simulation outcomes coupled with planne e combat developer an analytical base to support	er ue ed the					
<i>FY 2020 Plans:</i> Will refine models utilized across ground vehicle platforms based on MET- with technologies identified for MET-D Phase II integration to conduct analy characteristics and identifying potential integration challenges. Will conduct Manned Fighting Vehicle (MFV) Phase II models and Next Generation Tan requirements, performance characteristics, and operational concepts to reco	D Phase I test results. Will update models ysis prior to integration informing performance ct performance and operational analysis with hk (NGT) concepts to inform and stabilize capabili duce future acquisition risk.	у					
FY 2019 to FY 2020 Increase/Decrease Statement: Modeling & Simulation has increased in FY 2020 due to the start of Phase concepting.	II modeling and simulation and Next Generation	「ank					
Title: Experimental Prototyping		-	51.512	139.266			
Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019				
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Appropriation/Budget Activity 2040 / 4	Projec EV7 / (	i <b>ject (Number/Name)</b> 7 I Combat Vehicle Prototyping					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020		
<b>Description:</b> Accelerate prototyping and technology maturation (both organic a fusion of data from different sensors and how it will be displayed and used by n prototyping allows for aggressive innovation through integration of next general and public/private partnerships. This includes the development of the XM-913 of lethality improvements. Experimentation of these platforms will help to inform how they will operate, mitigate capability gaps, and reduce technology maturati provide improved capabilities for command and control of the Robotic Combat through experimentation.	and from Industry) for combat vehicles and int nanned and autonomous systems. Experimen- tion technologies developed in the S&T portfo and additional ammo needed for the developr m requirements for the NGCV platform(s) and ion and integration risks. The prototypes will a Vehicle (RCV), demonstrating those capabiliti	ernal htal lio ment also es					
<b>FY 2019 Plans:</b> TARDEC is using their existing OTA contract and accelerating the IFV build in prototype is utilizing latest off-the shelf technologies and have the capability to technologies as they become available. Acceleration of the contract will require	order to deliver a first prototype by 1Q FY202 upgrade to the Combat Vehicle Prototyping (C modification of the current contract.	1. The CVP)					
NGCV Cross Functional Team (CFT)/PM is using the OTA to submit a call for we technologies that will improve a combat vehicle (IFV or Tank) in the areas of means fusion and demonstrate a path to autonomy. The white papers will be use which will be delivered by 1Q FY2021. Information from the prototypes (both or modeling and simulation will inform the development of the NGCV requirement	white papers to Industry for concepts that will sobility, survivability, lethality, situational aware sed to award 1 to 2 contracts to build a prototy ganic and from Industry), along with the paral s.	show eness, /pe lel					
Demonstrating Sensor Fusion/Crew Station requirements for manned and unmusupport and technology procurement for the software system integration laborate evaluation for the crew station SIL. These SILs will allow the integration team to the actual physical integration of the system. Work performed in these SILs is contegrated systems experimentation by identifying any system integration-related early in the integration process will allow the team to develop solutions in a time the system level integration of the powerpack (engine, transmission, integrated management system) along with working new projects in the areas of sensor further from Global Positioning System (GPS), Light Detection and Raging (LID, RAdio Detection And Ranging (RADAR), optical Infrared, UltraViolet (UV), etc. and continuing to provide software support that is needed for system integration <i>FY 2020 Plans:</i>	anned systems. Continuing to provide integra atory (SIL). Providing integration support and us o simulate integrated system functionality prio critical to the successful mitigation of risk for the ed errors as early as possible. Identifying error ely and effective manner. Continuing to mature I starter generator, exhaust, air inlet, and therr usion, which may include, but not limited to, da AR), SOund Navigation And Ranging (SONAI Procuring specialty tooling and long-lead item n, for the accelerated experimentation.	tion user r to ne rs e nal ata R), us,					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date:	March 2019			
Appropriation/Budget Activity 2040 / 4	Project (Number/ EV7 / Combat Vel	yject (Number/Name) 7 I Combat Vehicle Prototyping				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020		
The program will utilize an Other Transaction Agreement (OTA) mechanism D experimental prototypes in FY 2021. The MET-D Phase II efforts will con integration; maintain system level software; and develop software stability u I Experimentation. The platform software upgrades will support integration Machine Interface (WMI), and improvements for Robotic Combat Vehicle (R from the Phase I Experiment, MET-D Phase II will also update the software SIL, and software test benches in order to simulate integrated system functi The MET-D Phase II effort will also begin to build prototypes with increased technological deliverables. The effort will begin with the purchase of long le prototype upgrades for integration of the technologies, and system software maturation of foundational architectures and technologies for power and mo The effort will conduct the development engineering effort for maturation an Next Generation Combat Vehicles, such as powertrain and running gear, in- technologies, sensors, crew interfaces and autonomous systems for crew a architecture, data architecture, communications, active and adaptive protect	in order to deliver the second phase of MET- tinue system level prototype development and pgrades based on results from the MET-D Phase of advanced technologies, improved Warfighter RCV) command and control. Based on feedback system integration laboratory (SIL), crew station onality prior to physical integration for Phase II. capability provided from the next increment of S& ad materials and technologies, design of the Phase updates. The effort will continue the refinement a obility, lethality, protection, and situational awarenee d integration of technologies necessary to support direct driver's vision and situational awareness ugmentation, lethality solutions, high voltage powe tion solutions and payloads.	Г e II nd ss. r				
FY 2019 to FY 2020 Increase/Decrease Statement: Experimental Prototypoing has increased in FY 2020 due to the beginning of	of MET-D Phase II.					
Title: Powertrain Maturation		-	-	2.000		
<b>Description:</b> This effort will emphasize improving component engine and transmission cost and manufacturing time. The Army will conduct matu technology transition from laboratory to operational use and prepare for low and transmission. This effort will conduct the evaluation of reliability, maintate to a vehicle platform and conduct maturation to the components as a result.	ansmission subsystem maturity and reduce engine iration and demonstration activities to expedite rate initial production of the advanced combat enginability, and logistical analyses necessary to trans of these evaluations.	e line lition				
<i>FY 2020 Plans:</i> Advanced Combat Engine efforts developed and delivered in FY19 under th Technology project will be assessed for manufacturability of the design. Des integration of the components and reduce cost and manufacturing time of th manufacturability of the design which includes replacing expensive customs These efforts will lead to iterative engine prototypes that require performance	ne Advanced Powertrain Demonstrator Science an sign improvements will be made to further improve ne components. In 2020, the focus will be on the subcomponents against mass produced hardware be testing to ensure they can achieve durability me	d				

Exhibit R-2A, RDT&E Project Justification: PB 20	)20 Army						Date: M	arch 2019	
Appropriation/Budget Activity 2040 / 4	Project (Number/Name) EV7 / Combat Vehicle Prototyping								
B. Accomplishments/Planned Programs (\$ in Mil	llions)					Γ	FY 2018	FY 2019	FY 2020
while maintaining their performance capabilities. The logistical analyses necessary to transition to a vehic	ese will be the initial as the platform.	ssessments	for the reliab	ility, maintai	nability, and				
FY 2019 to FY 2020 Increase/Decrease Statement Powertrain Maturation is a new requirement for FY 2	<b>nt:</b> 2020.								
Title: 2019 SBIR/STTR Transfer							-	4.191	-
<b>FY 2019 Plans:</b> FY 2019 SBIR/STTR Transfer									
FY 2019 to FY 2020 Increase/Decrease Statement FY 2019 SBIR/STTR transfer	nt:								
		Accon	nplishments	/Planned P	rograms Sul	ototals	41.431	84.297	157.656
C. Other Program Funding Summary (\$ in Million	<u>15)</u>								
Line Item FY 2018 • 0605625A: Manned - Ground Vehicle	FY 2019         FY 2020           -         378.400	<u>FY 2020</u> <u>OCO</u> -	<u>FY 2020</u> <u>Total</u> 378.400	<u>FY 2021</u> 320.100	<b>FY 2022</b> 218.700	<u>FY 202</u> 65.70	<u>3</u> <u>FY 2024</u> 0 52.300	Cost To Complete 0.000	<u>Total Cost</u> 1,035.200

#### D. Acquisition Strategy

Next Generation Combat Vehicle (NGCV) prototyping provides focused investment for development of the combat vehicles in future battlefields. The purpose of this funding is to integrate the next generation of technology enabled capabilities developed in the Science and Technology (S&T) portfolio to demonstrate new capabilities to meet emerging military needs, provide hardware for Soldier operational evaluation/feedback, to determine integration potential across the current Army portfolio of ground vehicles and to develop platform level prototypes.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project Co	ost Analysis: PB 2		Date: March 2019							019				
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 060 <i>Moderr</i>	ogram Ele 3645A / A hization - A	ement (N Armored S Adv Dev	<b>umber/Na</b> System	ame)	Project EV7 / C	(Numbe combat Ve	r/ <b>Name)</b> chicle Pro		
Product Developmer	nt (\$ in Mi	llions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
NGCV Contract(s)	C/TBD	TBD : TBD	-	5.671	Jul 2018	31.188	Mar 2019	67.321	Mar 2020	-		67.321	Continuing	Continuing	Continuing
SCMM Phase 1	RO	CERDEC : TBD	-	1.233	Jul 2018	-		-		-		-	Continuing	Continuing	Continuing
Prototyping with Industry	C/Various	Various : Various	-	-		15.324	Jul 2019	71.945	Feb 2020	-		71.945	Continuing	Continuing	Continuing
Sensor Fuse/Crew/SIL	SS/TIA	TBD : TBD	-	10.000	Oct 2018	5.000	Jul 2019	-		-		-	0.000	15.000	-
Powerttrain Maturation	C/TBD	TBD : TBD	-	-		-		2.000	Jul 2020	-		2.000	0.000	2.000	-
	-	Subtotal	-	16.904		51.512		141.266		-		141.266	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
PMO/PEO Support	MIPR	PM/PEO : Warren, MI	-	13.546	Dec 2018	18.760	Dec 2018	9.550	Dec 2019	-		9.550	0.000	41.856	-
2019 SBIR/STTR Transfer	TBD	ASA(ALT) : Washington, DC	-	-		4.191	Nov 2018	-		-		-	0.000	4.191	-
		Subtotal	-	13.546		22.951		9.550		-		9.550	0.000	46.047	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
SCMM User Evaluation	MIPR	Various : Various	-	7.981	Oct 2017	-		-		-		-	Continuing	Continuing	Continuing
Modeling & Simulation	Various	Various : Various	-	3.000	Jan 2018	1.834	Mar 2019	4.360	Mar 2020	-		4.360	Continuing	Continuing	Continuing
Developmental testing	MIPR	Various : Various	-	-		8.000	Jul 2019	2.480	Jul 2020	-		2.480	Continuing	Continuing	Continuing
		Subtotal	-	10.981		9.834		6.840		-		6.840	Continuing	Continuing	N/A
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	41.431		84.297		157.656		-		157.656	Continuing	Continuing	N/A

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Appropriation/Budget Activity       R-1 Program Element (Number/Name)       Project (Number/Name)         2040 / 4       PE 0603645A / Armored System       EV7 / Combat Vehicle Prototyping         Modernization - Adv Dev       Targ	Exhibit R-3, RDT&E Project Cost Analysis: PB 20	020 Arm	у					Date:	March 20	19	
Targ	Appropriation/Budget Activity 2040 / 4	R-1 Program El PE 0603645A / A Modernization - A	<b>ement (Number/N</b> Armored System Adv Dev	ame)	Project (Number/Name) EV7 / Combat Vehicle Prototyping						
PriorFY 2020FY 2020FY 2020Cost ToTotalValueYearsFY 2018FY 2019BaseOCOTotalCompleteCostControl		Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2 OC	020 O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 /	Army																Da	ate: I	Marc	ch 20	)19			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)Project (NPE 0603645A / Armored SystemEV7 / CorModernization - Adv DevEV7								(Number/Name) ombat Vehicle Prototyping															
		V 2040		<b>F</b> \	1 204			EV	2020		-	( 202			- 2 20	22		EV						24
Event Name	1 2	2018	1	2	3	4	1	2	3 4	1	2	3	4	1	2 3	3 4	1	2	3	4	1	2	3	4
FFV Phase I Extension (GDLS/BAE)	Fully fund	ed (FFV Conce	ept Des	signs (	(BAE/GI	DLS) ar	id Den	nonstra	tor (GDLS))															
Combat Vehicle Prototyping Technologies	Combat V	ehicle Prototyp	ing Te	echnol	ogies																			
SCMM Phase 1: Modified Bradley Fire Team IFV	SCMM Ph	ase 1: Modifie	d Brad	dlev Fi	re Tean	mIEV																		
Live Experiment				xperim	nent																			
Operational Modeling	Operation	al Modeling																						
Operational Modeling/O&O					Open	ational	Modelir	ing/O&C	)															
Technologies Assessments and prioritization	Technolog	gies Assessmer	nts and	d prior	ritization	n																		
MET-D Phase I Build				ļ	MET-D	Phase	Build																	
MET-D Phase I Test & Evaluation						ME	-D Phi	ase 1Ta	\$E															
SCMM Experiment - Modified MOTS Demonstrators (6)	SCMM Ex	periment - Mod	ified M	NOTS	Demons	strators	(6)																	
MAPS Hard Kill / Soft Kill Demo on Bradley	MAPS Ha	rd Kill / Soft Kill	Demo	o on Bi	radley																			
Powertrain Maturation							Power	rtrain M	aturation															
MET-D Phase 2 Design							MET	T-D Pha	se 2 Desig	n														

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy					Date: March 20	19
Appropriation/Budget Activity 2040 / 4		R PI <i>M</i>	-1 Program Element E 0603645A / Armore lodernization - Adv D	(Number/Name) ombat Vehicle Prototyping			
[							
Event Name	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
MET-D Phase 2 Build			MET-D Phase Phas	e 2 Build			
MET-D Phase II Test & Evaluation				MET-D Phase 2 T&E			
MET-D Phase 3 Design			MET-D Phase 3 Design				
MET-D Phase 3 Build				MET-DI	Phase 3 Build		
MET-D Phase 3 Test & Evaluation					MET-I	Phase 3 T&E	
Next Generation Tank (NGT) Concepts			Next Generation Tank (NG	GT) Concepts			
						1	I

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Mar	ch 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Numb</b> PE 0603645A <i>I Armored System</i> <i>Modernization - Adv Dev</i>	er/Name) I m	Project (Number/Name) EV7 / Combat Vehicle Prototyping				
	Schedule Details						
	S	tart	E	Ind			
Events	Quarter	Year	Quarter	Year			
FFV Phase I Extension (GDLS/BAE)	1	2018	3	2018			
Combat Vehicle Prototyping Technologies	1	2018	4	2019			
SCMM Phase 1: Modified Bradley Fire Team IFV	1	2018	4	2018			
Live Experiment	1	2019	1	2019			
Operational Modeling	1	2018	4	2018			
Operational Modeling/O&O	3	2019	4	2021			
Technologies Assessments and prioritization	1	2018	4	2018			
MET-D Phase I Build	2	2019	4	2019			
MET-D Phase I Test & Evaluation	4	2019	2	2020			
SCMM Experiment - Modified MOTS Demonstrators (6)	1	2018	4	2019			
MAPS Hard Kill / Soft Kill Demo on Bradley	1	2018	4	2018			
Powertrain Maturation	1	2020	4	2023			
MET-D Phase 2 Design	1	2020	3	2020			
MET-D Phase 2 Build	2	2020	1	2021			
MET-D Phase II Test & Evaluation	1	2021	3	2021			
MET-D Phase 3 Design	1	2020	4	2021			
MET-D Phase 3 Build	4	2021	4	2022			
MET-D Phase 3 Test & Evaluation	4	2022	2	2023			
Next Generation Tank (NGT) Concepts	1	2020	4	2023			

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Exhibit R-2, RDT&E Budget Item	n Justificat	ion: PB 202	20 Army					Date: Marc	ch 2019				
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	ppropriation/Budget Activity         040: Research, Development, Test & Evaluation, Army I BA 4: Advanced         component Development & Prototypes (ACD&P)         Prior         FY 2020					<b>R-1 Program Element (Number/Name)</b> PE 0603747A / Soldier Support and Survivability							
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	-	15.759	11.735	6.514	3.000	9.514	9.042	9.020	9.812	10.252	0.000	75.134	
610: Food Adv Development	-	6.286	4.593	3.721	-	3.721	3.223	3.175	3.972	4.133	0.000	29.103	
C08: Rapid Equipping Force	-	9.043	5.796	2.793	3.000	5.793	5.819	5.845	5.840	6.119	0.000	44.255	
EL1: Army Field Feeding Programs	-	0.430	1.346	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.776	

#### A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	<u>FY 2020</u>	) Total
Previous President's Budget	13.157	11.746	7.402	-		7.402
Current President's Budget	15.759	11.735	6.514	3.000		9.514
Total Adjustments	2.602	-0.011	-0.888	3.000		2.112
<ul> <li>Congressional General Reductions</li> </ul>	-0.007	-0.011				
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-				
<ul> <li>Congressional Rescissions</li> </ul>	-	-				
<ul> <li>Congressional Adds</li> </ul>	3.000	-				
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-				
<ul> <li>Reprogrammings</li> </ul>	-	-				
<ul> <li>SBIR/STTR Transfer</li> </ul>	-0.391	-				
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-0.888	3.000		2.112
Congressional Add Details (\$ in Millions, and Includ	es General Redu	uctions)		ſ	FY 2018	FY 2019
Project: C08: Rapid Equipping Force				-		
Congressional Add: Soldier Enhancement Program				-	3.000	-
			Congressional Add Subt	otals for Project: C08	3.000	-
			Congressional Add	Totals for all Projects	3.000	-
				L		

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603747A / Soldier Support and Survivability	
Change Summary Explanation		
Change Summary Explanation Fiscal Year 2018 Congressional Add of \$3.000 Million for "Program In	ncrease" applied to Project C08.	
PE 0603747A: Soldier Support and Survivability	JNCLASSIFIED	125
		001

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Army

R-1 Line #79

Exhibit R-2A, RDT&E Project Ju	Date: Marc	ch 2019										
Appropriation/Budget Activity 2040 / 4		<b>R-1 Progra</b> PE 060374 <i>Survivabilit</i>	am Elemen 17A / Soldie ty	<b>t (Number/</b> r Support al	l <b>umber/Name)</b> I Adv 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
610: Food Adv Development	-	6.286	4.593	3.721	-	3.721	3.223	3.175	3.972	4.133	0.000	29.103
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: Fielded Individual Ration Improvement Project (FIRIP)	0.641	-	-	-	-
<b>Description:</b> Continuous product improvement for the Meal, Ready to Eat (MRE) through the advanced development of novel nutrition, processing and packaging technologies to improve operational effectiveness and improve logistics.					
Title: Assault/Special Purpose Ration Improvement Project (ASPIP)	0.441	-	-	-	-
<b>Description:</b> Continuous product improvement of special purpose rations through the advanced development of novel nutrition, processing and packaging technologies to improve operational effectiveness and improve logistics. Special purpose rations include the Meal, Cold Weather (MCW), First Strike Ration (FSR), and Modular Operational Ration Enhancement (MORE).					
Title: Fielded Group Ration Improvement Project (FGRIP)	0.474	-	-	-	-
<b>Description:</b> Continuous product improvement to update/improve group ration components, menus, and packaging by integrating state-of-the-art military/commercial packaging and technology base transitions. The family of Unitized Group Rations (UGRs) includes the Unitized Group Ration - Heat & Serve (UGR-H&S), Unitized Group Ration - Express (UGR-E), Unitized Group Ration - A (UGR-A), and Unitized Group Ration - M (UGR-M).					
Title: US Navy Standard Core Menu (NSCM) Continuous Product Improvement Project	0.708	-	-	-	-

Appropriation/Budget Activity R-1 Program	Element (Number/Name					
2040 / 4 PE 0603747A Survivability	I Soldier Support and	e) (	Project (N 610 / Food	umber/Nam Adv Develo	ne) opment	
B. Accomplishments/Planned Programs (\$ in Millions)	FY2	2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Description:</b> Provide recommendations to the Naval Supply Systems Command (NAVSUP) f improving Navy Standard Core Menu (NSCM) components by introducing new preparation terenhance menu acceptance and effectiveness while reducing labor requirements.	or upgrading/ hniques to					
Title: Multi-Purpose Individual Heating Technology (MIT)	(	0.658	-	-	-	-
<b>Description:</b> Develop a disposable, lightweight heating mechanism as a low-cost component Weather (MCW) to facilitate MCW preparation in extreme environments with reduced resourc increased ease of use.	of the Meal, Cold e requirements and					
Title: Joint Intuitive Multi-function Kitchen Equipment (JIMKE)	(	0.724	-	-	-	-
<b>Description:</b> Reduce logistics burden associated with life cycle management of Navy (USN), and Marine Corps (USMC) foodservice equipment. Integrate diagnostic technologies to predic reduce labor associated with troubleshooting equipment in the field and increase mean time b (MTBF).	Air Force (USAF) t maintenance, etween failures					
Title: Navy Galley and Scullery Upgrades	(	0.670	-	-	-	-
<b>Description:</b> Continuously modernize foodservice operations by adding capabilities to provide feeding, standardizing foodservice equipment assets fleet-wide, improving space utilization, a the continued use of the NSCM. Design, processes and equipment insertions will be impleme platforms during overhaul periods and during the new construction process on future vessels.	e optimized nd facilitating nted on legacy					
Title: Defense Logistics Agency (DLA)	(	0.548	-	-	-	-
<b>Description:</b> Support management of the Department of Defense (DoD) Electronic Documen and Wide Area Workflow (WAWF) programs.	Access (EDA)					
<i>Title:</i> Tray Ration Heater ? Improved (TRH-I)	(	0.485	-	-	-	-
<b>Description:</b> Develop an updated and compact Tray Ration Heater to meet the requirements up-armored HMMWV cargo beds. Reduce the overall weight, improve man-portability, heat tr thermal storage efficiency, and reduce water consumption. Meet USMC-approved Statement requirement for a Modernized Tray Ration Heat System.	of the smaller, ansfer efficiency, of Need					
Title: Inflatable Refrigerated Space (IRefS)	(	0.609	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603747A / Soldier Support al Survivability	Name) nd	Project (N 610 / Food	umber/Nan Adv Develo	ne) opment	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Description:</b> Develop a pallet sized, rapidly deployable, air deliverable field ref of UGR-A rations to units located in austere environments with little to no ability containers.	rigeration system for safe storage to obtain rigid refrigerated					
Title: Navy Mobile Feeding Galley		0.328	-	-	-	-
<b>Description:</b> Develop a mobile feeding system for shore bases that is equipped technology. The platform will have the capability to produce a rotating menu of appeal to the millennial generation of sailors.	d with innovative cooking fresh and healthy cuisine that will					
Title: Joint Service Combat Ration Advanced Development		-	1.751	2.483	-	2.483
<b>Description:</b> This effort matures and integrates combat ration technologies and warfighter maneuver, readiness and effectiveness during highly mobile, dispers are transitioned from PE 0603001A/Project C07 to provide individual and group with improved capabilities including improved warfighter physical and cognitive nutrition and a reduced logistics burden through weight and cube reduction.	d prototypes that enable ed operations. Technologies combat rations and components performance through optimized					
<b>FY 2019 Plans:</b> Mature and integrate applied nutrition, food engineering, and food packaging in group ration platforms to increase operational effectiveness; identify suitable CG enhance warfighter acceptability, increase consumption and improve nutritional house production to support engineering design, technology insertion, and com accelerated storage studies to validate candidate components meet or exceed test menus for warfighter evaluations; and transition validated prototypes to 6.5 top-level system and end item user requirements for the developmental Close G accelerate concepts for Test and Evaluation (T&E).	novations into individual and DTS/NDI candidate items to intake; conduct pilot scale in- mercial producibility; conduct shelf-life requirements; develop for operational testing. Identify Combat Assault Ration (CCAR) to					
<b>FY 2020 Base Plans:</b> Will continue to validate and integrate S&T innovations and COTS/NDI candida platforms (e.g. Meal, Ready-to-Eat, Unitized Group Ration) to increase operation T&E of S&T innovations and food component/packaging optimization efforts for to enable 7-day operations in the absence of resupply and improve readiness the weight, cube, and energy density; will initiate T&E of technologies for integration	te items into existing ration onal effectiveness; will conduct integration into prototype CCARs hrough significantly reduced n into prototype Expeditionary					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603747A / Soldier Support an Survivability	Name) nd	Project (N 610 / Food	umber/Nam Adv Develo	n <b>e)</b> opment	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Group Rations (EGRs) to decrease the logistics burden and enable group feed transition validated prototypes to PE 0604713A/Project 548 for operational test	ing in austere environments; will ing.					
FY 2019 to FY 2020 Increase/Decrease Statement: Change in funding supports development/acceleration of new CCAR prototype	s.					
Title: Joint Service Field Feeding Equipment and Menu Development		-	2.674	1.238	-	1.238
<b>Description:</b> This effort matures and integrates field feeding equipment technologies of the Navy, Air Force, and Marine Corps that reduce the logistics burden, imple operation and support costs as directed by the DoD CFREB. This effort also co (T&E) on Navy Standard Core Menu components and preparation techniques the standardization across the fleet and reduce labor requirements.	ologies and prototypes in support rove efficiency, and decrease anducts test and evaluation to enhance efficiency through					
<b>FY 2019 Plans:</b> Conduct T&E of prototype equipment with diagnostic and predictive capabilities cycle costs and decrease equipment downtime; conduct design reviews and fat the heating efficiency of rations while reducing overall weight, cube and total life a rapidly deployable field refrigeration prototype to reduce resupply requirement test and evaluate new products and food preparation techniques to enhance metabor requirements; and transition prototypes to PE 0604713A/Project 548 for S Demonstration.	s to decrease sustainment life- bricate prototypes that improve ecycle costs; design and fabricate its to units in austere locations; enu acceptance and reduce System Development and					
<b>FY 2020 Base Plans:</b> Will fabricate prototypes that improve the heating efficiency of rations while red total lifecycle costs; will initiate T&E of energy conservation technologies for Air will initiate T&E of upgrades to USMC Expeditionary Field Kitchen (EFK) and n Navy expeditionary units; will initiate T&E of new products and food preparation acceptance and reduce labor requirements; and will transition prototypes to PE operational test and evaluation (OT&E).	ucing overall weight, cube and r Force (USAF) BEAR kitchens; ew kitchen for shore-based n techniques to enhance menu 5 0604713A/Project 548 for					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 funds shifted to support the Army's modernization priorities in support of	the National Defense Strategy.					
<i>Title:</i> FY2019 SBIR/STTR Transfer		-	0.168	-	-	-
Description: FY2019 SBIR/STTR Transfer						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army							Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4		<b>R-1 Pr</b> PE 060 <i>Surviva</i>	ogram Elen )3747A / So ability	nent (Numbei Idier Support a	r/ <b>Name)</b> and	Project (N 610 / Food	umber/Nar Adv Devel	<b>ne)</b> opment	
B. Accomplishments/Planned Programs (\$ in Millions)					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>FY 2019 Plans:</b> FY2019 SBIR/STTR Transfer									
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR/STTR Transfer									
۵	Accomplishme	ents/Plan	ned Progra	ms Subtotals	<b>6</b> .286	4.593	3.721	-	3.721
C. Other Program Funding Summary (\$ in Millions)									
Line Item         FY 2018         FY 2019           • 548: Mil Subsistence Sys         0.678         1.092	FY 2020         F           Base         2.393	<u>Y 2020</u> <u>OCO</u> -	<u>FY 2020</u> <u>Total</u> 2.393	<u>FY 2021</u> 2.817	<u>FY 2022</u> 1.817	<u>FY 2023</u> 1.531	<b>FY 2024</b> 1.611	Cost To Complete 0.000	<u>Total Cost</u> 11.939

# D. Acquisition Strategy

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

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activit	y				R-1 Pro PE 060 Surviva	ogram Ele 3747A / S ability	ement (N Soldier Su	lumber/N upport and	ame) /	<b>Project</b> 610 / <i>F</i>	t <b>(Numbe</b> bod Adv E	r/ <b>Name)</b> Developme	ent	
Management Service	es (\$ in N	lillions)		FY	2018	FY	2019	FY 2 Ba	2020 Ase	FY 2	2020 CO	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
Combat Feeding Program Management	Allot	RDECOM, NSRDEC, Natick, MA : Natick, MA	6.359	0.665	Oct 2017	0.468	Oct 2018	0.372	Oct 2019	-		0.372	Continuing	Continuing	Continuing
DLA Bill Pay	TBD	Various : Various	1.550	0.586	Oct 2017	-		-		-		-	0.000	2.136	-
		Subtotal	7.909	1.251		0.468		0.372		-		0.372	Continuing	Continuing	N/A
Product Developme	nt (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Joint Service Rations and Combat Feeding Equipment	Various	Various : Various	30.501	4.500	Oct 2017	3.555	Oct 2018	3.349	Oct 2019	-		3.349	Continuing	Continuing	Continuing
FY2019 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.168	Oct 2018	-		-		-	0.000	0.168	-
		Subtotal	30.501	4.500		3.723		3.349		-		3.349	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Mill	ions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Joint Service Rations and Combat Feeding Equipment	Allot	RDECOM, NSRDEC, Natick, MA : Natick, MA	0.352	0.535	Oct 2017	0.402	Oct 2018	-		-		-	Continuing	Continuing	Continuing
		Subtotal	0.352	0.535		0.402		-		-		-	Continuing	Continuing	N/A
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 1se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	_	Project Cost Totals	38.762	6.286		4.593		3.721		-		3.721	Continuing	Continuing	N/A
<u>Remarks</u>															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٩rm	ıy																						Dat	te: I	Mar	ch 20	019				
Appropriation/Budget Activity 2040 / 4									<b>R-1</b> PE ( <i>Sur</i> )	<b>Pro</b> g 0603 /ivat	<b>grar</b> 3747 bility	n E A /	emei Soldie	nt ( er S	Nur Supp	nbe port	er/N t and	ame /	e)	(	<b>Pro</b> 610	ject / Fo	(Nu bod	ג <b>mt</b> Ad	oer/ / De	'Nar evel	ne) opm	ent				
Event Name	Γ	F	FY	2018			FY	20	19		F	Y 20	20		F	Y 2	2021			F	Y 20	022			FY	20	23			Y 2	2024	4
	1		2	3 4	4	1	2	3	4	1	2	3	4	1		2	3	4	1	2		3	4	1	2	3	4	1	1	2	3	4
Evaluate individual and group ration enhancements and transiti																																
Conduct in-house T&E of CCAR components, packaging and as	sser	nbly	forr	mats																												
Conduct in-house T&E of optimized MRE and FSR w/ candidate	cc	AR c	com	ponents	;																											
Transition validated CCAR components and packaging to 6.5 fo		r&E																														
Conduct in-house T&E of EGR and transition to 6.5 for OT&E																																
Provide USN w/CPI, evaluations and menu development to sup																																
ID and evaluate advanced galley/scullery equipment for the US	r																															
Conduct Dem/Val of Galley/Scullery equipment and transition to																																
Conduct in-house T&E of JSERCS prototype for BEAR Type I kit	ti		rUS	AF																												
Identify and procure JIMKE prototypes																																
Conduct in-house T&E of JIMKE intuitive equipment and transiti	ion t	o SD	DD f	or OT&E	=																											
Conduct T&E on rapidly deployable refrigeration prototype																																
Award contract for build of prototype mobile galley feeding syste	e																															
										i																						

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	۲m	/																		D	ate	e: M	larc	h 20	19			
Appropriation/Budget Activity 2040 / 4		<b>R</b> - PE <i>Sเ</i>	- <b>1 Pr</b> E 060 urviva	<b>ogi</b> 037 abil	r <b>am</b> 47A /ity	Elei / Sc	men oldie	nt (N er St	luml uppc	b <b>er/N</b> ort an	lame d	<del>)</del> )	<b>F</b> 6	<b>Proj</b> 610	<b>ect (</b> / Foo	Nun od A	nbe dv	er/N Dev	<b>lam</b> velo	i <b>e)</b> opme	ent							
		EV	2018		EV	2010			EV	2020	•		EV	202	1		E)	( 20	22				202	3		EV	20	24
Event Name	1	2	3 4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1		2	3	4	1	2	3	4
Conduct in-house T&E of mobile feeding galley and transition to	SDI	D for (	OT&E																									
Award contract to fabricate IRefS prototype and conduct in-hous	е Т&	E																										
Conduct in-house T&E of energy conservation technologies for	BEAI	R Kitc	hens																									
Conduct in-house T&E of EFK upgrades for USMC																												
Conduct in-house T&E of expeditionary kitchen systems for sho	re-ba	ased I	lavy units																									

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: March	า 2019		
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program E</b> PE 0603747A <i>I</i> <i>Survivability</i>	Element (Number Soldier Support a	r/ <b>Name)</b> and	Project (Number/Name) 610 / Food Adv Development			
Sc	hedule Details						
		Sta	art	En	d		
Events		Quarter	Year	Quarter	Year		
Evaluate individual and group ration enhancements and transition to SDD	for OT&E	1	2017	4	2024		
Conduct in-house T&E of CCAR components, packaging and assembly for	ormats	1	2019	4	2020		
Conduct in-house T&E of optimized MRE and FSR w/ candidate CCAR co	omponents	1	2020	4	2020		
Transition validated CCAR components and packaging to 6.5 for OT&E		4	2020	4	2020		
Conduct in-house T&E of EGR and transition to 6.5 for OT&E		1	2020	4	2021		
Provide USN w/CPI, evaluations and menu development to support NSCM	/ upgrades	1	2017	4	2024		
ID and evaluate advanced galley/scullery equipment for the USN		1	2017	4	2021		
Conduct Dem/Val of Galley/Scullery equipment and transition to SDD for	OT&E	1	2017	4	2021		
Conduct in-house T&E of JSERCS prototype for BEAR Type I kitchen for	USAF	1	2017	1	2018		
Identify and procure JIMKE prototypes		1	2018	2	2019		
Conduct in-house T&E of JIMKE intuitive equipment and transition to SDE	) for OT&E	2	2019	4	2021		
Conduct T&E on rapidly deployable refrigeration prototype		1	2020	4	2020		
Award contract for build of prototype mobile galley feeding system for USI	N	1	2018	1	2019		
Conduct in-house T&E of mobile feeding galley and transition to SDD for	OT&E	1	2019	1	2020		
Award contract to fabricate IRefS prototype and conduct in-house T&E		1	2019	4	2020		

Conduct in-house T&E of EFK upgrades for USMC

Conduct in-house T&E of energy conservation technologies for BEAR Kitchens

Conduct in-house T&E of expeditionary kitchen systems for shore-based Navy units

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2022

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4

Exhibit R-2A, RDT&E Project Ju	stification	PB 2020 A	rmy							Date: Marc	h 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060374 Survivabilit	a <b>m Elemen</b> 7A / Soldiel y	<b>t (Number</b> / r Support ai	Project (N C08 / Rapi	lumber/Name) id Equipping Force				
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	
C08: Rapid Equipping Force	-	9.043	5.796	2.793	3.000	5.793	5.819	5.845	5.840	6.119	0.000	44.255	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### Note

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

#### A. Mission Description and Budget Item Justification

The REF FY 2020 RDT&E request is \$2.793 million (Base) and \$3.000 million (OCO) and is for system integration, testing, and evaluation to support project requirements

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

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

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

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

The REF capabilities cross all Warfighter Functions: 1. Mission Command

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019		
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603747A <i>I Soldier Support and</i> <i>Survivability</i>	Project (N C08 / Rapi	umber/Name) d Equipping Force
<ol> <li>Movement and Maneuver</li> <li>Intelligence</li> <li>Fires</li> <li>Sustainment</li> <li>Protection</li> </ol>			
The RDT&E funding also provides the REF the flexibility to invest in near-term Most importantly, REF requires RDT&E funds to conduct safety certification (terequirement exists to ensure that REF-provided equipment is safe for Soldiers funds to integrate several different COTS/GOTS and NDI technologies into one	, and innovative solutions. RDT&E funds are r esting) for non-standard equipment before it is to use and that any risks are identified and do e capability that solves the tougher and more o	necessary ir equipped to ocumented. complex pro	the majority of all REF projects. the Soldier. This critical The REF also requires RDT&E blems. RDT&E funds maybe

used to further develop high (>6) Technology Readiness Level (TRL) systems or advanced technologies in conjunction with industry and Other Governmental Agencies (OGAs). Frequently, these technologies only need small amounts of funding to help them achieve a maturity level that is suitable to solve deployed U.S. Army Forces problems.

The REF requires RDT&E funds to modify, test, and evaluate existing technologies that were developed for one purpose, however may be suitable to solve another problem. REF will also fund deliberate projects in support of technology-solution-scouting to meet anticipated Army needs and to mitigate operational gaps. These efforts measure and identify current technologies, and provide information to better inform Army Training and Doctrine Command (TRADOC) and other communities of interest, with the intent of enlightening future Army requirements. Example efforts that may require RDTE include the following projects: Tactical Satellite Communications (SATCOM) and communications systems; tactical and small Combat Out Post/Forward Operating Base (COP/FOB) Intelligence, Surveillance, and Reconnaissance (ISR) and Force Protection systems; Counter Unmanned Aerial Systems (CUAS); Electronic Warfare (EW) systems; Non-Tactical Vehicles (NTV); Persistent Duration UAS, and Subterranean (SubT) Operations.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
<i>Title:</i> Rapid Equipping Force	6.043	5.706	2.793	3.000	5.793
Description: Funding is provided for the following effort.					
<b>FY 2019 Plans:</b> The REF partners with ASCC forces and Army SOF community to support globally deployed Soldiers and regionally aligned BCTs in all areas of responsibility. The REF anticipates increased uncertainty regarding the future of OIR and other operations in the CENTCOM AOR requiring additional flexibility to develop technological solutions supporting the reduced numbers of Soldiers operating globally in order to fill force protection gaps in the face of a lethal terrorism threat. The REF expects to continue our engagement with the ASCCs to address capability gaps generated by geographical and environmental constraints. Conversely, the REF will increase its understanding of evolving threats and operating conditions within the respective ASCC areas of operations.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: Marc	ate: March 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603747A / Soldier Support an Survivability	Name) nd	<b>Project (N</b> C08 <i>I Rapi</i>	ne) Force			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
The REF also expects to play a much more deliberate role in providing support wider range of response missions. In accordance with REF?s participation in th (OSD) led quick reaction capability effort, the Army determined the REF would p capability at ~600 requirements in FY19 and beyond.	to the GRF as they prepare for a ne Office of Secretary of Defense provide the Army?s warm base						
For FY19 the REF projects ~495 (Base/OCO) requirements in the following REI	<sup>-</sup> Warfighter function areas.						
<ol> <li>Mission Command</li> <li>Movement and Maneuver</li> <li>Intelligence</li> <li>Fires</li> <li>Sustainment</li> <li>Protection</li> </ol>							
The FY19 funds for projects in the amount of \$1.160 million (10% of Budget); b requirements trend.	reakout is base on the FY18						
The REF anticipates ATEC testing and evaluation cost of \$4.546 million. The R technologies in order to ensure suitability and safety before equipping the Soldie NDI item has to be tested.	EF requires RDT&E funds to test er - any modified COTS/GOTS/						
<b>FY 2020 Base Plans:</b> The REF partner with ASCC forces and Army SOF community to support global regionally aligned BCTs in all areas of responsibility. The REF anticipates increate the future of Operation Inherent Resolve (OIR) and other operations in the CEN (AOR) requiring additional flexibility to develop technological solutions supporting Soldiers operating globally in order to fill force protection gaps in the face of a lease expects to continue our engagement with the ASCCs to address capability gaps and environmental constraints. Conversely, the REF will increase its understand operating conditions within the respective ASCC areas of operations. The REF more deliberate role in providing support to the GRF as they prepare for a wider accordance with REF?s participation in the Office of Secretary of Defense (OSE)	Ily deployed Soldiers and based uncertainty regarding TCOM Area of Responsibility og the reduced numbers of thal terrorism threat. The REF is generated by geographical ding of evolving threats and also expects to play a much r range of response missions. In D) led quick reaction capability						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: Marc	h 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603747A / Soldier Support an Survivability	Name) nd	<b>Project (N</b> C08 <i>I Rapi</i>	oject (Number/Name) 08 / Rapid Equipping Force			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
effort, the Army determined the REF would provide the Army?s warm base cap FY20 and beyond.	ability at ~ 600 requirements in						
REF Warfighter function areas							
<ol> <li>Mission Command</li> <li>Movement and Maneuver</li> <li>Intelligence</li> <li>Fires</li> <li>Sustainment</li> <li>Protection</li> <li>For FY20 the REF projects ~600 (Base/OCO) requirements in the following RE</li> <li>The FY20 funds for projects in the amount of \$279K (10% of Budget); breakout requirements trend.</li> <li>The REF anticipates ATEC testing and evaluation cost of \$2.514 million. The F technologies in order to ensure suitability and safety before equipping the Soldi</li> </ol>							
NDI item has to be tested. <b>FY 2020 OCO Plans:</b> The REF partner with ASCC forces and Army SOF community to support global regionally aligned BCTs in all areas of responsibility. The REF anticipates incre- the future of Operation Inherent Resolve (OIR) and other operations in the CEN (AOR) requiring additional flexibility to develop technological solutions support Soldiers operating globally in order to fill force protection gaps in the face of a le expects to continue our engagement with the ASCCs to address capability gaps and environmental constraints. Conversely, the REF will increase its understar operating conditions within the respective ASCC areas of operations. The REF more deliberate role in providing support to the GRF as they prepare for a wide accordance with REF?s participation in the Office of Secretary of Defense (OSI	Ily deployed Soldiers and eased uncertainty regarding TCOM Area of Responsibility og the reduced numbers of ethal terrorism threat. The REF is generated by geographical ding of evolving threats and also expects to play a much r range of response missions. In D) led quick reaction capability						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	ch 2019			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Nau PE 0603747A / Soldier Support and Survivability							
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total		
effort, the Army determined the REF would provide the Army?s warm base cap FY20 and beyond.	pability at ~ 600 requirements in							
REF Warfighter function areas								
<ol> <li>Mission Command</li> <li>Movement and Maneuver</li> <li>Intelligence</li> <li>Fires</li> <li>Sustainment</li> <li>Protection</li> </ol>								
For FY20 the REF projects ~600 (Base/OCO) requirements in the following RE	EF Warfighter Functions.							
The FY20 funds for projects in the amount of \$300K (10% of Budget); breakou requirements trend.	t is base on the FY18							
The REF anticipates ATEC testing and evaluation cost of \$2.700 million. The technologies in order to ensure suitability and safety before equipping the Solo NDI item has to be tested.	REF requires RDT&E funds to test lier - any modified COTS/GOTS/							
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> There is no significant decrease (\$.006M).								
Title: FY 2019 SBIR / STTR Transfer		-	0.090	-	-	-		
Description: FY 2019 SBIR / STTR Transfer								
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer								
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer								
Accomplishme	nts/Planned Programs Subtotals	6.043	5.796	2.793	3.000	5.793		

Exhibit R-2A, RDT&E Project Just		Date: March 2019									
Appropriation/Budget Activity       R-1 Program Element (Number/Name)       Project         2040 / 4       PE 0603747A / Soldier Support and       C08 / I         Survivability       EY 2018       EY 2018									l <b>umber/Na</b> id Equippin	<b>me)</b> ng Force	
							FY 2018	FY 2019	]		
Congressional Add: Soldier Enhan	ncement Prog	am					3.000	-			
FY 2018 Accomplishments: Soldie	er Enhanceme	nt Program									
				Cong	ressional A	dds Subtotals	<b>s</b> 3.000	-			
C. Other Program Funding Summ	ary (\$ in Milli	ons)									
			<u>FY 2020</u>	<u>FY 2020</u>	FY 2020					<u>Cost To</u>	
Line Item	FY 2018	FY 2019	Base	000	<u>Total</u>	FY 2021	FY 2022	FY 2023	FY 2024	Complete	Total Cost
• M80101: Rapid Equipping	13.500	29.879	9.877	24.122	33.999	33.999	9.878	9.879	9.899	0.000	141.033
Soldier Support Equipment											
<u>Remarks</u>											

#### D. Acquisition Strategy

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

#### **E. Performance Metrics**

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	019		
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060 <i>Surviva</i>	<b>gram El</b> 3747A / S bility	<b>ement (N</b> Soldier Su	umber/N Ipport and	ame) d	Project (Number/Name) C08 / Rapid Equipping Force					
Product Developmer	nt (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	020 CO	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	
Mission Command	C/FFP	Various : Various	0.100	0.091		0.116		0.019		0.021		0.040	0.000	0.347	-	
Movement and Maneuver	C/FFP	Various : Various	0.198	0.150		0.192		0.049		0.053		0.102	0.000	0.642	-	
Intelligence	C/FFP	Various : Various	0.080	0.208		0.267		0.077		0.083		0.160	0.000	0.715	-	
Fires	C/FFP	Various : Various	0.007	0.003		0.004		0.002		0.002		0.004	0.000	0.018	-	
Sustainment	C/FFP	Various : Various	0.093	0.144		0.184		0.034		0.037		0.071	0.000	0.492	-	
Protection	C/FFP	Various : Various	0.186	0.308		0.487		0.098		0.104		0.202	0.000	1.183	-	
Dismounted Improvised Explosive Device (IED) Defeat	C/FFP	Various : Various	2.889	-		-		-		-		-	Continuing	Continuing	Continuing	
Dismounted Operations Support	C/FFP	Various : Various	4.796	-		-		-		-		-	Continuing	Continuing	Continuing	
Intelligence, Surveillance, and Reconnaissance (ISR) Shortfalls in Environmentally Inhospitable OEs	C/FFP	Various : Various	5.951	-		-		-		-		-	Continuing	Continuing	Continuing	
Small Combat Outpost (COP) / Patrol Base (PB) Force Protection and Sustainment	C/FFP	Various : Various	3.738	-		-		-		-		-	Continuing	Continuing	Continuing	
Other-REF RIPL Priorities (5-10)	C/FFP	Various : Various	8.778	-		-		-		-		-	Continuing	Continuing	-	
Other	C/FFP	Various : Various	2.208	-		-		-		-		-	0.000	2.208	-	
Base: Various Projects- Protect the Force in Counter Insurgency	C/FFP	Various : Various	11.841	-		-		-		-		-	0.000	11.841	-	
Small Combat Outpost (COP)/Patrol Base (PB) Sustainment	C/FFP	Various : Various	1.506	-		-		-		-		-	0.000	1.506	-	
Base: Various Projects- Enhance Intelligence Surveillance Recon	C/FFP	Various : Various	9.009	-		-		-		-		-	0.000	9.009	-	

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	019	
Appropriation/Budge 2040 / 4	t Activity	/				<b>R-1 Pro</b> PE 060 <i>Surviva</i>	o <b>gram El</b> 3747A / S <i>bility</i>	<b>ement (N</b> Soldier Su	umber/N pport and	ame) d	Project C08 / R	(Numbei apid Equi	r/ <b>Name)</b> ipping For	rce	
Product Developmen	nt (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	2020 CO	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
Small Combat Outpost (COP)/Patrol Base (PB) Force Protection	C/FFP	Various : Various	2.093	-		-		-		-		-	0.000	2.093	-
Dismounted Blue Force Tracking and Mission Command	C/FFP	Various : Various	0.528	-		-		-		-		-	0.000	0.528	-
Base: Various Projects- Logistics/Medical in Counterinsurgency Ops	C/FFP	Various : Various	1.639	-		-		-		-		-	0.000	1.639	-
Base: Various Projects- Timeliness of Analysis and Information Dissemination	C/FFP	Various : Various	6.961	-		-		-		-		-	0.000	6.961	-
Congressional Add-Squad Mission Support System (SMSS)	C/FFP	Various : Various	1.600	-		-		-		-		-	0.000	1.600	-
SSTR/Economic Assumptions/FFRDC and SBIR	C/FFP	Various : Various	1.090	-		-		-		-		-	0.000	1.090	-
OCO: Rapid Equipping Force	C/FFP	Various : Various	19.190	-		-		-		-		-	0.000	19.190	-
		Subtotal	84.481	0.904		1.250		0.279		0.300		0.579	Continuing	Continuing	N/A
Test and Evaluation (	(\$ in Milli	ions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 O(	2020 CO	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
ATEC (REF Integrated Priority List 1-10)	C/FFP	Various : Various	11.344	-		-		-		-		-	Continuing	Continuing	Continuing
ATEC (Warfighter Function Areas)	C/FFP	Various : Various	5.975	8.139		4.546		2.514		2.700		5.214	0.000	23.874	-
ATEC (REF Integrated Priority List 1-7)	C/FFP	Various : Various	2.000	-		-		-		-		-	0.000	2.000	-

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Exhibit R-3, RDT&E P	hibit R-3, RDT&E Project Cost Analysis: PB 2020 Army													Date: March 2019			
Appropriation/Budge 2040 / 4	t Activity	,				<b>R-1 Pro</b> PE 0603 <i>Surviva</i>	<b>gram El</b> 3747A / S bility	e <b>ment (N</b> Soldier Su	umber/Na pport and	ame) /	Project C08 / Ra	(Number apid Equi	r/ <b>Name)</b> oping For	се			
est and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2 OC	2020 CO	FY 2020 Total					
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract		
		Subtotal	19.319	8.139		4.546		2.514		2.700		5.214	Continuing	Continuing	N/A		
Prior Years			Prior Years	FY 2	018	FY 2	019	FY 2 Ba	:020 se	FY 2 O(	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
Project Cost Totals 103.800 9.04				9.043		5.796		2.793		3.000		5.793	Continuing	Continuing	N/A		

**Remarks** 

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Exhibit R-4, RDT&E Schedule Profile: PB 2020	) Army	/																				Dat	<b>e:</b> N	Лагс	h 20	019	)		
Appropriation/Budget Activity 2040 / 4	R- PE Su							<b>R-1</b> PE Sur	<b>Pro</b> 0603 vival	<b>gra</b> 3747 bility	m El 7A / 3 ′	eme Sola	ent ( lier \$	( <b>Nu</b> Sup	mbe port	r/Na and	ame	;)	Pr C0	<b>ojec</b> )8 / <i>F</i>	t (N Rapi	umb d Eq	er/ uip	Nam ping	i <b>e)</b> For	rce			
		FY 2	018	3		FY	201	9		FY	2020	)		FY	202	1		FY	202	2		FY	202	3		F	Y 20	24	
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	:	2	3	4
Rapid Equipping Force																													

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army	/			Date: Marc	h 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program I</b> PE 0603747A <i>Survivability</i>	Element (Number Soldier Support a	r/ <b>Name)</b> and	Project (Number/Nam C08 / Rapid Equipping	<b>ne)</b> I Force
	Schedule Details	;			
		Sta	irt	Er	nd
Events		Quarter	Year	Quarter	Year
Rapid Equipping Force		1	2020	1	2020

Exhibit R-2A, RDT&E Project Ju	hibit R-2A, RDT&E Project Justification: PB 2020 Army											
Appropriation/Budget Activity 2040 / 4 Prior					<b>R-1 Progra</b> PE 060374 <i>Survivabilit</i>	am Element 7A / Soldiei ty	umber/Nan / Field Feed	mber/Name) Field Feeding Programs				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EL1: Army Field Feeding Programs	-	0.430	1.346	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.776
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### <u>Note</u>

Project EL1 efforts complete in FY 2019

#### A. Mission Description and Budget Item Justification

This Project provides for the advanced component development and prototyping of Army combat feeding equipment designed to reduce the logistics burden and Operation and Support (O&S) costs of subsistence support to service personnel. Project supports development of rapidly deployable field food service equipment in coordination with ration development efforts. Project conducts demonstration and validation of improved subsistence support items used to enhance soldier effectiveness and quality of life. This project develops critical enablers that support the Joint Future Force Capabilities and the Joint Expeditionary Mindset by maintaining readiness through fielding and integrating new equipment. This equipment enhances the field Soldier's well-being and provides the Soldier with usable equipment, in addition to reducing sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands on 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: Ethylene Control Device (ECD) for Multi Temperature Refrigerated Container System (MTRCS)	0.183	0.705	-	-	-
<b>Description:</b> Develop a compact, low power, automated system that decomposes ethylene inside the Multi Temperature Refrigerated Container Systems (MTRCS) to extend the shelf life of fresh fruits and vegetables. The 300 watt Ethylene Control Device (ECD) provides an average of two week shelf life extension of fresh produce. It can be operated independently or in unison with the MTRCS refrigeration system and can be temporarily or permanently mounted with no negative impact to the MTRCS storage capacity (MTRCS Operational Requirements Document (ORD) approved Apr 2002).					
<b>FY 2019 Plans:</b> Funds reallocated to Containerized Food Sanitation Center (CFSC) for prototype fabrication and testing.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Army efforts will complete in FY19. Following FY 19, funding will shift to other accounts to support the Army's modernization priorities in support of the National Defense Strategy.					
<i>Title:</i> Deployable Sustainable Efficient Refrigeration Technology (DESERT)	0.247	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	er/Name) Project (Number/Name) t and EL1 / Army Field Feeding Program					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Description:</b> Develop enhanced refrigeration unit that uses a lower Global Watthan the current MTRCS. The Deployable Sustainable Efficient Refrigeration T of R-134A as the working fluid. R-134A has a GWP of ~1300 as compared to refride the R404A which has a GWP of ~3900. The redesigned refrigeration unit offers grat real sun/desert temperatures of 135F, increased reliability and the ability to sources to augment efficiency. The DESERT refrigeration unit shall be backwat continuing procurement and as a replacement (MTRCS ORD approved Apr 2000).	arming Potential (GWP) refrigerant echnology (DESERT) makes use the current MTRCS refrigerant eater fuel efficiency, operation make use of alternate power ards compatible to the MTRCS for 002).					
Title: Containerized Food Sanitation Center (CFSC)		-	0.598	-	-	-
<b>Description:</b> Develop and Test a Containerized Food Sanitation Center (CFS the Force Provider Expeditionary (FPE) and uses fuel fired water heating to im <b>FY 2019 Plans:</b>	C) that meets the requirements of prove energy efficiency					
documentation for transition to production.						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Army efforts complete in FY19 and funding will shift to other accounts to support priorities in support of the National Defense Strategy.	ort the Army's modernization					
Title: FY 2019 SBIR / STTR Transfer		-	0.043	-	-	-
Description: FY 2019 SBIR / STTR Transfer						
<i>FY 2019 Plans:</i> FY 2019 SBIR / STTR Transfer						
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer						
Accomplishme	nts/Planned Programs Subtotals	0.430	1.346	-	-	-

Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Pi PE 06 <i>Surviv</i>	r <b>ogram Elen</b> 03747A / So ability	n <mark>ent (Numb</mark> Idier Suppor	Jumber/Name) Ny Field Feeding Programs							
C. Other Program Funding Summa	ary (\$ in Milli	ons)						I			
		·	<u>FY 2020</u>	FY 2020	FY 2020					Cost To	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	Base	000	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<b>Complete</b>	Total Cost
• EL2: Army Field	7.883	3.410	0.000	-	0.000	-	-	-	-	0.000	11.293
Feeding Equipment											
• M65806: Assault Kitchen (AK)	4.608	4.587	1.673	-	1.673	-	-	-	-	0.000	10.868
<ul> <li>M65801: REFRIGERATED</li> </ul>	10.877	9.140	0.000	-	0.000	-	-	-	-	0.000	20.017
CONTAINER SYSTEMS											
• R62830: Battlefield Kitchen (BK)	-	2.024	0.000	-	0.000	-	-	-	-	0.000	2.024
<u>Remarks</u>											

### D. Acquisition Strategy

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

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19										
Appropriation/Budget Activity 2040 / 4							<b>gram El</b> o 3747A / S bility	ement (N Soldier Su	lumber/N upport and	ame) /	Project EL1 / A	(Numbe rmy Field	r/Name) Feeding F	<b>e)</b> ing Programs										
Management Servic	es (\$ in M	illions)		FY 2018		FY 2	:019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	PMFSS : Natick, MA	0.349	0.128		0.190		-		-		-	0.000	0.667	-									
		Subtotal	0.349	0.128		0.190		-		-		-	0.000	0.667	N/A									
Product Developme	nt (\$ in M	illions)		FY 2	2018	FY 2	:019	FY 2 Ba	2020 ase	FY 2	2020 CO	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									
Battlefield Kitchen	Various	PMFSS : Natick, MA	2.632	-		-		-		-		-	0.000	2.632	-									
ECD for MTRCS	Various	Various : Various	-	0.125		0.612		-		-		-	0.000	0.737	-									
DESERT	Various	PMFSS : Natick, MA	-	0.177		-		-		-		-	0.000	0.177	-									
FSC III	Various	Various : Various	-	-		0.501		-		-		-	0.000	0.501	-									
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.043		-		-		-	0.000	0.043	-									
		Subtotal	2.632	0.302		1.156		-		-		-	0.000	4.090	N/A									
			Prior Years	FY 2	2018	FY 2	019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract									
		Project Cost Totals	2.981	0.430		1.346		-		-		-	0.000	4.757	N/A									
<u>Remarks</u>																								

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy																		Da	te: N	/larc	h 20	19			
Appropriation/Budget Activity 2040 / 4					R Pl Si	- <b>1 P</b> E 06 <i>urviv</i>	r <b>ogr</b> 0374 vabili	am   47A ity	Elem / Sole	nent dier	t <b>(Nu</b> ' Sup	i <b>mb</b> opor	er/Na t and	ame /	e)	<b>Pi</b> El	r <b>oje</b> L1 / .	ct (N Arm	luml y Fie	ber/l e/d F	Nam eedi	i <b>e)</b> ing F	Progra	ms		
Event Name	F	Y 2018		FY	( 2019	)		FY 2	2020			FY	2021			FY	202	2		FY	202	3	I	FY 2	2024	Ļ
Conduct evaluation of ECD performance and application	1	2 3 4	1 1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Conduct evaluation of ECD perforamance and application																										
Conduct in house CFSC design																										
Award contract for CFSC design		1																								
Fabricate CFSC test prototype and conduct testing																										
Transition CFSC to production					4	2																				
										I				1					<u> </u>							

khibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	h 2019							
opropriation/Budget Activity 40 / 4	<b>R-1 Program</b> PE 0603747A <i>Survivability</i>	Element (Numbe I Soldier Support	r/Name) and	<b>Project (Number/Name)</b> EL1 <i>I Army Field Feeding Programs</i>								
	Schedule Details	6										
		St	art	End								
Events		Quarter	Year	Quarter	Year							
Conduct evaluation of ECD perforamance and application		1	2018	4	2018							
Conduct in house CFSC design		2	2018	3	2018							
Award contract for CFSC design		4	2018	4	2018							
Fabricate CFSC test prototype and conduct testing		1	2019	4	2019							
Transition CFSC to production		4	2019	4	2019							
Exhibit R-2, RDT&E Budget Item	hibit R-2, RDT&E Budget Item Justification: PB 2020 Army									Date: Marc	h 2019	
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Appropriation/Budget Activity           2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced           Component Development & Prototypes (ACD&P)           Prior					<b>R-1 Program Element (Number/Name)</b> PE 0603766A <i>I Tactical Electronic Surveillance System - Adv Dev</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	27.733	35.667	34.890	-	34.890	26.257	29.299	31.285	33.987	Continuing	Continuing
907: Tactical Exploitation Of National Capabilities-MIP	34.890	-	34.890	26.257	29.299	31.285	33.987	Continuing	Continuing			

#### <u>Note</u>

All funding is in support of the ACTIVE COMPONENT

### A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	27.733	35.667	37.731	-	37.731
Current President's Budget	27.733	35.667	34.890	-	34.890
Total Adjustments	0.000	0.000	-2.841	-	-2.841
<ul> <li>Congressional General Reductions</li> </ul>	-	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
Congressional Adds	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-2.841	-	-2.841

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060376 Surveilland	<b>am Elemen</b> 66A / <i>Tactica</i> ce System -	m Element (Number/Name)Project (Number/Name)A I Tactical Electronic907 I Tactical Exploitation Of NationalSystem - Adv DevCapabilities-MIP					onal
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
907: Tactical Exploitation Of National Capabilities-MIP	-	27.733	35.667	34.890	-	34.890	26.257	29.299	31.285	33.987	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### <u>Note</u>

All funding is in support of the ACTIVE COMPONENT.

#### A. Mission Description and Budget Item Justification

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

FY 2020 Base funding in the amount of \$34.890 million provides: (1) engineering and collaborative development on multiple validated National Intelligence Community (IC) advanced software and prototype developments that leverage National IC investments for Army use and ensure continuous Army interoperability with National IC assets and architectures, e.g. Information Store (iStore), Scalable User-Defined Real-time GEOINT Environment (SURGE), ADV Pilot, GETS-Cedalion Transition, MERIT project management and transition; (2) Advanced Miniaturized Data Acquisition System (AMDAS) 'Next' system development; (3) advanced development of more effective intelligence collection, processing, exploitation and dissemination (PED); (4) advanced development of capabilities for Air Vigilance (AV) Army Program of Record; and (5) development of TENCAP Radio Frequency Exploitation (TRFE) effort to support future synchronization of SIGINT, Cyber and Electronic Warfare operations.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: TENCAP Cross-agency Core Engineering activities	15.836	10.594	13.605
<b>Description:</b> By utilizing organic and matrix engineering subject matter experts, TENCAP collaborates, develops and exploits emerging multi-intelligence based technologies to satisfy/accelerate Army Intelligence, Surveillance, Reconnaissance (ISR), Mission Command and Force Protection requirements.			
FY 2019 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	arch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603766A <i>I Tactical Electronic</i> <i>Surveillance System - Adv Dev</i>	<b>Project</b> 907 / Ta Capabi	t <b>(Number/N</b> actical Explo lities-MIP	lame) itation Of Nat	tional
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
Continue work to incorporate Army requirements into earliest stages and multi-intelligence based capabilities; Monitor emerging technolog and signal technologies; Develop prototypes that improve Army intell	of National developments; Ensure Army access to sens jies and systems; Exploit advances in commercial imag igence products.	sors lery			
<i>FY 2020 Plans:</i> Will work to incorporate Army requirements into earliest stages of Na multi-intelligence based capabilities; Monitor emerging technologies a signal technologies; Develop prototypes that improve Army intelligence	tional developments; Ensure Army access to sensors a and systems; Exploit advances in commercial imagery a ce products.	ind and			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Funds increase to support TENCAP engineering and management ent to prototype development and testing.	fforts that includes initial studies and designs, and prog	resses			
Title: Air Vigilance - Advanced Development			5.802	5.163	5.479
Description: Enhance intelligence, force protection, and indications a	and warning capabilities under Army TENCAP program				
<i>FY 2019 Plans:</i> Continue to develop advanced signal and software enhancements fo	r Air Vigilance (AV) Army Program of Record.				
<i>FY 2020 Plans:</i> Will continue to develop advanced signal and software enhancement the programs Capability Drops.	s for Air Vigilance (AV) Army Program of Record that s	upport			
FY 2019 to FY 2020 Increase/Decrease Statement: Funds increase to support software changes required by capability dr	rop requirements and newly identified and/or evolving t	nreats.			
Title: Advanced Miniaturized Data Acquisition System(AMDAS)/ AMI	DAS Dissemination Vehicle (ADV)		6.095	14.760	12.959
<b>Description:</b> Continue advanced engineering and development effor Army Corp-level TENCAP subsystems that provide national data to the classified national systems.	ts to ensure continued interoperability and effectivenes he tactical warfighter via intelligence community partner	s of ˈs			
<b>FY 2019 Plans:</b> AMDAS Next: Development of TENCAP new prototype subsystem are early developmental testing. Continued work on advance sensor developmental architectural enhancements as the National Tere <b>FY 2020 Plans:</b>	ntenna, which will include modeling and simulation alon elopment, and design ground processor, to ensure alig chnical Means (NTM) capabilities progress.	g with nment			
				I	

PE 0603766A: *Tactical Electronic Surveillance System ...* Army

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Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: Ma	rch 2019		
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 06 Survei	ogram Eler 03766A / Ta llance Syste	n <b>ent (Numb</b> ctical Electro m - Adv Dev	o <b>er/Name)</b> onic /	<b>Project (</b> 907 / Tac Capabilit	ject (Number/Name) I Tactical Exploitation Of National pabilities-MIP			
B. Accomplishments/Planned Prog	grams (\$ in N	<u>//illions)</u>						F	Y 2018	FY 2019	FY 2020	
AMDAS Next: Will continue the deve and simulation along with early deve processor, to ensure alignment with capabilities progress.	lopment of T lopmental tes evolving natio	ENCAP new sting. Contin onal architec	prototype s ued work on tural enhanc	ubsystem ar advance se cements as t	itenna, whic nsor develor he National	h will include oment, and o Technical M	e modeling design ground eans (NTM)	1				
FY 2019 to FY 2020 Increase/Decre Funds decrease due to projected cos	ease Statem st of the scop	ent: e of work to	be performe	ed.								
Title: TENCAP Radio Frequency Ex	ploitation (TR	RFE)							-	5.150	2.847	
<ul> <li>Description: Prototype capability kit by targeting modern digital communi RF Characterization for modern com Warfare operations. Utilizes commer scalability/modularity.</li> <li>FY 2019 Plans: Initial Development of TRFE cognitiv countering Peer State and modern com FY 2020 Plans: Continue to develop the MULTI-INT</li> </ul>	that informs, cations syste munication e cial industry e software ba ommunication	influences a ms employe nvironments components ased Electro n targets and ve software	and enhance d by near-pe with the inte and archited nic Warfare d threats.	es Terrestrial eer nation sta ent to synchr ctures to min and Cyber A NT-Enabled I	Layer Intelli ate armies. A onize SIGIN imize hardw ttack prototy Electronic W	gence Supp Assists with T, Cyber an are costs, ri ppe capabilit arfare and C	ort (TLIS) Battlespace d Electronic sk and maxin y focused on Cyber Attack	nizes				
prototype capability focused on coun	Itering Peer S	State and mo	dern commu	unication targ	gets and thre	eats.						
<b>FY 2019 to FY 2020 Increase/Decre</b> Funds decrease due to the projected and prototyping efforts.	ease Statem	ent: Irk for TENC	AP Radio Fr	equency Exp	oloitation (TF	RFE) advanc	ced developm	ent				
				Accon	nplishments	s/Planned P	rograms Su	ototals	27.733	35.667	34.890	
C. Other Program Funding Summa	<mark>ry (\$ in Milli</mark>	<u>ons)</u>	<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2020</u>					<u>Cost To</u>		
Line Item • 0605766A: National Capabilities Integration (MIP) <u>Remarks</u>	<u>FY 2018</u> 9.382	<u>FY 2019</u> 12.340	<u>Base</u> 7.835	000	<u>Total</u> 7.835	<u>FY 2021</u> 7.677	<u>FY 2022</u> 11.682	FY 2023 11.054	<u>FY 2024</u> 11.299	<u>Complete</u> 0.000	<u>Total Cost</u> 71.269	

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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 (N	umber/Name)
2040 / 4	PE 0603766A / Tactical Electronic	907 I Tactio	cal Exploitation Of National
	Surveillance System - Adv Dev	Capabilities	s-MIP

### D. Acquisition Strategy

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

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 060 <i>Surveill</i>	ogram Ele 3766A / 7 ance Sys	ement (N Factical El tem - Adv	umber/N lectronic / Dev	ame)	<b>Project</b> 907 / Ta Capabil	(Number actical Exp ities-MIP	r/ <b>Name)</b> ploitation (	Of Nation	al
Management Servic	es (\$ in M	lillions)	ſ	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	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
Intelligence Engineers (SETA)	C/FPAF	Perspecta : Alexandria, VA	18.531	4.200	Feb 2018	3.033	Jan 2019	3.100	Jan 2020	-		3.100	0.000	28.864	Continuing
Intelligence Engineers(Matrix Gov)	MIPR	AGC : Alexandria, VA	5.977	1.280	Jan 2018	1.300	Jan 2019	1.300	Jan 2020	-		1.300	0.000	9.857	Continuing
		Subtotal	24.508	5.480		4.333		4.400		-		4.400	0.000	38.721	N/A
Product Developme	nt (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
TENCAP Core (Focus) Areas	Various	Multiple : Multiple	11.091	7.400	Jan 2018	3.103	Feb 2019	5.980	Feb 2020	-		5.980	0.000	27.574	Continuing
Air Vigilance	MIPR	Classified : MIPR	3.773	5.802	Jan 2018	5.163	Jan 2019	5.479	Jan 2020	-		5.479	0.000	20.217	Continuing
AMDAS/ADV	MIPR	Classified : MIPR	11.595	6.095	Jan 2018	14.760	Jan 2019	12.959	Jan 2020	-		12.959	0.000	45.409	Continuing
TRFE	MIPR	Classified : MIPR	-	-		5.150	Jan 2019	2.847	Jan 2020	-		2.847	0.000	7.997	Continuing
		Subtotal	26.459	19.297		28.176		27.265		-		27.265	0.000	101.197	N/A
Support (\$ in Millior	ıs)			FY 2	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
Prgm Mgmt-Dir Gov,travel,etc.	Allot	Army TENCAP : Alexandria, VA	11.655	2.076	Jan 2018	2.258	Jan 2019	2.300	Jan 2020	-		2.300	0.000	18.289	Continuing
Secured Facilities	MIPR	Army Geospatial : Ft. Belvoir, VA	2.647	0.455	Jan 2018	0.475	Jan 2019	0.500	Jan 2020	-		0.500	0.000	4.077	Continuing
		Subtotal	14.302	2.531		2.733		2.800		-		2.800	0.000	22.366	N/A
PE 0603766A: Tactica	al Electron	ic Surveillance Syst	em		UN		SIFIED		P	1 l ine #	80				198

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	19	
Appropriation/Budg 2040 / 4	ppropriation/Budget Activity )40 / 4							R-1 Program Element (Number/Name)ProjePE 0603766A / Tactical Electronic907 /Surveillance System - Adv DevCapar						Of Nation	al
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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
Lab Tests, Exercises, Simulations	MIPR	Multiple : Multiple	1.385	0.425	Jan 2018	0.425	Jan 2019	0.425	Jan 2020	-		0.425	0.000	2.660	Continuing
		Subtotal	1.385	0.425		0.425		0.425		-		0.425	0.000	2.660	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	66.654	27.733		35.667		34.890		-		34.890	0.000	164.944	N/A

Remarks

Party or an Element (Budget Activity Broth 1       Program Element (Mumber/Mane) Surveillance System - Adv Devi       Project (Number/Mane) Surveillance System - Adv Devi       Project (Number/Mane) Surveillance System - Adv Devi	Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army Date: March 2019												
Event Name       FY 2019       FY 2020       FY 2020       FY 2021       FY 2022       FY 2023       FY 2024       FY 2024 <td>Appropriation/Budget Activity 2040 / 4</td> <td></td> <td></td> <td><b>R-1 P</b> PE 06 <i>Surve</i></td> <td>Program Elemen 603766A / Tactica eillance System -</td> <td>at (Number/Name al Electronic Adv Dev</td> <td>e) Project (N 907 / Tacti Capabilitie</td> <td>lumber/Name) ical Exploitation C es-MIP</td> <td>Of National</td>	Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06 <i>Surve</i>	Program Elemen 603766A / Tactica eillance System -	at (Number/Name al Electronic Adv Dev	e) Project (N 907 / Tacti Capabilitie	lumber/Name) ical Exploitation C es-MIP	Of National				
Event Name       P1 2018       P1 2018       P1 2021       P1 2021       P1 2022       P1 2023       P1 2023       P1 2024       P1 2024 <td></td> <td>EV 2019</td> <td>EX 20</td> <td>10</td> <td>EX 2020</td> <td>EV 2021</td> <td>EX 2022</td> <td>EV 2022</td> <td>EV 2024</td>		EV 2019	EX 20	10	EX 2020	EV 2021	EX 2022	EV 2022	EV 2024				
CORE Cross-Agency Advanced Development and Engineering Development and Neuroperet with Net Neuroperet Development and Engineering TENCAP General Officer Steering Group (TGOSG) - annual - guides FV21-25 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV21-25 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV21-25 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV21-25 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV22-26 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV22-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FV25-29 POM TENCAP General O	Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	<b>FT 2023</b>	1 2 3 4				
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22-23 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22-23 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY22-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-27 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM TENCAP General Officer Steering Group (TGOSG	CORE Cross-Agency Advanced Development and Engineering												
TENCAP General Officer Steering Group (TGOSG) - annual - guides Pr22-26 POM       Image: Comparison of the compariso	TENCAP General Officer Steering Group (TGOSG) - annual - gu	Development with Nat Int	el Community										
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-27 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-27 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-28 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-29 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-29 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-29 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY23-29 POM   ADV Advanced Development and Engineering   AMDAS Next Studies/Antenna DesignDevelopment   ANDAS Next Ground Processor Development   Ar Vigilance Advanced Development and System prototype effe   TFPE Prototype Development and System Integration Efforts	TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY21-25 POM	2										
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY24-28 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY24-28 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY25-29 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY25-29 POM   TENCAP General Officer Steering Group (TGOSG) - annual - guides FY26-20   ADV Advanced Development and Engineering   AMDAS Next Studies/Antenna Design/Development   AMDAS Next Studies/Antenna Design/Development   Air Vigitance Advanced Development and System prototype efforts   TRFE Prototype Development and System integration Efforts	TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY22-26 POM			3								
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY24-28 POM   TENCAP General Officer Steering Group (TGOSG) - annual - informs POM FY26-30   ADV Advanced Development and Engineering   AMDAS Next Studies/Antenna Design/Development   AMDAS Next Studies/Antenna Design/Development   AMDAS Next Ground Processor Development   Arr Vigilance Advanced Development and System prototype effort   TRFE Prototype Development and System Integration Efforts	TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY23-27 POM				4							
TENCAP General Officer Steering Group (TGOSG) - annual - guides FY25-29 POM       Image: Steering Group (TGOSG) - annual - in prms POM FY26-30       Image: Steering Group (TGOSG) - annual - in prms POM FY26-30         ADV Advanced Development and Engineering       Image: Steering Group (TGOSG) - annual - in prms POM FY26-30       Image: Steering Group (TGOSG) - annual - in prms POM FY26-30         AMDAS Next Studies/Antenna Design/Development       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM       Image: Steering Group (TGOSG) - annual - in prms POM FY26-30         AMDAS Next Studies/Antenna Design/Development       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM         AMDAS Next Ground Processor Development       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM         Arr Vigilance Advanced Development and System prototype off/       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM         TRFE Prototype Development and System Integration Efforts       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM         TRFE Prototype Development and System Integration Efforts       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM       Image: Steering Group (TGOSG) - annual - guides FY26-29 POM	TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY24-28 POM					<u>5</u>						
TENCAP General Officer Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (TGOSG) - annual - informs POM FY26-30       Image: Steering Group (	TENCAP General Officer Steering Group (TGOSG) - annual - gu	ides FY25-29 POM						6					
ADV Advanced Development and Engineering AMDAS Next Studies/Antenna Design/Development AMDAS Next Studies/Antenna Design/Development AMDAS Next Ground Processor Development AMDAS Next Ground Processor Devel	TENCAP General Officer Steering Group (TGOSG) - annual - inf	orrms POM FY26-30							<u>^</u>				
AMDAS Next Studies/Antenna Design/Development AMDAS Next Ground Processor Development Air Vigilance Advanced Development and System prototype effort TRFE Prototype Development and System Integration Efforts	ADV Advanced Development and Engineering												
AMDAS Next Ground Processor Development AMDAS Next Ground Processor Development Air Vigilance Advanced Development and System prototype efforts TRFE Prototype Development and System Integration Efforts	AMDAS Next Studies/Antenna Design/Development												
Air Vigilance Advanced Development and System prototype efforts	AMDAS Next Ground Processor Development												
TRFE Prototype Development and System Integration Efforts       Image: Contract of the system Integration Efforts	Air Vigilance Advanced Development and System prototype effe												
	TRFE Prototype Development and System Integration Efforts												

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program I</b> PE 0603766A <i>Surveillance</i> S	Element (Number I Tactical Electron ystem - Adv Dev	r/ <b>Name)</b> ic	<b>Project (Number/Name)</b> 907 I Tactical Exploitation Of Nation Capabilities-MIP		
	Schedule Details	5				
	[	Sta	art	E	nd	
Events		Quarter	Year	Quarter	Year	
CORE Cross-Agency Advanced Development and Engineering		1	2018	4	2024	
TENCAP General Officer Steering Group (TGOSG) - annual - guide	2	2018	2	2018		
TENCAP General Officer Steering Group (TGOSG) - annual - guide	s FY21-25 POM	2	2019	2	2019	
TENCAP General Officer Steering Group (TGOSG) - annual - guide	s FY22-26 POM	2	2020	2	2020	
TENCAP General Officer Steering Group (TGOSG) - annual - guide	s FY23-27 POM	2	2021	2	2021	
TENCAP General Officer Steering Group (TGOSG) - annual - guide	s FY24-28 POM	2	2022	2	2022	
TENCAP General Officer Steering Group (TGOSG) - annual - guide	s FY25-29 POM	2	2023	2	2023	
TENCAP General Officer Steering Group (TGOSG) - annual - inform	ms POM FY26-30	2	2024	2	2024	
ADV Advanced Development and Engineering		2	2015	4	2024	
AMDAS Next Studies/Antenna Design/Development		1	2018	1	2024	
AMDAS Next Ground Processor Development		2	2020	4	2024	
Air Vigilance Advanced Development and System prototype efforts	3	2013	4	2024		
TRFE Prototype Development and System Integration Efforts		1	2018	4	2024	

Exhibit R-2, RDT&E Budget Item	Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	h 2019	
<b>ppropriation/Budget Activity</b> 040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					<b>R-1 Program Element (Number/Name)</b> PE 0603774A <i>I Night Vision Systems Advanced Development</i>							
COST (\$ in Millions)	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	-	501.816	7.341	251.011	-	251.011	10.340	10.450	9.602	9.378	Continuing	Continuing
BQ5: Visual Augmentation System Advanced Development	-	0.000	0.000	242.000	-	242.000	0.000	0.000	0.000	0.000	0.000	242.000
VT7: Soldier Maneuver Sensors - Adv Dev	-	501.816	7.341	7.528	-	7.528	7.573	7.683	7.602	7.378	Continuing	Continuing
VT8: SOLDIER PRECISION TARGETING DEVICES - ADV DEV	-	0.000	0.000	1.483	-	1.483	2.767	2.767	2.000	2.000	Continuing	Continuing

### A. Mission Description and Budget Item Justification

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

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

Project VT7 (Soldier Maneuver Sensors-Advanced Development) focuses on developing integrated and enhanced products to provide the Soldier with the ability to "fight, win and survive, day and night, in a multi-domain environment now and tomorrow". Products include maneuver capabilities to detect, recognize and identify targets, and to provide target acquisition capabilities to mitigate threats prior to being engaged. The integration of higher performing multispectral sensors with smart processing will provide automatically adjusted weapon sight reticles and leverage network connectivity to enable improved situational awareness/understanding. Additional capabilities include signature management and resiliency across the electromagnetic spectrum, integration of a modular design structure for laser target acquisition applications including support for wireless data transfer, and mitigation of manned and unmanned threat sensor systems. This Project supports efforts to evaluate and integrate technologies and representative prototype systems for development of Soldier sensor devices, transitioning from the Science and Technology (S&T) stage to operational use. This Project includes associated costs for efforts associated with integration and interface of products on the Soldiers' head, body, and weapon. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy.

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

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

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	12.347	7.350	8.012	-	8.012
Current President's Budget	501.816	7.341	251.011	-	251.011
Total Adjustments	489.469	-0.009	242.999	-	242.999
<ul> <li>Congressional General Reductions</li> </ul>	-0.009	-0.009			
<ul> <li>Congressional Directed Reductions</li> </ul>	-1.400	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	491.300	-			
SBIR/STTR Transfer	-0.422	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	242.999	-	242.999

#### **Change Summary Explanation**

FY 2018 increase begins the development of the Integrated Visual Augmentation System (IVAS) Heads Up Display (HUD) 3.0. FY 2020 increase is for improved Forward Looking Infrared (IFLIR) and IVAS HUD in support of the Army's modernization priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: Marc	ch 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)Project (Number/Name)PE 0603774A / Night Vision SystemsBQ5 / Visual AuAdvanced DevelopmentAdvanced Development						<b>۱r/Name)</b> gmentation System lopment		
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	
BQ5: Visual Augmentation System Advanced Development	-	0.000	0.000	242.000	-	242.000	0.000	0.000	0.000	0.000	0.000	242.000	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Pro		FY 2018	FY 2019	FY 2020							
<i>Title:</i> Heads Up Display (HUD)									-	-	242.000
<b>Description:</b> Integrated Visual Augmentation System (IVAS) HUD 3.0 provides a first generation single platform for Soldier/ Marines to train, rehearse, and fight in day and night that provides increased lethality, mobility, and situational awareness necessary to achieve overmatch against our current and future adversaries.											
<b>7 2020 Plans:</b> pomplete the development and technology improvements to IVAS.											
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY2020 is the first year for IVAS in this project.											
				Accon	nplishments	s/Planned P	rograms Su	btotals	-	-	242.000
C. Other Program Funding Summ	ary (\$ in Milli	ons)									
			FY 2020	FY 2020	FY 2020					<u>Cost To</u>	
Line Item	<u>FY 2018</u>	FY 2019	Base	<u>000</u>	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<u>Complete</u>	Total Cost
• VT7: Soldier Maneuver Sensors - Adv Dev	501.816	7.341	7.528	-	7.528	7.573	7.683	7.602	7.378	0.000	546.921
F 0603774A: Night Vision Systems Advanced Developmen UNCLASSIFIED											

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040 / 4					rogram Elen 03774A I Nig ced Develop	n <b>ent (Numt</b> ght Vision S oment	<b>Number/Name)</b> ual Augmentation System I Development					
C. Other Program Funding Summary (\$ in Millions)												
			FY 2020	FY 2020	<u>FY 2020</u>					Cost To		
Line Item	<u>FY 2018</u>	FY 2019	Base	000	<u>Total</u>	FY 2021	FY 2022	FY 2023	FY 2024	<b>Complete</b>	<b>Total Cost</b>	
<ul> <li>BQ6: Visual Augmentation</li> </ul>	-	-	89.000	-	89.000	-	-	-	-	0.000	89.000	
System Eng Dev												
• L67: Soldier Night Vision Devices	108.518	58.987	40.060	-	40.060	28.667	19.240	20.646	25.310	0.000	301.428	
K36400: Helmet Mounted	144.644	112.251	129.485	-	129.485	207.845	245.266	6.442	382.007	Continuing	Continuing	
Enhanced Vision Devices										-	-	
• K36402: IVAS/Heads Up Display	-	-	76.225	-	76.225	907.000	1,046.775	320.000	-	Continuing	Continuing	
Remarks												

## D. Acquisition Strategy

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

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19			
Appropriation/Budge 2040 / 4	ppropriation/Budget Activity )40 / 4					R-1 Program Element (Number/Name)Project (NPE 0603774A / Night Vision SystemsBQ5 / VisitAdvanced DevelopmentAdvanced							Number/Name) sual Augmentation System d Development				
Product Developmer	nt (\$ in Mi	illions)		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		
Heads Up Display (HUD)	Various	Various : Various	-	-		-		232.534	Nov 2019	-		232.534	0.000	0.000 232.534			
Subtotal -				-		-		232.534		-		232.534	0.000	232.534	N/A		
Support (\$ in Million	s)			FY 2018		FY 2	019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total					
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract		
Matrix Support	MIPR	NVESD : Fort Belvoir, Virginia 22060	-	-		-		9.466	Nov 2019	-		9.466	0.000	9.466	-		
		Subtotal	-	-		-		9.466		-		9.466	0.000	9.466	N/A		
Prior Years FY 2018					2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
	Project Cost Totals					0.000 242.000 -					242.000	0.000	242.000	N/A			

#### Remarks

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

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army													Da	ate: I	Marc	h 20′	19							
ppropriation/Budget Activity 040 / 4					R-1 Program Element (Number/Name)ProjectPE 0603774A / Night Vision SystemsBQ5 / ViAdvanced DevelopmentAdvanced								o <b>ject (I</b> 5 / Vis vanceo	(Number/Name) sual Augmentation System ed Development										
Event Name		FY	201	8		FY 2	2019		F	Y 202	20	F	Y 20	21		FY 2	022		FY	202	3	F	FY 20	024
	1	2	3	4	1	2	3	4 1	2	3	4	1 2	2 3	3 4	1	2	3 4	1	2	3	4	1	2 :	3 4
Heads Up Display (HUD)																								
					evelop	ment																		
Technology improvements HUD 4.0												Developm	nent											

hibit R-4A, RDT&E Schedule Details: PB 2020 Army				Da	Date: March 2019		
propriation/Budget Activity 40 / 4	Element (Numbe I Night Vision Sys velopment	stems	Project (Num BQ5 / Visual / Advanced De	<b>Dject (Number/Name)</b> 5 I Visual Augmentation System vanced Development			
	Schedule Detail	S					
		St	art		En	d	
Events		Quarter	Year	Qua	arter	Year	
Heads Up Display (HUD)		4	2018	۷	4	2020	

xhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019			
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 40 / 4 PE Adv					a <b>m Elemen</b> 74A / Night Developme	<b>t (Number/</b> /ision Syste nt	Project (N VT7 / Sold	( <b>Number/Name)</b> Idier Maneuver Sensors - Adv 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	
VT7: Soldier Maneuver Sensors - Adv Dev	-	501.816	7.341	7.528	-	7.528	7.573	7.683	7.602	7.378	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

### A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Family of Vision and Mobility Capabilities (FVMC)	8.965	5.815	3.637
<b>Description:</b> FVMC provides the next generation vision capabilities for day and night that will reduce Soldier's load and allow hands free operation. The FVMC will provide spatially-aligned imagery from the weapon sight to the heads-up display. FVMC supports Nett Warrior by fusing sensor video and data sources using smart processing to provide improved situational awareness/ understanding in the Soldier vision system. The FVMC will provide day/night Rapid Target Acquisition capability by wirelessly interfacing with all variants of the Family of Weapon Sights. The FVMC will serve as the Soldier's digital platform for displaying augmented reality data. FVMC will integrate with future digital combat optics. FVMC provides capabilities that support overmatch against threats documented in the New Generation Warfare study, OSD Close Combat Strategic Portfolio Review and the Small Arms Ammunition Configuration study. These capabilities are captured in the Maneuver Force Modernization Strategy and Squad and Soldier Modernization Deep Dive strategic plans.			
FY 2019 Plans: In FY19, additional integration work will be performed for making an integral laser range finder work within the Lethality Smart System (LSS). In addition, the plan is to complete, establish and document, via Interface Control Documents (ICDs), the integration of the LSS with the Enhanced Night Vision Goggles, Integrated Visual Augmentation System and Next Generation			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019		
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A I Night Vision Systems Advanced Development	<b>Project (Number/Name)</b> VT7 / Soldier Maneuver Sensors - Adv			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020	
Weapons. Some funding will go towards integration of more robust and le (OLEDs) that are used on essentially all Soldier Sensors and Lasers prog	ess power micro Organic Light Emitting Diode Disp grams.	lays			
<b>FY 2020 Plans:</b> For FY20, in addition to continuing unfinished work initiated in FY19, integroduct line. ENVG-B furthers wireless Augmented Reality (AR) and Magenhancements is anticipated. Work is continuing on a more robust, harder of this 256-bit encryption solution will be performed on all SSL programs of (ISW) network. In FY20, the ISW network will be documented (via ICDs) wireless connectivity with the ISW network.	gration and enhancements are expected in the EN chine Learning (ML) into the goggle and incorporat er to detect and intercept wireless solution. Integra of record in an effort to establish a Intra Soldier Wir and available for use on any program that desires	/G-B ion of tion eless			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> In FY 2020, funding decrease in FMVC is due to the development and ma support LSS programs.	aturation of components and algorithms required to	,			
Title: Pre-Shot Threat Detection (PTD)		-	-	0.280	
<b>Description:</b> The PTD is a capability designed to detect threat Snipers, F view and indirect view optics. The PTD functions include laser illumination be integrated into other Soldier systems. PTD (Covert) provides the mane provides the Soldier with a capability to conduct pre-shot threat detection while remaining undetected.	Forward Observers and Scouts equipped with direct n, optical augmentation and pointing. PTD function euver element with an enhanced solution (Covert) to by detecting and identifying the location of threat of	t s will hat optics			
<b>FY 2020 Plans:</b> Continue development of covert components functionality.					
FY 2019 to FY 2020 Increase/Decrease Statement: There is no funding planned for PTD in FY 2019.					
Title: Family of Target Acquisition Laser (FTAL)		1.551	1.257	-	
<b>Description:</b> FTAL develops modular laser components and representation pointing, ranging, target hand-off, detection and mitigation of threat sense core for fire control and other laser capabilities based on Squad member FTAL will also pursue a common remote to operate all weapon enablers. including specifications and interface control documents such that they such that that they such that that they such that they such t	ive prototype systems to support target acquisition ors. FTAL will develop a common laser range findin Table of Organization and Equipment (TOE) positi FTAL modules will be developed with full documer upport the Adaptive Soldier Architecture.	for g on. htation,			
FY 2019 Plans:					

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603774A <i>I Night Vision Systems</i> <i>Advanced Development</i>	<b>Project (Number/Name)</b> VT7 I Soldier Maneuver Sensors - Adv De				
B. Accomplishments/Planned Programs (\$ in Millions)		[	FY 2018	FY 2019	FY 2020	
Initiate development and integration of modular target acquisition laser compo	nents.					
FY 2019 to FY 2020 Increase/Decrease Statement: A portion of FTAL funding transitioned to the Heads Up Display (HUD) in FY 2	020.					
<i>Title:</i> Heads Up Display (HUD)			491.300	-	-	
<b>Description:</b> The Heads Up Display (HUD) is an output of the FVMC investme The HUD will deliver overmatch warfighting capability plus enable Synthetic Tr will also provide a single integrated digital, low profile, conformal day/night dev Rehearse and Fight in any operational environment. Finally, prototyping will p vendor progress and capability to the force.	ent as a result of emerging commercial technol raining Environment squad capabilities. The H rice that allows Soldiers and Squads to Train, rovide multiple knowledge point events to gaug	ogy. UD ge				
<i>Title:</i> Lethality Smart System (LSS)			-	-	3.611	
<b>Description:</b> The LSS is the next generation weapon targeting sensor for use which provides additional situational awareness and lethality by wirelessly inte LSS Soldier capabilities include providing heads up Rapid Target Acquisition (mounted Soldier vision systems and interface to the Next Generation Rifle through sight augmented reality for enhanced situational awareness. Additional image in multiple spectral bands, interrogate potential targets, provide facial re target handoff, provide distance to target through laser rangefinder interface, a advanced fire control algorithms.	on the Next Generation Squad Weapons (NG rfacing to other Soldier devices. The increase RTA) though the wireless interface with the he ough the Intelligent/Powered Rail. LSS will also ange Mission Command information and provid ally, LSS will provide day and night capabilities ecognition capabilities at tactical ranges, perfor- and calculate and adjust for displaced reticule u	SW) d ad o le s to m ising				
<b>FY 2020 Plans:</b> Within the Pre-Shot Detection and Family of Target Acquisition Laser lines, FY components including the "ATOM" Short Wave Infra-Red (SWIR) laser that is plasers primarily used for aiming, target handoff, target illumination and ranging	2019 should complete the development of las planned for incorporation into the LSS. The AT.	er ΓΟΜ				
FY 2019 to FY 2020 Increase/Decrease Statement: In FY 2020, funding increased due to the development and maturation of comp	conents and algorithms required to support LS	S.				
Title: FY 2019 SBIR / STTR Transfer			-	0.269	-	
Description: FY 2019 SBIR / STTR adjustment.						
FY 2019 Plans:						

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

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Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> PE 06 <i>Advar</i>	rogram Eler 03774A / Nig aced Develor	<b>nent (Num</b> l ght Vision S oment	b <b>er/Name)</b> Systems	Projec VT7 /	ct (Number/N Soldier Mane	<b>lame)</b> ouver Sensors	: - Adv Dev
B. Accomplishments/Planned Prog	<u>rams (\$ in I</u>	<u> Millions)</u>						[	FY 2018	FY 2019	FY 2020
FY 2019 SBIR / STTR adjustment.											
FY 2019 to FY 2020 Increase/Decree FY 2019 SBIR / STTR adjustment.	ease Statem	ent:									
				Accor	nplishment	s/Planned I	Programs Su	btotals	501.816	7.341	7.528
C. Other Program Funding Summa	ry (\$ in Milli	ions)	EV 2020	EV 2020	EV 2020						
Line Itom	EV 2018	EV 2019	<u>FT 2020</u> Baso	<u>FT 2020</u> 000	<u>F f 2020</u> Total	EV 2021	EV 2022	EV 202	03 EV 202	<u>Cost IO</u> 4 Complete	Total Cost
I 67: Soldier Night Vision Devices	108 518	58 987	40 060	<u>- 000</u>	40 060	28 667	19 240	20.64	16 25.31	0 Continuina	Continuina
K36400: Helmet Mounted	144.644	112.251	129.485	-	129.485	207.845	245.266	6.44	12 382.00	7 Continuing	Continuing
Enhanced Vision Devices										· · · · · · · · · · · · · · · · ·	
• K22002: FWS-INDIVIDUAL	59.105	94.932	81.541	-	81.541	70.211	61.922	71.60	00 77.79	7 Continuing	Continuing
• K22003: FWS-CREW SERVED	-	31.106	39.342	-	39.342	85.949	85.002	85.64	17 77.30	6 Continuing	Continuing
• K22004: FWS-SNIPER	-	-	0.000	-	0.000	2.571	11.348	18.86	62 19.78	7 Continuing	Continuing
<ul> <li>B53800: Laser Target</li> </ul>	37.975	32.704	24.354	-	24.354	13.913	20.839	23.77	73 24.18	2 Continuing	Continuing
Locator Systems											
• K35110: Small Tactical	16.157	21.238	22.623	-	22.623	10.607	21.377	26.08	37 31.84	5 Continuing	Continuing
Optical Rifle Mounted MLRF											
BQ5: Visual Augmentation	-	-	242.000	-	242.000	-	-			0.000	242.000
System Advanced Development			~~ ~~~								~~ ~~~
BQ6: Visual Augmentation	-	-	89.000	-	89.000	-	-			0.000	89.000
System Eng Dev			76 005		76 005	007 000	4 0 4 6 7 7 5	220.00		Continuing	Continuing
• K30402: IVAS/Heads Up Display	-	-	10.225	-	10.225	907.000	1,040.775	320.00	- 00	Continuing	Continuing

#### **Remarks**

## D. Acquisition Strategy

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

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Advanc	ogram Ele 3774A / N ed Develo	ement (N light Visio opment	lumber/Na on System	ame) <sup>IS</sup>	Project VT7 / S	(Number oldier Ma	r/ <b>Name)</b> neuver Se	ensors - A	dv Dev
Management Service	es (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	Various : Various	5.083	15.912	Nov 2017	0.383	Nov 2018	0.394	Nov 2019	-		0.394	Continuing	Continuing	-
		Subtotal	5.083	15.912		0.383		0.394		-		0.394	Continuing	Continuing	N/A
Product Developmer	nt (\$ in Mi	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Family of Vision and Mobility Capabilities (FVMC)	MIPR	NVESD : FT BELVOIR, VA	6.511	8.301	Dec 2017	5.048	Dec 2018	3.397	Nov 2019	-		3.397	Continuing	Continuing	-
Pre-Shot Threat Detection (PTD)	MIPR	NVESD : FT BELVOIR, VA	7.543	-		-		0.280	Nov 2019	-		0.280	Continuing	Continuing	-
Family of Target Acquisition Laser (FTAL)	MIPR	NVESD : FT BELVOIR, VA	-	1.458		0.999	Jan 2019	-		-		-	Continuing	Continuing	-
Heads Up Display (HUD)	Various	Various : Various	-	461.235	Sep 2018	-		-		-		-	Continuing	Continuing	-
Lethality Smart System (LSS)	TBD	TBD : TBD	-	-		-		2.797	Nov 2019	-		2.797	Continuing	Continuing	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.269		-		-		-	Continuing	Continuing	-
		Subtotal	14.054	470.994		6.316		6.474		-		6.474	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Support	MIPR	NVESD : FT BELVOIR, VA	1.887	9.220	Nov 2017	0.642	Nov 2018	0.660	Nov 2019	-		0.660	Continuing	Continuing	-
		Subtotal	1.887	9.220		0.642		0.660		-		0.660	Continuing	Continuing	N/A
DE 0602774A. Nicht V	ision Sud	toms Advanced Da	volonmon		LIN										
TE 0003114A. MIGHL V	131011 3981	enis Auvanceu Del	reiopinen												040

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Army	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 060 Advanc	o <b>gram El</b> 3774A / / ed Devel	e <b>ment (N</b> Night Visio opment	umber/N on Systen	<b>ame)</b> ns	Project VT7 / So	(Numbe oldier Ma	r/ <b>Name)</b> neuver Se	ensors - A	dv Dev
Test and Evaluation (\$ in Millions) FY 2018					2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Support Test Activity	MIPR	Army Test and Evaluation Command : Varrious	0.600	5.690	Apr 2019	-		-		-		-	Continuing	Continuing	-
		Subtotal	0.600	5.690		-		-		-		-	Continuing	Continuing	N/A
Prio Yea		Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals 21.624 501							7.528		-		7.528	Continuing	Continuing	N/A

#### **Remarks**

FY 2018 increase begins the development of the Integrated Visual Augmentation System (IVAS) Heads Up Display (HUD) 3.0.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٨rmy	/																				Dat	:e: N	Лагс	h 20	19			
Appropriation/Budget Activity 2040 / 4								2 <b>-1 P</b> 2E 06 ∂ <i>dvar</i>	<b>rog</b> i 3037 ncea	ram 74A 1 De	Ele I N velo	mer ight pme	n <b>t (N</b> Visio ent	on .	n <b>be</b> i Sys	/ <b>Nan</b> tems	ıe)		<b>Pro</b> ∨T	oject 7 / S	<b>t (N</b> Sold	umt ier N	oer/ /and	Nam euve	<b>1e)</b> er Se	nsor	s - A	ldv I	Dev
		FY	2018			FY	2019	•		FY	202	0		F	Y 21	)21		F	-Y 2	2022			FY	202	3		FY	202	4
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	2	3 4	1	<u>п</u>	2	3	4	1	2	3	4	1	2	3	4
Lethality Smart System (LSS) MS A									1 MS A											·									
Family of Target Acquisition Laser (FTAL)				0	Develo	opmen	t																						
Lethality Smart System (LSS)					Develo	opmen	t																						
Heads Up Display (HUD)				De	velop	ment																							
																					1					1			

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Ma	rch 2019
ppropriation/Budget Activity D40 / 4	<b>R-1 Program Element (Nu</b> PE 0603774A I Night Vision Advanced Development	n <b>ber/Name)</b> Systems	Project (Number/Na VT7 / Soldier Maneu	i <b>me)</b> ver Sensors - Adv De
	Schedule Details			
		Start		End
Events	Quarter	Voar	Quartor	
	Quartor	Ieai	Quarter	Year
Lethality Smart System (LSS) MS A	1	2020		<b>Year</b> 2020
Lethality Smart System (LSS) MS A Family of Target Acquisition Laser (FTAL)	1 1	2020 2019	1 4	Year           2020           2023
Lethality Smart System (LSS) MS A Family of Target Acquisition Laser (FTAL) Lethality Smart System (LSS)	1 1 1 1	2020 2019 2019	1 4 4	Year           2020           2023           2024

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2020 A	Army							Date: Mai	rch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060377 Advanced	<b>am Elemen</b> 74A I Night Developme	<b>t (Number/</b> Vision Syste nt	' <b>Name)</b> ems	Project (N VT8 / SOL DEVICES	lumber/Na DIER PRE - ADV DE\	<b>me)</b> CISION TAF ⁄	RGETING
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
VT8: SOLDIER PRECISION TARGETING DEVICES - ADV DEV	-	0.000	0.000	1.483	-	1.483	2.767	2.767	2.000	2.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This project focuses on developir improvements to system perform and designate targets across a b development will precede integra improved lasers for range finding fusion; laser designator spot dete support of the National Defense S <b>B. Accomplishments/Planned P</b> <i>Title:</i> Precision Pointing and Nav <i>Description:</i> This project support targeting devices. Dismounted S precisely designate targets and b conditions, and in GPS-contested <b>FY 2020 Plans:</b>	ng compone ance while roader rang tion into sp /designatio ection and in Strategy. Programs ( igation Con ts developm oldiers will attlefield that I conditions	ent technolo reducing siz ge of operati becific syster n/marking; e maging; inte <b>\$ in Million</b> <b>\$ in Million</b> <b>\$ in Million</b> nponent Dev nent of adva have the ca reats 24/7, a s.	gies and re ze, weight, a ng environr ns and will i electro-optic gration of a s) velopment unced comp pability to ra across a bro	presentative and power r nents, inclu include imp cal sensors dvanced po onents and apidly acqui pader range	e prototype required by ding all wea roved Preci such as infr ower manag prototype s re, accurate of operatin	systems for those syste ather conditi sion Azimut ared, near-i gement tech systems for ely locate, p g environme Precision T	Soldier por ms. Efforts ons and GF h and Vertie nfrared, ultr nologies. F Soldier-borr ositively ide ents such as	rtable precis will improve PS-contester cal Angle Ma ra-violet, and funding in the me precision entify, and s in all weat	sion targeti the Soldie d environm easuremen d visible sp nis project a	ng devices r's ability to hents. Comp nt (PAVAM) bectrum ima aligns with <i>i</i> <b>7 2018</b>	to continue precisely lo ponent techr devices; sol gers; senso Army's priorit FY 2019	cate iology id-state, r and data ties in <b>FY 2020</b> 1.483
Y 2020 resources will be used to integrate Intra-Soldier Wireless capabilities into Soldier Precision Targeting Devices (SPTD) ires portfolio. In addition, as the Army begins to introduce M-Code, the more robust north finding solution will be integrated into the Fires SPTD products. <b>EY 2019 to FY 2020 Increase/Decrease Statement:</b> his increase is due to FY 2020 being the first year that the VT8/Soldier Precision Targeting Devices - Advanced Development is unded.												
					Accomplis	shments/Pl	anned Prog	grams Subt	totals	-	-	1.483

Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: Ma	rch 2019			
Appropriation/Budget Activity 2040 / 4				<b>R-1 Pr</b> PE 060 <i>Advan</i>	ogram Elen 03774A / Nig ced Develop	n <b>ent (Numb</b> ght Vision Sy oment	<b>er/Name)</b> rstems	Project (I VT8 / SO DEVICES	Number/Na LDIER PRE - ADV DE	<b>me)</b> CISION TAF /	RGETING		
C. Other Program Funding Summary (\$ in Millions)													
		Cost To											
Line Item	FY 2018	FY 2019	<b>Base</b>	000	<u>Total</u>	FY 2021	FY 2022	FY 2023	<u>FY 2024</u>	<b>Complete</b>	<b>Total Cost</b>		
<ul> <li>L76: Dismounted Fire Support</li> </ul>	14.366	15.322	5.836	-	5.836	5.249	5.452	4.878	5.480	0.000	56.583		
Laser Targeting Systems													
<ul> <li>L79: Joint Effects</li> </ul>	7.824	10.463	7.810	-	7.810	5.571	5.608	5.040	5.609	0.000	47.925		
Targeting Systems (JETS)													
<ul> <li>K32101: JOINT EFFECTS</li> </ul>	38.664	66.574	69.720	-	69.720	69.714	69.707	69.701	69.694	0.000	453.774		
TARGETING SYSTEM (JETS)													
• K32307: <i>LLDR 3</i>	-	-	0.000	-	0.000	31.364	54.425	59.123	61.841	Continuing	Continuing		
• KA3100: Mod Of In-	9.172	24.833	6.044	-	6.044	-	-	-	-	0.000	40.049		
Svc Equip (LLDR)													

#### **Remarks**

## D. Acquisition Strategy

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

## E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	У								Date:	March 20	)19	
Appropriation/Budg 2040 / 4	et Activit <u>y</u>	/				<b>R-1 Pr</b> PE 060 <i>Advanc</i>	ogram Ele 3774A / N ced Devel	e <b>ment (N</b> Night Visi opment	lumber/Na on System	ame) 15	Project VT8 / S DEVICI	t <b>(Numbe</b> OLDIER I ES - ADV	·/ <b>Name)</b> PRECISIC DEV	ON TARG	ETING
Management Servic	es (\$ in N	lillions)		FY	2018	FY	2019	FY : Ba	2020 ase	FY 2	2020 CO	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 SSL : Ft. Belvoir, VA 22060	-	-		-		0.023	Nov 2019	-		0.023	Continuing	Continuing	-
	<b>I</b>	Subtotal	-	-		-		0.023		-		0.023	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY	2018	FY	2019	FY : Ba	2020 ase	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Base Award Cost Date Cost		Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Precision Pointing and Navigation	C/FFP	Various : Various	-	-		-		1.439	Dec 2019	-		1.439	Continuing	Continuing	-
		Subtotal	-	-		-		1.439		-		1.439	Continuing	Continuing	N/A
Support (\$ in Millior	ıs)			FY	2018	FY	2019	FY : Ba	2020 ase	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Support	MIPR	NVESD : Ft. Belvoir, VA 22060	-	-		-		0.021	Nov 2019	-		0.021	Continuing	Continuing	-
		Subtotal	-	-		-		0.021		-		0.021	Continuing	Continuing	N/A
			Prior Years	FY	2018	FY	2019	FY : Ba	2020 ase	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals		0.000		1.483		-		1.483	Continuing	Continuing	N/A		
Demerke															

Remarks

Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06	Program	Elemen	t (Number/Name	e) Proiect (N	lumber/Name)	
			Adva	nced Dev	I Night velopme	Vision Systems nt	VT8 / SOL DEVICES	DIER PRECISIO - ADV DEV	N TARGETING
Event Name	FY 2018	FY 20	19	FY 2	2020	FY 2021	FY 2022	FY 2023	FY 2024
Lvent Name	1 2 3 4	1 2 3	4	1 2	3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Future Dismounted Fire Support Development									
Precision Pointing and Navigation Development									
								1	

khibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019
opropriation/Budget Activity )40 / 4	<b>R-1 Program</b> PE 0603774A <i>Advanced De</i>	Element (Numbe I Night Vision Sys velopment	r/Name) Pr stems VT DE	oject (Number/Nai 8 / SOLDIER PRE VICES - ADV DEV	<b>ne)</b> CISION TARGETING ′
	Schedule Detail	S			
		St	art	E	ind
Events		Quarter	Year	Quarter	Year
Future Dismounted Fire Support Development		3	2020	4	2024
Precision Pointing and Navigation Development		3	2020	4	2024

Exhibit R-2, RDT&E Budget Item		Date: Marc	ch 2019									
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	anced	<b>R-1 Progra</b> PE 060377	am Elemen '9A / Enviro	<b>t (Number/</b> nmental Qu	Name) ality Techno	ology - Dem	/Val					
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	-	15.039	14.731	15.132	-	15.132	16.263	15.324	14.933	13.944	0.000	105.366
035: National Defense Cntr For Enviro Excellence	-	3.628	4.864	5.121	-	5.121	5.205	5.327	6.455	6.587	0.000	37.187
E21: Environmental Quality Technology Dem/Val	-	11.411	9.867	10.011	-	10.011	11.058	9.997	8.478	7.357	0.000	68.179

### A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	10.456	14.749	14.979	-	14.979
Current President's Budget	15.039	14.731	15.132	-	15.132
Total Adjustments	4.583	-0.018	0.153	-	0.153
<ul> <li>Congressional General Reductions</li> </ul>	-0.008	-0.018			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	5.000	-			
SBIR/STTR Transfer	-0.409	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	0.153	-	0.153

#### **Change Summary Explanation**

FY2018 reprogramming increase of \$5.000 Million supports Explosive Ordnance Disposal (Project E21).

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060377 Technology	<b>am Elemen</b> 79A I Enviro y - Dem/Val	<b>t (Number</b> / nmental Qu	Name) ality	<b>Project (N</b> 035 / Natio Excellence	umber/Nan nal Defense	<b>1e)</b> e Cntr For E	inviro
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
035: National Defense Cntr For Enviro Excellence	-	3.628	4.864	5.121	-	5.121	5.205	5.327	6.455	6.587	0.000	37.187
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### A. Mission Description and Budget Item Justification

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

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<i>Title:</i> Conduct demonstration/validation of environmentally acceptable technologies that enhance military readiness and reduce production, operating, and/or disposal costs.	3.588	4.593	5.021
<b>Description:</b> Supports the demonstration and validation of mature (BA4) environment, safety, occupational health, and energy technologies that support the Army's Environmental Quality Technology mission. The objective is to invest in innovative technologies that support military mission/readiness, employ a high degree of technical fidelity, have a high potential for transition success, and align with modernization goals.			
<b>FY 2019 Plans:</b> The NDCEE Program Management Office (PMO) is on-boarding eight new projects for the FY 2019 funding cycle, including Autonomous Robotic and Remote Refueling Point for Rotary Wing Aircraft, Green Machining of Multi-Service Weapons by 3D			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A <i>I Environmental Quality</i> <i>Technology - Dem/Val</i>	<b>Proje</b> 035 / / <i>Excell</i>	ct (Number/N National Defe ence	Name) ense Cntr For	Enviro
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2018	FY 2019	FY 2020
Waterjet, Novel Bioaugmented Sorption Treatment Technology for CVOCs and Mat?ls for Corrosion & Wear Protection of Structural Metals on Military Aircraft Lithium-ion 6T batteries for Grounds Vehicle Use and Surface Ship Transport, Purifier, Visual Indicator for Hydrogen Fluoride Produced from Extinguishing Fin Power for Warfighter Expeditionary Non-resupply Missions. Additional funds at were initiated in FY 2017 - 2018.	I 1,4 Dioxane, Environmentally Compliant Inorg & Weapon Systems, Navy Safety Certification Energy Efficient Expeditionary Small Unit Wate res with Hydrofluorocarbons, and Lightweight re being distributed to continue nine projects the rest of the set of the rest of the set of the rest of the set of the rest of the set of the rest of the set of the rest of the set of the	ganic of er nat			
<b>FY 2020 Plans:</b> Will conduct demonstration/validation of environment, safety, occupational hea military mission/readiness, employ a high degree of technical fidelity, have a high modernization goals. Will conduct project selection process for potential FY 202 NDCEE project selection committee and approved by the NDCEE Lead Agent.	Ith, and energy technologies that support gh potential for transition success, and align w 21 new starts. Technologies will be selected by	ith ⁄ the			
FY 2019 to FY 2020 Increase/Decrease Statement: Increase in funding to support project selection process for potential FY 2021 n	iew starts.				
<i>Title:</i> NDCEE Government program management during contract negotiations technology transfer.	and during project formulation, execution, and		0.040	0.100	0.100
<b>Description:</b> Funds the NDCEE Government program management during concultivation and identification, screening, selection, execution, and technology tra	mprehensive NDCEE lifecycle, including project ansition.	xt			
<i>FY 2019 Plans:</i> Provide comprehensive day-to-day management of the NDCEE, including project oversight, funding distribution, and execution reporting. Funding the Army Consupport NDCEE contract closeouts. PMO staff is traveling to project demonstrated and the army constrained and the army constr	ect cultivation, identification, screening, financia tracting Command at Aberdeen Proving Grour ation sites, as appropriate.	al nd to			
<i>FY 2020 Plans:</i> Will fund the NDCEE program management during comprehensive NDCEE life identification, screening, selection, execution, reporting, and technology transfer closeouts, travel to conduct program management oversight, and program coordinates of the second strategy of the second strate	ecycle, including project cultivation and er. Includes contracting office support for contr rdination and education to DoD stakeholders.	act			
Title: FY2019 SBIR/STTR Transfer			-	0.171	-
Description: FY 2019 SBIR/STTR Transfer					
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date:	March 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)FPE 0603779A I Environmental QualityCTechnology - Dem/ValF	roject (Number 35 I National De Excellence	/ <b>Name)</b> fense Cntr For	Enviro
B. Accomplishments/Planned Programs (\$ in Millions) FY 2019 SBIR/STTR Transfer		FY 2018	FY 2019	FY 2020
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR/STTR Transfer				
	Accomplishments/Planned Programs Subto	tals 3.628	4.864	5.121
C. Other Program Funding Summary (\$ in Millions)				

N/A

#### Remarks

#### D. Acquisition Strategy

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

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

#### **E. Performance Metrics**

N/A

| oject Co                     | ost Analysis: PB 2  | 020 Army   | ,   |  
   |   |   
  |  |   
  |  |   
   | Date:   | March 20  
   | 019   |  |   |  |  |
|------------------------------|---|--|---
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--|---|--
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Activity	,
   | R-1 Pro<br>PE 060<br><i>Techno</i>  | o <b>gram Ele</b><br>3779A <i>I E</i><br>logy - Der   
  | e <b>ment (N</b><br>invironme<br>n/Val   | umber/Na<br>ental Qual  
  | a <b>me)</b><br>ity  | Project<br>035 / N<br>Excelle   
   | <b>(Numbe</b><br>ational De<br>nce  | r/ <b>Name)</b><br>efense Cn  
   | tr For En   | /iro   |   |  |  |
| (\$ in M                     | illions)  |  |   | 018  
   | FY 2019   |   
  | FY 2020<br>Base  |   
  | FY 2<br>O  | 2020<br>CO  
   | FY 2020<br>Total  |   
   |   |  |   |  |  |
| Contract<br>Method<br>& Type | Performing<br>Activity & Location   | Prior<br>Years   | Cost  | Award<br>Date  
   | Cost  | Award<br>Date   
  | Cost   | Award<br>Date   
  | Cost   | Award<br>Date   
   | Cost  | Cost To<br>Complete   
   | Total<br>Cost   | Target<br>Value of<br>Contract   |   |  |  |
| MIPR                         | AEC : San Antonio,<br>TX  | 24.876   | 0.040   |  
   | 0.100   | Nov 2018  
  | 0.100  | Nov 2018  
  | -  |   
   | 0.100   | Continuing  
   | Continuing  | Continuing   |   |  |  |
|                              | Subtotal  | 24.876   | 0.040   |  
   | 0.100   |   
  | 0.100  |   
  | -  |   
   | 0.100   | Continuing  
   | Continuing  | N/A  |   |  |  |
| (\$ in Mi                    | llions)   |  | FY 2  | 018  
   | FY 2  | 2019  
  | FY 2<br>Ba   | 2020<br>Ise   
  | FY 2   | 2020<br>CO  
   | FY 2020<br>Total  |   
   |   |  |   |  |  |
| Contract<br>Method<br>& Type | Performing<br>Activity & Location   | Prior<br>Years   | Cost  | Award<br>Date  
   | Cost  | Award<br>Date   
  | Cost   | Award<br>Date   
  | Cost   | Award<br>Date   
   | Cost  | Cost To<br>Complete   
   | Total<br>Cost   | Target<br>Value of<br>Contract   |   |  |  |
| TBD                          | TBD : TBD   | -  | -   |  
   | 0.171   |   
  | -  |   
  | -  |   
   | -   | 0.000   
   | 0.171   | -  |   |  |  |
|                              | Subtotal  | -  | -   |  
   | 0.171   |   
  | -  |   
  | -  |   
   | -   | 0.000   
   | 0.171   | N/A  |   |  |  |
| in Milli                     | ons)  |  | FY 2  | 018  
   | FY 2  | 2019  
  | FY 2<br>Ba   | 2020<br>Ise   
  | FY 2   | 2020<br>CO  
   | FY 2020<br>Total  |   
   |   |  |   |  |  |
| Contract<br>Method<br>& Type | Performing<br>Activity & Location   | Prior<br>Years   | Cost  | Award<br>Date  
   | Cost  | Award<br>Date   
  | Cost   | Award<br>Date   
  | Cost   | Award<br>Date   
   | Cost  | Cost To<br>Complete   
   | Total<br>Cost   | Target<br>Value of<br>Contract   |   |  |  |
| Various                      | Various. : Various  | 32.036   | 3.588   |  
   | 4.593   | Nov 2018  
  | 5.021  | Nov 2018  
  | -  |   
   | 5.021   | Continuing  
   | Continuing  | Continuing   |   |  |  |
|                              | Subtotal  | 32.036   | 3.588   |  
   | 4.593   |   
  | 5.021  |   
  | -  |   
   | 5.021   | Continuing  
   | Continuing  | N/A  |   |  |  |
|                              |   | Prior<br>Years   | FY 2  | 018  
   | FY 2  | 2019  
  | FY 2<br>Ba   | 2020<br>Ise   
  | FY 2   | 2020<br>CO  
   | FY 2020<br>Total  | Cost To<br>Complete   
   | Total<br>Cost   | Target<br>Value of<br>Contract   |   |  |  |
|                              | Project Cost Totals   | 56.912   | 3.628   |  
   | 4.864   |   
  | 5.121  |   
  | -  |   
   | 5.121   | Continuing  
   | Continuing  | N/A  |   |  |  |
|                              | oject Co<br>Activity<br>(\$ in M<br>Contract<br>Method<br>& Type<br>MIPR<br>(\$ in Mi<br>Contract<br>Method<br>& Type<br>TBD<br>in Milli<br>Contract<br>Method<br>& Type<br>Various | oject Cost Analysis: PB 2<br>Activity<br>(\$ in Millions)<br>Contract<br>MIPR Activity & Location<br>MIPR AEC : San Antonio,<br>TX Subtotal<br>(\$ in Millions)<br>Contract<br>Method Performing<br>Activity & Location<br>TBD TBD : TBD<br>TBD TBD : TBD<br>Subtotal<br>in Millions)<br>Contract<br>Method Performing<br>Activity & Location<br>TBD Various Various<br>Subtotal<br>Performing<br>Activity & Location<br>Various Various : Various<br>Subtotal | oject Cost Analysis: PB 2020 ArmyActivityActivity(\$ in Millions)Performing<br>YearsMIPRAEC : San Antonio,<br>TX24.876(\$ in Millions)Subtotal24.876Contract<br>Method<br>TBDPerforming<br>Activity & LocationPrior<br>YearsTBDTBD : TBD-IBDTBD : TBD-In Millions)Subtotal-Contract<br>Method<br>& TypePerforming<br>Activity & LocationPrior<br>YearsTBDTBD : TBD-In Millions)Subtotal-Contract<br>Method<br>& TypePerforming<br>Activity & LocationPrior<br>YearsVariousVarious. : Various32.036VariousVarious. : Various32.036VariousFrior<br>YearsYearsVariousPrior<br>YearsSubtotalVariousSubtotal32.036 | oject Cost Analysis: PB 2020 Army         Activity         (\$ in Millions)       FY 2         Contract Method       Performing Activity & Location       Prior Years         MIPR       AEC : San Antonio, TX       24.876       0.040         Subtotal       24.876       0.040         (\$ in Millions)       FY 2         Contract Method       Performing AEC : San Antonio, TX       24.876       0.040         (\$ in Millions)       FY 2       0.040       0.040         Contract Method       Performing Activity & Location       Prior Years       Cost         TBD       TBD : TBD       -       -       -         In Millions)       FY 2       Cost       -       -         Contract Method       Performing Activity & Location       Prior Years       Cost         TBD       TBD : TBD       -       -       -         In Millions)       FY 2       Cost       -         Contract Method       Performing Activity & Location       Prior Years       Cost         Various       Various. : Various       32.036       3.588         Various       Various. : Various       32.036       3.588         Subtotal       32.036       3.588 </td <td>Activity          (\$ in Millions)       FY 2018         Contract       Performing       Prior       Award         MIPR       AEC : San Antonio,       24.876       0.040         MIPR       AEC : San Antonio,       24.876       0.040         (\$ in Millions)       Subtotal       24.876       0.040         (\$ in Millions)       FY 2018       Award         Contract       Performing       Prior       Award         AEC : San Antonio,       24.876       0.040       4ward         Contract       Performing       Prior       Award         MIPR       TBD       FY 2018       4ward         Contract       Performing       Prior       Award         TBD       TBD : TBD       -       -         In Millions)       FY 2018       5ubtotal       -         Contract       Performing       Prior       Award         Method       Performing       Prior       Award         Activity &amp; Location       Years       Cost       Award         Various       Various.: Various       32.036       3.588       -         Various       Various.: Various       32.036       3.588       -         Project Cost</td> <td>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activity<br/>Activi</td> <td>Activity Activity Contract MIPR ACT Subtotal ACC Subtotal ACC Subtotal Activity Acti</td> <td>Performing<br/>Activity &amp; Location<br/>Method<br/>&amp; Type         Activity &amp; Location         Prior<br/>Years         Cost<br/>Cost         Award<br/>Date         Award<br/>Cost         Award<br/>Date         Award<br/>Cost         Award<br/>Date         Award<br/>Cost         Award<br/>Date         Cost         Cost         Award<br/>Date         Cost         Cost         Award<br/>Date         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost<td>Poject Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Na<br/>PE 0603779A / Environmental Qual<br/>Technology - Dem/Val           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base           Contract<br/>Method<br/>&amp; Type         Activity &amp; Location<br/>Years         Cost         Award<br/>Date         Cost         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date         Award<br/>Date         Award<br/>Date         Award<br/>Date         Award<br/>Date         Award<br/>Date           MiPer Activity &amp; Location         Years         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date           Subtotal         24.876         0.040         0.100         Nº 2020<br/>Base           Subtotal         Prior         Cost         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date           FY 2018         FY 2019         FY 2020<br/>Base           Subtotal         -         O.171         -           <th c<="" td=""><td>Diject Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Name)<br/>PE 0603779A / Environmental Quality<br/>Technology - Dem/Val           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base         OC           Contract<br/>Method<br/>&amp; Type         Activity &amp; Location         Years         Cost         Award<br/>Date         Cost           MIPR         AEC : San Antonio,<br/>TX         24.876         0.040         0.100         Nov 2018         0.100         Nov 2018         -           FY 2018         FY 2019         FY 2020         FY 72           Cost         Award         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost</td><td>opject Cost Analysis: PB 2020 Army         Activity       Project 0603779A I Environmental Quality       Project 035 I /M         Activity a Location       Project 035 I /M       <th col<="" td=""><td>joject Cost Analysis: PB 2020 Army         Date:           Activity         R-1 Program Element (Number/Name)<br/>PE 0603779A / Environmental Quality         Project (Number/Simple OS / National De Excellance)           Activity &amp; Location         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total           OCC         FY 2020<br/>Total           Subtotal 24.876         0.040         0.0100         Nov 2018         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date         Cost         Award<br/>Date         Cost         OCC         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020           FY 2018         FY 2019         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020           FY 2018         FY 2019         FY 2020</td><td>joject Cost Analysis: PB 2020 Army         Date: March 20           Activity         Project (Number/Name)<br/>PE 6603779A / Environmental Quality<br/>Technology - Dem/Val         Project (Number/Name)<br/>035 / National Defense Cn<br/>Excellence           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total         FY 2020<br/>Cost To<br/>at march and the performing<br/>Activity &amp; Location         Prior<br/>24.876         0.040         OCO         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>Cost To<br/>complete         Cost To<br/>Cost T</td><td>Opject Cost Analysis: PB 2020 Army         Date: March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Cost Analysis: PB 2020 Army         Opject March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Mumber/Mame)         Opject Mumber/Mame)           Subtoral         Prior         Award         FY 2019         FY 2020         FY 2010           Subtoral         Award         Cost         Date         Cost         Date         Cost         Cost         Date         Cost         Cost          Cost         <th co<="" td=""></th></td></th></td></th></td></td> | Activity          (\$ in Millions)       FY 2018         Contract       Performing       Prior       Award         MIPR       AEC : San Antonio,       24.876       0.040         MIPR       AEC : San Antonio,       24.876       0.040         (\$ in Millions)       Subtotal       24.876       0.040         (\$ in Millions)       FY 2018       Award         Contract       Performing       Prior       Award         AEC : San Antonio,       24.876       0.040       4ward         Contract       Performing       Prior       Award         MIPR       TBD       FY 2018       4ward         Contract       Performing       Prior       Award         TBD       TBD : TBD       -       -         In Millions)       FY 2018       5ubtotal       -         Contract       Performing       Prior       Award         Method       Performing       Prior       Award         Activity & Location       Years       Cost       Award         Various       Various.: Various       32.036       3.588       -         Various       Various.: Various       32.036       3.588       -         Project Cost | Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activity<br>Activi | Activity Contract MIPR ACT Subtotal ACC Subtotal ACC Subtotal Activity Acti | Performing<br>Activity & Location<br>Method<br>& Type         Activity & Location         Prior<br>Years         Cost<br>Cost         Award<br>Date         Award<br>Cost         Award<br>Date         Award<br>Cost         Award<br>Date         Award<br>Cost         Award<br>Date         Cost         Cost         Award<br>Date         Cost         Cost         Award<br>Date         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost <td>Poject Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Na<br/>PE 0603779A / Environmental Qual<br/>Technology - Dem/Val           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base           Contract<br/>Method<br/>&amp; Type         Activity &amp; Location<br/>Years         Cost         Award<br/>Date         Cost         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date         Award<br/>Date         Award<br/>Date         Award<br/>Date         Award<br/>Date         Award<br/>Date           MiPer Activity &amp; Location         Years         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date           Subtotal         24.876         0.040         0.100         Nº 2020<br/>Base           Subtotal         Prior         Cost         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date           FY 2018         FY 2019         FY 2020<br/>Base           Subtotal         -         O.171         -           <th c<="" td=""><td>Diject Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Name)<br/>PE 0603779A / Environmental Quality<br/>Technology - Dem/Val           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base         OC           Contract<br/>Method<br/>&amp; Type         Activity &amp; Location         Years         Cost         Award<br/>Date         Cost           MIPR         AEC : San Antonio,<br/>TX         24.876         0.040         0.100         Nov 2018         0.100         Nov 2018         -           FY 2018         FY 2019         FY 2020         FY 72           Cost         Award         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost</td><td>opject Cost Analysis: PB 2020 Army         Activity       Project 0603779A I Environmental Quality       Project 035 I /M         Activity a Location       Project 035 I /M       <th col<="" td=""><td>joject Cost Analysis: PB 2020 Army         Date:           Activity         R-1 Program Element (Number/Name)<br/>PE 0603779A / Environmental Quality         Project (Number/Simple OS / National De Excellance)           Activity &amp; Location         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total           OCC         FY 2020<br/>Total           Subtotal 24.876         0.040         0.0100         Nov 2018         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date         Cost         Award<br/>Date         Cost         OCC         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020           FY 2018         FY 2019         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020           FY 2018         FY 2019         FY 2020</td><td>joject Cost Analysis: PB 2020 Army         Date: March 20           Activity         Project (Number/Name)<br/>PE 6603779A / Environmental Quality<br/>Technology - Dem/Val         Project (Number/Name)<br/>035 / National Defense Cn<br/>Excellence           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total         FY 2020<br/>Cost To<br/>at march and the performing<br/>Activity &amp; Location         Prior<br/>24.876         0.040         OCO         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>Cost To<br/>complete         Cost To<br/>Cost T</td><td>Opject Cost Analysis: PB 2020 Army         Date: March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Cost Analysis: PB 2020 Army         Opject March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Mumber/Mame)         Opject Mumber/Mame)           Subtoral         Prior         Award         FY 2019         FY 2020         FY 2010           Subtoral         Award         Cost         Date         Cost         Date         Cost         Cost         Date         Cost         Cost          Cost         <th co<="" td=""></th></td></th></td></th></td> | Poject Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Na<br>PE 0603779A / Environmental Qual<br>Technology - 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Dem/Val         Project (Number/Name)<br/>035 / National Defense Cn<br/>Excellence           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total         FY 2020<br/>Cost To<br/>at march and the performing<br/>Activity &amp; Location         Prior<br/>24.876         0.040         OCO         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>Cost To<br/>complete         Cost To<br/>Cost T</td><td>Opject Cost Analysis: PB 2020 Army         Date: March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Cost Analysis: PB 2020 Army         Opject March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Mumber/Mame)         Opject Mumber/Mame)           Subtoral         Prior         Award         FY 2019         FY 2020         FY 2010           Subtoral         Award         Cost         Date         Cost         Date         Cost         Cost         Date         Cost         Cost          Cost         <th co<="" td=""></th></td></th></td></th> | <td>Diject Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Name)<br/>PE 0603779A / Environmental Quality<br/>Technology - 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Dem/Val         Project (Number/Name)<br/>035 / National Defense Cn<br/>Excellence           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total         FY 2020<br/>Cost To<br/>at march and the performing<br/>Activity &amp; Location         Prior<br/>24.876         0.040         OCO         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>Cost To<br/>complete         Cost To<br/>Cost T</td><td>Opject Cost Analysis: PB 2020 Army         Date: March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Cost Analysis: PB 2020 Army         Opject March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Mumber/Mame)         Opject Mumber/Mame)           Subtoral         Prior         Award         FY 2019         FY 2020         FY 2010           Subtoral         Award         Cost         Date         Cost         Date         Cost         Cost         Date         Cost         Cost          Cost         <th co<="" td=""></th></td></th></td> | Diject Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Name)<br>PE 0603779A / Environmental Quality<br>Technology - Dem/Val           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br>Base         OC           Contract<br>Method<br>& Type         Activity & Location         Years         Cost         Award<br>Date         Cost           MIPR         AEC : San Antonio,<br>TX         24.876         0.040         0.100         Nov 2018         0.100         Nov 2018         -           FY 2018         FY 2019         FY 2020         FY 72           Cost         Award         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost         Cost | opject Cost Analysis: PB 2020 Army         Activity       Project 0603779A I Environmental Quality       Project 035 I /M         Activity a Location       Project 035 I /M       Project 035 I /M <th col<="" td=""><td>joject Cost Analysis: PB 2020 Army         Date:           Activity         R-1 Program Element (Number/Name)<br/>PE 0603779A / Environmental Quality         Project (Number/Simple OS / National De Excellance)           Activity &amp; Location         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total           OCC         FY 2020<br/>Total           Subtotal 24.876         0.040         0.0100         Nov 2018         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date         Cost         Award<br/>Date         Cost         OCC         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020           FY 2018         FY 2019         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020           FY 2018         FY 2019         FY 2020</td><td>joject Cost Analysis: PB 2020 Army         Date: March 20           Activity         Project (Number/Name)<br/>PE 6603779A / Environmental Quality<br/>Technology - Dem/Val         Project (Number/Name)<br/>035 / National Defense Cn<br/>Excellence           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total         FY 2020<br/>Cost To<br/>at march and the performing<br/>Activity &amp; Location         Prior<br/>24.876         0.040         OCO         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>Cost To<br/>complete         Cost To<br/>Cost T</td><td>Opject Cost Analysis: PB 2020 Army         Date: March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Cost Analysis: PB 2020 Army         Opject March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Mumber/Mame)         Opject Mumber/Mame)           Subtoral         Prior         Award         FY 2019         FY 2020         FY 2010           Subtoral         Award         Cost         Date         Cost         Date         Cost         Cost         Date         Cost         Cost          Cost         <th co<="" td=""></th></td></th> | <td>joject Cost Analysis: PB 2020 Army         Date:           Activity         R-1 Program Element (Number/Name)<br/>PE 0603779A / Environmental Quality         Project (Number/Simple OS / National De Excellance)           Activity &amp; Location         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total           OCC         FY 2020<br/>Total           Subtotal 24.876         0.040         0.0100         Nov 2018         Award<br/>Date         Cost         Award<br/>Date         Award<br/>Date         Cost         Award<br/>Date         Cost         OCC         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020           FY 2018         FY 2019         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020           FY 2018         FY 2019         FY 2020</td> <td>joject Cost Analysis: PB 2020 Army         Date: March 20           Activity         Project (Number/Name)<br/>PE 6603779A / Environmental Quality<br/>Technology - Dem/Val         Project (Number/Name)<br/>035 / National Defense Cn<br/>Excellence           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br/>Base         FY 2020<br/>OCO         FY 2020<br/>Total         FY 2020<br/>Cost To<br/>at march and the performing<br/>Activity &amp; Location         Prior<br/>24.876         0.040         OCO         FY 2020<br/>FY 2020         FY 2020<br/>FY 2020         FY 2020<br/>Cost To<br/>complete         Cost To<br/>Cost T</td> <td>Opject Cost Analysis: PB 2020 Army         Date: March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Cost Analysis: PB 2020 Army         Opject March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Mumber/Mame)         Opject Mumber/Mame)           Subtoral         Prior         Award         FY 2019         FY 2020         FY 2010           Subtoral         Award         Cost         Date         Cost         Date         Cost         Cost         Date         Cost         Cost          Cost         <th co<="" td=""></th></td> | joject Cost Analysis: PB 2020 Army         Date:           Activity         R-1 Program Element (Number/Name)<br>PE 0603779A / Environmental Quality         Project (Number/Simple OS / National De Excellance)           Activity & Location         FY 2018         FY 2019         FY 2020<br>Base         FY 2020<br>OCO         FY 2020<br>Total           OCC         FY 2020<br>Total           Subtotal 24.876         0.040         0.0100         Nov 2018         Award<br>Date         Cost         Award<br>Date         Award<br>Date         Cost         Award<br>Date         Cost         OCC         FY 2020<br>FY 2020         FY 2020<br>FY 2020         FY 2020<br>FY 2020         FY 2020<br>FY 2020           FY 2018         FY 2019         FY 2020<br>FY 2020         FY 2020<br>FY 2020           FY 2018         FY 2019         FY 2020 | joject Cost Analysis: PB 2020 Army         Date: March 20           Activity         Project (Number/Name)<br>PE 6603779A / Environmental Quality<br>Technology - Dem/Val         Project (Number/Name)<br>035 / National Defense Cn<br>Excellence           (\$ in Millions)         FY 2018         FY 2019         FY 2020<br>Base         FY 2020<br>OCO         FY 2020<br>Total         FY 2020<br>Cost To<br>at march and the performing<br>Activity & Location         Prior<br>24.876         0.040         OCO         FY 2020<br>FY 2020         FY 2020<br>FY 2020         FY 2020<br>Cost To<br>complete         Cost To<br>Cost T | Opject Cost Analysis: PB 2020 Army         Date: March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Cost Analysis: PB 2020 Army         Opject March 2019           Activity         Prior: Analysis: PB 2020 Army         Opject Mumber/Mame)         Opject Mumber/Mame)           Subtoral         Prior         Award         FY 2019         FY 2020         FY 2010           Subtoral         Award         Cost         Date         Cost         Date         Cost         Cost         Date         Cost         Cost          Cost <th co<="" td=""></th> |  |

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٩rmy													Da	te: March 20	)19	
Appropriation/Budget Activity 2040 / 4						<b>R-1</b> PE ( <i>Tech</i>	Prog 0603 11nolo	<b>yram</b> 779A 9 <i>gy -</i>	Eleme I Envii Dem/Va	e <b>nt (</b> ronn 'al	(Number/Name mental Quality	<del>)</del> )	<b>Project (</b> 035 / Nat Excellend	Numl ional ce	<b>ber/Name)</b> Defense Cn	tr For En	viro
Event Name		FY 2	018		FY 2	019		FY	2020		FY 2021	F	Y 2022		FY 2023	FY	2024
Lvent Name	1	2	3 4	1	2	3 4	1	2	3 4	1	1 2 3 4	1	2 3 4	1	2 3 4	1 2	3 4
NDCEE Management and Operations (Enduring)																	
NDCEE Env, Safety, Occ Health, and Energy Technology Dem/	Val (Ei	nduring	)														
																I	

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				C	Date: March	2019								
Appropriation/Budget Activity 040 / 4	<b>R-1 Program El</b> PE 0603779A / <i>I</i> <i>Technology - De</i>	m Element (Number/Name)Project9A I Environmental Quality035 I Na- Dem/ValExcelle			( <b>Number/Name)</b> tional Defense Cntr For Envir ce									
	Schedule Details													
		Start			End									
		Sta	rt		En	d								
Events		Sta Quarter	rt Year	Qu	Eno	d Year								
Events NDCEE Management and Operations (Enduring)		Sta Quarter 1	rt Year 2019	Qu	En uarter 4	d Year 2024								
Exhibit R-2A, RDT&E Project Ju	Date: Marc	ch 2019												
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Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)ProPE 0603779A I Environmental QualityE2Technology - Dem/ValDe					Project (Number/Name) E21 / Environmental Quality Technolog Dem/Val				
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		
E21: Environmental Quality Technology Dem/Val	-	11.411	9.867	10.011	-	10.011	11.058	9.997	8.478	7.357	0.000	68.179		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

#### A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<i>Title:</i> Environmental quality technology demonstration and validation: Toxic Metal Reduction in Surface Finishing of Army Weapon Systems (RDECOM)	2.391	2.954	3.102
<b>Description:</b> Increase operational readiness and reduce Soldier and worker human health risks by reducing or eliminating the use of cancer-causing hexavalent chromium, cadmium and associated toxic materials used in surface finishing processes for the current and future force. These surface coating technologies will be used to provide superior corrosion and wear protection for components used on Future Vertical Lift and Next Generation Combat Vehicles and enable increased performance/extended barrel life for Long Range Precision Fire systems.			
FY 2019 Plans: Demonstrate hexavalent chromium-free anodizing process on aluminum aircraft parts; establish test bed for cold spray repair of hard chrome-plated wear surfaces during depot maintenance; qualify hexavalent chromium-free alternatives for sealing heavy zinc phosphate surfaces on steel weapon systems.			
FY 2020 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	arch 2019	
Appropriation/Budget Activity 2040 / 4	Project (Number/N E21 / Environmenta Dem/Val	Name) tal Quality Technology		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Will demonstrate zinc-nickel alternatives to cadmium for use on fast portable cold spray system and trivalent chromium electroplating as	teners, electrical connectors and in brush plating; will qua hard chrome alternatives.	alify		
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increase due to economic adjustment.				
<i>Title:</i> Environmental quality technology demonstration and validatio (RDECOM)	n: Airborne Lead Reduction from Army Weapon System	s 1.273	1.837	2.727
<b>Description:</b> Sustain Soldier training readiness, maintain/restore trailead exposure and increase life safety and protection of human heat toxic lead compounds ? which are known to cause damage to centraterm effects for children, as well as potential developmental impacts rocket and missile propellants and primary explosives (primers/deto free formulations will provide a domestic, readily available source for and Soldier Lethality systems.	aining capability at ranges closed due to dangerous leve Ith on Army installations by reducing or eliminating the u ral nervous, cardiovascular and immune systems with lor s, including IQ loss, behavioral issues and hearing loss - onators/initiators) for the current and future force. These or primary explosives used in all Long Range Precision F	ls of se of ng- in lead- ires		
<b>FY 2019 Plans:</b> Demonstrate lead-free primary explosive composition in stab detona production of lead-free percussion primers and conduct first article t	ator and electric detonator configurations; establish pilot- testing in hand held signals.	scale		
<b>FY 2020 Plans:</b> Will demonstrate lead-free primer in small/medium caliber ammunitidouble-base propellants for Hydra rockets.	ion; will complete flight weight demonstration of reduced	lead		
FY 2019 to FY 2020 Increase/Decrease Statement: Funding change due to economic adjustment.				
<i>Title:</i> Environmental quality technology demonstration and validatio Ozone Depleting Substances (ODS) (RDECOM)	n: Low Global Warming Potential (LGWP) Alternatives to	) -	0.250	0.222
<b>Description:</b> Evaluate low GWP ODS alternatives being developed and verify their acceptability in military unique refrigeration and fire s Next Generation Combat Vehicle.	l by industry to assess their toxicity and flammability haz suppression applications, including Future Vertical Lift ar	ards nd		
FY 2019 Plans:				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603779A <i>I Environmental Quality</i> <i>Technology - Dem/Val</i>	<b>Project (N</b> E21 <i>I Envir</i> Dem/Val	<b>ject (Number/Name)</b> I <i>I Environmental Quality Technology</i> m/Val				
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2018	FY 2019	FY 2020		
Demonstrate new test method suitable for classifying the flammability of re threats.	frigerants facing realistic current and future force						
FY 2020 Plans: Will validate and promulgate the demonstrated refrigerant flammability test	method.						
FY 2019 to FY 2020 Increase/Decrease Statement: Funding change due to economic adjustment.							
<i>Title:</i> Environmental quality technology demonstration and validation: ESC Procedures	OH Impacts of Short-Term Noise Assessment		0.625	0.250	-		
<b>Description:</b> Demonstrate and validate the technologies, including the und short-term noise assessment procedures on environmental footprint and S have validated short-term noise assessment procedures, including uncerta modules for Sustainable Range Program range officers on performing and	derlying computational algorithms, for the impact o oldier readiness. When completed the program wil inty metrics and 2) have on-line, self-guided trainin interpreting short-term noise assessment results.	f I: 1) Ig					
<b>FY 2019 Plans:</b> Provide a report that summarizes all results of the demonstration and valid accuracy across a range of environmental conditions and assessment constructions	ation study. Validation report will document assess sistency across user applications.	sment					
FY 2019 to FY 2020 Increase/Decrease Statement: This effort ends in FY 2019							
Title: Environmental quality technology demonstration and validation: Adva	anced Water Reuse Technology for Fixed Installati	ons	0.572	-	-		
<b>Description:</b> Demonstrate and validate advanced water reuse technology the completion of this program, the following will be accomplished: 1) demotechnology at installations, 2) ESOH analysis of three water reuse technologies distributed water reclamation, and centralized reclamation; 3) reports on be of advanced reuse technologies; and 4) marketing materials comparing quit to support technology adoption campaigns at installations and contingency	for fixed installations and assess ESOH impacts. A onstration of energy efficient advanced water reuse ogies for installations including shower water recyclest practices for permitting, design, and safe opera ality of advanced reuse water to tap and bottled way bases.	At e tion ater					
Title: Environmental quality technology demonstration and validation: Inse	nsitive Munitions (IM) Wastewater Treatment		1.575	1.685	1.635		
<b>Description:</b> Demonstrate and validate optimized scalable wastewater treat treatment of existing and emerging insensitive munitions (IM) contaminated ammunition plant munitions production.	atment system basic technology for the destructive d production wastewater generated during Army						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date:	March 2019			
Appropriation/Budget Activity 2040 / 4	<b>Project (Number</b> / E21 <i>I Environmen</i> <i>Dem/Val</i>	<b>roject (Number/Name)</b> 21 I Environmental Quality Technology em/Val				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020		
<b>FY 2019 Plans:</b> Transition IM wastewater treatment technologies from a prototype pildemonstration and validation of cost effective treatment of IM wastewater	lot scale system to an initial field-scale pilot system for vater.					
<b>FY 2020 Plans:</b> Will continue operation of Fenton oxidation pilot demonstration syste adjust operations and perform manufacturing trials to optimize treatm wastewaters. Will install pilot demonstration unit for continuous preci MCAAP.	m at MCAAP with ramp up to 500 gpd total capacity. Wil nent. Will document cost savings for Fenton oxidation of pitation and membrane concentration of IM wastewaters	l IM at				
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to economic adjustment.						
<i>Title:</i> Environmental quality technology demonstration and validation (FRESCO?)	a: Fate and Risk Evaluation System for Contaminants	-	1.254	1.500		
<b>Description:</b> FRESCO? will ensure Solider readiness through reduct will provide the capability to model and forecast contaminant fate and environment, pursuant to unfilled technology gap identified in DoD In	tion in training range down time. Validation of FRESCO? d health risks associated with new military materials in th struction Number 4715.18.	e				
FY 2019 Plans:						
Will demonstrate software for environmental fate and transport data	with user community for evaluation.					
<ol> <li>Will finalize integration of upgraded existing components, perform testing will be finalized in FY20.</li> </ol>	testing and debugging ? existing component integration	and				
2) Will add new capabilities to FRESCO?, perform testing and debug new fate and transport models and databases have been developed be upgraded to give greater support in evaluating the fate and transp	gging ? since the development of ARAMS? and TREECS . Soils Model, Vadose Zone Model, and Channel Model v port of EC.	?, vill				
3) Will validate FRESCO? System using existing army data ? the pro (TTA) partners to select an applicable demonstration site that will allo	oject team will work with our Technology Transition Agree ow us to demonstration and validate the full system featu	ement res.				
FY 2019 to FY 2020 Increase/Decrease Statement: Funding change due to economic adjustment.						
Title: Environmental quality technology demonstration and validation	: Environmental Toolkit for Expeditionary Operations	-	1.275	0.825		

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019							
Appropriation/Budget Activity 2040 / 4	A     R-1 Program Element (Number/Name)     Program Element (Number/Name)       1 4     PE 0603779A I Environmental Quality     E2*       Technology - Dem/Val     Dem									
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020						
<b>Description:</b> Conduct pilot-scale demonstration and validation studie methods developed for rapidly collecting environmental data in the file requirements on installations. Demonstrate the ability of ETEO softw sensors through simple device driver (with minimal or no development for their ability to detect and quantify environmental contaminants. D designated locations.	es to determine the effectiveness of basic technologies/ eld for the purposes of reducing impact of environmental vare to communicate easily with new, commercially availant). Assess available chemical databases on the new servemonstrate the operational ETEO software and sensors	ible nsor at								
FY 2019 Plans: Will demonstrate software and sensors package for environmental ba	aseline evaluation capabilities with engineer soldiers.									
<b>FY 2020 Plans:</b> Will demonstrate software and sensors package for environmental back demonstration of ETEO at an ARMY installation with Directorate of P Security; and Directorate of Emergency Services on developed platfor During this phase, a two-day field demonstration will be conducted. T ability to detect the presence of environmental contaminants in soils a ETEO software and to quickly understand the resulting information and the security is a security of the presence	aseline evaluation capabilities with engineer soldiers. Per Public Works; Directorate of Plans, Training, Mobilization, form and prepare a technical/functional assessment repor The demonstration will be conducted to test the installation with the sensor suite to transfer that data into an EBS using and its implication to operations.	form and  n?s ng								
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease due to economic adjustment.										
<i>Title:</i> Explosive Ordnance Disposal (ERDC)		4.975	-	-						
<b>Description:</b> Evaluate innovative technology that would reduce the emunitions by eliminating the explosive hazard while leaving munitions demonstrate and validate the use of cut and capture technologies, su	environmental impact associated with the remediation of s? bodies in place. Effort partners ERDC with industry to upporting the recommended leave-in-place scenario.									
<i>Title:</i> FY2019 SBIR/STTR Transfer		-	0.362	-						
Description: FY2019 SBIR/STTR Transfer										
<b>FY 2019 Plans:</b> FY2019 SBIR/STTR Transfer										
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SBIR/STTR Transfer										
	Accomplishments/Planned Programs Subt	otals 11.411	9.867	10.011						

Exhibit R-2A, RDT&E Project Just	Date: March 2019										
Appropriation/Budget Activity 2040 / 4	<b>R-1 P</b> PE 06 <i>Techn</i>	rogram Elen 03779A / En ology - Dem,	n <b>ent (Numb</b> vironmental ⁄Val	<b>er/Name)</b> Quality	<b>Project (Number/Name)</b> E21 <i>I Environmental Quality Technology</i> <i>Dem/Val</i>						
C. Other Program Funding Summ	ary (\$ in Milli	<u>ons)</u>	FY 2020	FY 2020	FY 2020					Cost To	
Line Item • 06I: Environmental Quality Technology Support	<u>FY 2018</u> 0.682	<u>FY 2019</u> 0.921	<u>Base</u> 0.562	020	<u>Total</u> 0.562	<u>FY 2021</u> 0.605	<u>FY 2022</u> 0.614	<u>FY 2023</u> 0.651	<u>FY 2024</u> 0.426	<u>Complete</u> 0.000	<u>Total Cost</u> 4.461

#### <u>Remarks</u>

### D. Acquisition Strategy

The project ultimately transitions successfully demonstrated environmental quality technologies to Army acquisition, industrial base and installation end users. As part of the Army's Environmental Quality Technology Program, all technology efforts address a valid Army Environmental Requirements and Technology Assessments (AERTA) requirement. The Army's Environmental Technology Integrated Product Team conducts a thorough assessment and makes funding recommendations to senior Army environmental leadership. Efforts approved by senior Army environmental leadership receive Advanced Component Development and Prototype funding to fully demonstrate and validate the technology for transition to end users for follow on implementation.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603779A <i>I Environmental Quality</i> <i>Technology - Dem/Val</i>					<b>Project (Number/Name)</b> E21 <i>I Environmental Quality Technology</i> <i>Dem/Val</i>				logy				
Product Development (\$ in Millions) FY 2018					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	-	-		0.362	Oct 2018	-		-		-	0.000	0.362	-
		Subtotal	-	-		0.362		-		-		-	0.000	0.362	N/A
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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 Demonstrations	MIPR	Varies : Varies	15.881	11.411		9.505	Oct 2018	10.011	Oct 2019	-		10.011	Continuing	Continuing	Continuing
		Subtotal	15.881	11.411		9.505		10.011		-		10.011	Continuing	Continuing	N/A
		Project Cost Tatels	Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 ISE	FY 2 Of	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Froject Cost Totals	13.001	11.411		9.007		10.011		-		10.011	Continuing	Continuing	IN/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy							Date: March 20	19
Appropriation/Budget Activity 2040 / 4		<b>R-1 I</b> PE 0 <i>Tech</i>	Program Elemen 603779A I Enviro nology - Dem/Va	Number/Name) ironmental Quality Technology					
	FY 2018	FY 20 <sup>4</sup>	19	FY 2020	FY 2021	I	FY 2022	FY 2023	FY 2024
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4
Toxic Metals Reduction Demonstration/Validation									
Airborne Lead Reduction Demonstration/Validation									
ESOH Impacts of Short-Term Noise Assessment Procedures De									
Advanced Water Reuse Technology for Fixed Installations									
Insensitive Munitions (IM) Wastewater Treatment									
Fate and Risk Evaluation System for Contaminants									
Environmental Toolkit for Expeditionary Operations									
Low Global Warming Potential Dem/Val									
Securing the Availability of Green, Enhanced Coatings Dem/Val									

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: N	larch 2019
Appropriation/Budget Activity 2040 / 4	propriation/Budget Activity     R-1 Program       10 / 4     PE 06037794       Technology -     Technology -				
	Schedule Detail	S			
		St	art		End
Events		Quarter	Year	Quarter	Year
Toxic Metals Reduction Demonstration/Validation		1	2015	4	2023
Airborne Lead Reduction Demonstration/Validation		1	2015	4	2024
ESOH Impacts of Short-Term Noise Assessment Procedures Den	nonstration/Validation	1	2016	4	2019
Advanced Water Reuse Technology for Fixed Installations		1	2016	4	2019
Insensitive Munitions (IM) Wastewater Treatment		1	2018	4	2022
Fate and Risk Evaluation System for Contaminants		1	2019	4	2021
Environmental Toolkit for Expeditionary Operations		1	2019	4	2022
Low Global Warming Potential Dem/Val		1	2019	4	2023
Securing the Availability of Green, Enhanced Coatings Dem/Val		1	2020	4	2024

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					<b>R-1 Program Element (Number/Name)</b> PE 0603790A <i>I NATO Research and Development</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	020 FY 2020 FY 2020 See OCO Total FY 2021 FY 2022 FY 2023 FY 2024 Comp							Total Cost
Total Program Element	-	2.485	3.682	5.406	-	5.406	5.516	4.556	5.706	5.763	0.000	33.114
691: NATO Rsch & Devel	-	2.485	3.682	5.406	-	5.406	5.516	4.556	5.706	5.763	0.000	33.114

### A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	2.588	3.687	4.448	-	4.448
Current President's Budget	2.485	3.682	5.406	-	5.406
Total Adjustments	-0.103	-0.005	0.958	-	0.958
<ul> <li>Congressional General Reductions</li> </ul>	-0.002	-0.005			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-0.101	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	0.958	-	0.958

#### **Change Summary Explanation**

FY 2020 funding increase of \$1.052 million to support the Army's modernization priorities in support of the National Defense Strategy.

Exhibit R-2A, RDT&E Project Ju	stification	PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060379 Developme	am Elemen 0A / NATO ent	<b>t (Number</b> / Research a	Name) and	Project (N 691 / NATC	umber/Nan D Rsch & Do	<b>1e)</b> evel	
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
691: NATO Rsch & Devel	-	2.485	3.682	5.406	-	5.406	5.516	4.556	5.706	5.763	0.000	33.114
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Armaments Cooperation Enterprise Support	1.876	2.687	4.098
<b>Description:</b> Armaments Cooperation Enterprise Support/ International Online (IOL) Development and Implementation NATO/ International Cooperative R&D (AR 70-41) and International Acquisition (AR 70-1, AR 70-3).			
The goal of this activity is to expand worldwide allied standardization and interoperability through cooperative Research and Development (R&D) and technology sharing per SECDEF guidance and especially in support of the U.S. Army. The execution AR 70-41 responsibilities requires DASA (DE&C) to conduct engagement with key strategy foreign partners in all regions of the world through the SNR(A) program, international agreement negotiations, and other bilateral and multilateral forums involving DASA (DE&C) personnel. This program will fund the travel costs and administrative support (studies, analysis, interpretation, equipment, etc.) required to participate internationally, such as the NATO Army Armaments Group (NAAG), Defense Against Terrorism (DAT) and to pursue new cooperative R&D initiatives and international cooperative agreements such as memoranda of understanding.			
<b>FY 2019 Plans:</b> Funds will allow the coordination for cooperative research, development and evaluation of defense technologies / systems / equipment plus joint production and follow-on support of defense systems or equipment and the procurement of foreign technologies.			
FY ZUZU Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development	Project (N 691 / NA7	<b>lumber/N</b> O Rsch 8	<b>lame)</b> & Devel	
B. Accomplishments/Planned Programs (\$ in Millions)		F	r 2018	FY 2019	FY 2020
Funds will allow the coordination for cooperative research, development and e equipment plus joint production and follow-on support of defense systems or e technologies.	evaluation of defense technologies / systems / equipment and the procurement of foreign				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 funding increase of \$1.052 million to support the Army's modernization Strategy.	on priorities in support of the National Defense				
Title: Communications Interoperability, and Electronics Technologies			0.141	0.203	0.302
<b>Description:</b> The goal of this activity is to develop technologies that enable into control, communications, sensors, and information systems. Efforts include de development of multiple unique solutions and leverage existing interoperability include common doctrine, technical and procedural specifications to make bett leveraged national operating picture capabilities and enable the development of security domains and national networks architectures. Includes efforts from are Capabilities, Low Level Air Defense Interoperability, JTRS, Combat Identification	teroperability among partner countries' comma evelopment of a single solution standard avoidi v standards developed by NATO. Such standar ter use of existing information, shared data, of interoperability of data, databases, application eas formerly titled Multi-National Network Enal ion, and Multilateral Interoperability Program.	nd, ng rds ons, oled			
<b>FY 2019 Plans:</b> FY 2019 funds include efforts from areas formerly titled Multi-National Network Interoperability, JTRS, Combat Identification, and Multilateral Interoperability F	< Enabled Capabilities, Low Level Air Defense Program.				
<b>FY 2020 Plans:</b> FY 2020 funds include efforts from areas formerly titled Multi-National Network Interoperability, JTRS, Combat Identification, and Multilateral Interoperability F	< Enabled Capabilities, Low Level Air Defense Program.				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 funding increase of \$1.052 million to support the Army's modernization Strategy.	on priorities in support of the National Defense				
Title: Senior National Representatives (Army) (SNR-(A))			0.015	0.021	0.031
<b>Description:</b> Senior National Representatives (Army) (SNR-(A)) Projects (Par Italy): Supports harmonization of programs at various levels: exchanging inforr feasibility studies to further promote cooperative development; standardizing, f distributing the workload among the different nations. Technology Demonstration NATO Army Armaments Group (NAAG), will provide an opportunity to observe	tners: France, Germany, United Kingdom and mation, identifying knowledge gaps and condu fielding and road-mapping various processes; ions hosted by the U.S. reps to Land Group 6, a and demonstrate the current and future capa	cting bility			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A / NATO Research and Development	<b>Project (I</b> 691 / NA7	Number/N O Rsch &	<b>lame)</b> & Devel	
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2018	FY 2019	FY 2020
of participating NATO nations with a view to assisting future operational and studies, analysis and technology demonstrations.	materiel interoperability. Army support of NAAG	)			
<i>FY 2019 Plans:</i> Funds will be used to pursue cooperative initiatives that were postponed, ca previous years such as forums and engagement with long-standing foreign p necessary standardization programs.	ncelled or not pursued due to funding reductions partners to identify interoperability gaps and dev	s in elop			
<i>FY 2020 Plans:</i> Funds will be used to pursue cooperative initiatives that were postponed, ca previous years such as forums and engagement with long-standing foreign processary standardization programs.	ncelled or not pursued due to funding reductions partners to identify interoperability gaps and dev	s in elop			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 funding increase of \$1.052 million to support the Army's moderniza Strategy.	tion priorities in support of the National Defense				
<i>Title:</i> Weapons and Munitions Technologies			0.113	0.163	0.243
<b>Description:</b> The goal of this activity is to cooperate with partner countries to technologies to improve range, payloads, speed, survivability and lethality to overmatch for Army weapons systems and associated munitions. Areas of counter systems, counter improvised explosive device neutralization, direct cooperative development will be done under the auspices of international agric countries for the purposes of improving defense capabilities of the U.S. and	o increase interoperability and develop jointly o maintain U.S. technical superiority and combat cooperation include fuzing and warhead systems eted energy, and fire control systems. Such greements established among the participating partner countries.	,			
<i>FY 2019 Plans:</i> Weapons and munitions technologies (Partners: France, Germany, Italy, UK automated software interface between their national field artillery command receive and provide mutual fire support (i.e. cannon and rocket fire) in comb	(): The Participants in this program will develop a and control systems. The nations will be able to ined operations more rapidly and with minimal e	an rrors.			
<b>FY 2020 Plans:</b> Weapons and munitions technologies (Partners: France, Germany, Italy, UK automated software interface between their national field artillery command receive and provide mutual fire support (i.e. cannon and rocket fire) in comb	(): The Participants in this program will develop a and control systems. The nations will be able to ined operations more rapidly and with minimal e	an rrors.			
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A <i>I NATO Research and</i> <i>Development</i>	Project (Number/ 691 / NATO Rsch	Name) & Devel	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
FY 2020 funding increase of \$1.052 million to support the Army's modernizatio Strategy.	n priorities in support of the National Defense			
Title: Ground Systems Technologies		0.113	0.163	0.243
<b>Description:</b> The goal of this activity is to cooperate with partner countries to in technologies to improve survivability, weapons, ground platforms (manned and to provide soldiers with unmatched offensive and defensive capabilities in wear include ground systems design, propulsion, structures, robotics, alternative fue and power management. Such cooperative development will be done under the among the participating countries for the purposes of improving defense capabilities.	ncrease interoperability and develop jointly unmanned), and mobility and counter-mobility pons and military vehicles. Areas of cooperation Is and lubricants, systems integration, electroni e auspices of international agreements establis ilities of the U.S. and partner countries.	n cs, ied		
<b>FY 2019 Plans:</b> FY 2019 funding will be used to fund the continuation of cooperative projects in unmanned ground vehicles such as Hybrid Electric Project Agreement between	n armored vehicle underbody blast protection ar ר US and Japan.	d		
<b>FY 2020 Plans:</b> FY 2020 funding will be used to fund the continuation of cooperative projects in unmanned ground vehicles such as Hybrid Electric Project Agreement between	า armored vehicle underbody blast protection ar า US and Japan.	d		
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 funding increase of \$1.052 million to support the Army's modernizatio Strategy.	n priorities in support of the National Defense			
Title: Aviation Systems Technologies		0.227	0.327	0.489
<b>Description:</b> The goal of this activity is to cooperate with partner countries to in improved aerodynamics, aeromechanics, avionics, weapons and sensor integri technologies that improve range, payloads, speed, survivability and lethality to overmatch for vertical lift aviation systems. Such cooperative development will agreements established among the participating countries for the purposes of in partner countries.	ncrease interoperability and develop jointly ation, propulsion, and aviation autonomy maintain U.S. technical superiority and combat be done under the auspices of international mproving defense capabilities of the U.S. and			
<i>FY 2019 Plans:</i> FY 2019 funding will be used to pursue cooperative projects (i.e., the developm systems that aid pilots and aircrew in degraded visual environments). <i>FY 2020 Plans:</i>	nent of advance rotorcraft technologies and imp	rove		

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A <i>I NATO Research and</i> <i>Development</i>	<b>Projec</b> 691 / N	t (Number/N IATO Rsch &	lame) & Devel	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
FY 2020 funding will be used to pursue cooperative projects (i.e., systems that aid pilots and aircrew in degraded visual environme	, the development of advance rotorcraft technologies and in ents).	nprove			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 funding increase of \$1.052 million to support the Army's Strategy.	s modernization priorities in support of the National Defense				
Title: FY 2019 SBIR / STTR Transfer			-	0.118	-
Description: FY 2019 SBIR / STTR Transfer					
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
	Accomplishments/Planned Programs Sub	ototals	2.485	3.682	5.406
<ul> <li>C. Other Program Funding Summary (\$ in Millions) N/A</li> <li>Remarks</li> <li>D. Acquisition Strategy Acquisition Strategy: The goal of this program is to expand worldwide allied standardiz SECDEF guidance and especially in support of the of the U.S. A All projects are test or technical demonstrations to feed into pote improvements to the Current Force.</li> <li>List of the programs curently in place: Communications, Interoperability, and Electronics Technologies</li> </ul>	zation interoperability through cooperative research and dev rmy. ential new requirements in support of Army Transformation t	velopmer to the Fut	nt (R&D) and ture Force or	technology s	sharing per
The goal of this project is to develop technologies that enable int systems. Efforts under this project include development of a sin interoperability standards developed by NATO. Such standards i information, shared data, leverage national operating picture cap	teroperability among partner countries' command, control, c ngle solution standard avoiding development of multiple union include common doctrine, technical and procedural specific pabilities and enable the development of interoperability of d	ommunic que solut ations to lata, data	cations, sens ions and lev make better abases, appl	sors, and info erage existing use of existin ications, secu	rmation g ng ırity
DE 0602700A: NATO Research and Development					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603790A <i>I NATO Research and</i> <i>Development</i>	Project (Number/Name) 691 / NATO Rsch & Devel
domains and national networks architectures. Includes projects formerly titled JTRS, Combat Identification, and Multilateral Interoperability Program.	Multi-National Network Enabled Capabilities, I	Low Level Air Defense Interoperability,
Aviation Systems Technologies The goal of this project is to cooperate with partner countries to increase intero and sensor integration, propulsion, and aviation autonomy technologies that im superiority and combat overmatch for vertical lift aviation systems. Such coope established among the participating countries for the purposes of improving de	perability and develop jointly improved aerody prove range, payloads, speed, survivability ar erative development will be done under the au fense capabilities of the U.S. and partner cour	namics, aeromechanics, avionics, weapons nd lethality to maintain U.S. technical spices of international agreements ntries.
Ground Systems Technologies The goal of this project is to cooperate with partner countries to increase interoplatforms (manned and unmanned), and mobility and counter-mobility to provide vehicles. Areas of cooperation include ground systems design, propulsion, strepower management. Such cooperative development will be done under the aupurposes of improving defense capabilities of the U.S. and partner countries.	perability and develop jointly technologies to in the soldiers with unmatched offensive and defe ructures, robotics, alternative fuels and lubrica uspices of international agreements establishe	mprove survivability, weapons, ground nsive capabilities in weapons and military nts, systems integration, electronics, and d among the participating countries for the
Weapons and Munitions Technologies The goal of this project is to cooperate with partner countries to increase intero and lethality to maintain U.S. technical superiority and combat overmatch for A and warhead systems, guidance systems, counter improvised explosive device will be done under the auspices of international agreements established among and partner countries.	perability and develop jointly technologies to in rmy weapons systems and associated munitic e neutralization, directed energy, and fire contr g the participating countries for the purposes o	mprove range, payloads, speed, survivability ons. Areas of cooperation include fuzing ol systems. Such cooperative development of improving defense capabilities of the U.S.
Armaments Cooperation Enterprise Support The goal of this program is to expand worldwide allied standardization and inter per SECDEF guidance and especially in support of the U.S. Army. This progra equipment, etc.) required to participate internationally, such as the North Atlant Terrorism (DAT) and to pursue new cooperative R&D initiatives and internation also include: the United States' share of costs of the NATO Civil Budget, Chap Cooperative Planning (U. S. Army is Executive Agent for this NATO bill); the Te many nations.	properability through cooperative research and m will fund the travel costs and administrative tic Treaty Organization (NATO) Army Armame nal cooperative agreements such as memoran oter IX, which funds the NATO Industrial Advis echnical Cooperation Program, and Army arm	development (R&D) and technology sharing support (studies, analysis, interpretation, ents Group (NAAG), Defense Against da of understanding. This program will ory Group (NIAG) and the Special Fund for aments cooperation working groups with
E. Performance Metrics N/A		

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Develo	ogram Ele 3790A / / pment	ement (N NATO Res	l <b>umber/N</b> search an	<b>ame)</b> d	<b>Project</b> 691 / <i>N</i> /	(Number ATO Rsch	r/ <b>Name)</b> a & Devel		
Management Service	es (\$ in M	illions)		FY	2018	FY :	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
ArmamentsCooperation Enterprise Support	MIPR	DASA DEC HQDA : Ft Belvoir, VA	0.010	-		-		-		-		-	0.000	0.010	-
Weapons and Munitions	TBD	CECOM : Aberdeen Proving Ground, MD	0.008	-		-		-		-		-	0.000	0.008	-
Communications Interoperability and Electronic Technologies Interoperability	MIPR	SPAWAR : Various	0.010	-		-		-		-		-	0.000	0.010	-
Ground Systems Technologies	MIPR	TARDEC : Warren, MI	0.010	-		-		-		-		-	0.000	0.010	-
Chemical and Biological Technologies	MIPR	Aberseen Proving Groun : MD	0.010	-		-		-		-		-	0.000	0.010	-
		Subtotal	0.048	-		-		-		-		-	0.000	0.048	N/A
Product Developmer	nt (\$ in M	illions)		FY	2018	FY :	2019	FY 2 Ba	2020 ase	FY 2 O(	2020 CO	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
Missiles and Rocket Technologies	MIPR	APG, Redstone Arsenal : MD, AL	0.100	-		-		-		-		-	0.000	0.100	-
Communications, Interoperability, and Electronics Technologies	MIPR	CECOM, JTRS, COALWNW, JTNC, SPAWAR : San Diego,CA, various	0.529	-		-		-		-		-	0.000	0.529	-
Weapons and Munitions	Various	ARDEC, PEO AMMO, PM-CAS : VARIOUS	0.752	-		-		-		-		-	0.000	0.752	-
Aviation Systems Technologies	Various	AMRDEC : RED STONE, VARIOUS	0.175	-		-		-		-		-	0.000	0.175	-
Ground Systems Technology	FFRDC	Various : Various	0.125	-		-		-		-		-	0.000	0.125	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	'								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 0603 Develop	<b>gram El</b> 3790A / <i>I</i> oment	ement (N NATO Res	umber/N search an	<b>ame)</b> d	<b>Project</b> 691 / <i>N</i>	(Numbe ATO Rsch	r/ <b>Name)</b> a & Devel		
Product Developme	nt (\$ in M	illions)		FY 2	2018	FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	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
SNR(A)	C/TBD	ARDEC: Arlington, VA : Various	9.012	-		-		-		-		-	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.118		-		-		-	0.000	0.118	-
		Subtotal	10.693	-		0.118		-		-		-	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY 2	2018	FY 2	019	FY 2 Ba	2020 se	FY 2 O	2020 CO	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
Armaments Cooperation Enterprise Support	C/FFP	LSS/GDIT : Fairfax, VA	4.762	1.877		1.864		2.870		-		2.870	0.000	11.373	-
Missiles and Rocket Technologies	MIPR	APG, Redstone Arsenal : MD, AL	0.100	-		0.600		0.895		-		0.895	0.000	1.595	-
Communications, Interoperability, and Electronics Technologies	MIPR	Joint Tactical Radio (JTRS), JTNC, COALWNW, SPAWAR, CERDEC, ARDEC W1DF : San Diego, CA, Red Stone Arsenal	0.818	0.141		0.300		0.448		-		0.448	0.000	1.707	-
Aviation Systems Technologies	MIPR	RDECOM/ AMRDEC : Red Stone Arsenal	0.585	0.225		0.300		0.448		-		0.448	0.000	1.558	-
Ground Systems Technology	MIPR	TARDEC : Various	0.365	0.113		-		-		-		-	0.000	0.478	-
Weapons and Munitions	Various	CECOM, ARDEC, AMMO, PEO C3T : Aberdeen Proving Ground, Various	0.926	0.113		0.500		0.745		-		0.745	0.000	2.284	-
Soldier Technologies	TBD	Various : Various	0.346	-		-		-		-		-	0.000	0.346	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	,								Date:	March 20	019	
Appropriation/Budge 2040 / 4	et Activit <u>y</u>	/				R-1 Pro PE 060 Develop	ogram Ele 3790A / N oment	ement (N NATO Res	umber/N search an	<b>ame)</b> d	<b>Project</b> 691 / <i>N</i>	t <b>(Numbe</b> ATO Rsch	r/ <b>Name)</b> a & Devel		
Support (\$ in Million	is)			FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
SNR(A)	C/TBD	ARL, HQDA, JCGISR: Army : Various	2.302	0.016		-		-		-		-	Continuing	Continuing	, Continuing
Chemical & Biological Defense Technologies	MIPR	ECBC : Edgewood, Aberdeen, MD	0.270	-		-		-		-		-	0.000	0.270	-
		Subtotal	10.474	2.485		3.564		5.406		-		5.406	Continuing	Continuing	, N/A
Test and Evaluation	(\$ in Mill	ions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 O(	2020 CO	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
Communications, Interoperability, and Electronics Technologies	Various	JTRN, JTNC, COALWNW, CERDEC, NIGHT VISION : SPAWAR	0.444	-		-		-		-		-	0.000	0.444	-
Weapons and Munitions	TBD	ARDEC, PEO AMMO, ASCA : Various	0.200	-		-		-		-		-	0.000	0.200	-
Aviation Systems Technologies	TBD	RDECOM, AMRDEC : RED STONE	0.080	-		-		-		-		-	0.000	0.080	-
Ground Systems Technologies	MIPR	TARDEC : Various	0.050	-		-		-		-		-	0.000	0.050	-
	-	Subtotal	0.774	-		-		-		-		-	0.000	0.774	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	21.989	2.485		3.682		5.406		-		5.406	Continuing	Continuing	, N/A
Remarks															

xhibit R-4, RDT&E Schedule Profile: PB 20	20 Army	/																		Da	te: N	1arcl	n 20	19		
oppropriation/Budget Activity 040 / 4							<b>F</b> F <i>L</i>	<b>R-1</b> PE ( Deve	<b>Prog</b> 0603 elopi	<b>gram</b> 790A ment	Elen / NA	nent TO F	(Nu Rese	mber earch	/ <b>Na</b> ı and	ne)	l (	<b>Proje</b> 691 / 7	ct ( NA	(Numl TO R	sch 8	Nam & De	<b>e)</b> vel			
		FY	2011			FY	2012			FY 20	13		FY	2014		F	Y 20	015		FY	201	6		FY 2	017	
	1	2	3	4	1	2	3	4	1	2	3 4	1	2	3	4	1	2	3 4		1 2	3	4	1	2	3	4
N/A										· · · · ·																
		FY	2018			FY	2019			FY 20	20		FY	2021		F	Y 2(	122		FY	202	3		FY 2	024	
	1	2	3	Δ	1	2	2	4	1	2	<u></u> 3	1	2	3	4	1	2	3 4		1 2	3	Δ	1	2	3	Δ
N/A		-	J	-		-	U	-	•	-			-	J	-	•	-	-		1 2	J		•	-	J	-

hibit R-4A, RDT&E Schedule Details: PB 2020 Army					Date: March	า 2019
opropriation/Budget Activity 40 / 4	<b>R-1 Program Ele</b> PE 0603790A / N Development	ment (Number ATO Research	r/ <b>Name)</b> and	Project (N 691 / NA7	Number/Nam O Rsch & De	e) vel
	Schedule Details					
		Sta	ırt		En	d
Events		Sta Quarter	irt Year		En Quarter	d Year

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					<b>R-1 Program Element (Number/Name)</b> PE 0603801A <i>I Aviation - Adv Dev</i>								
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020         FY 2020         FY 2021         FY 2022         FY 2023         FY 2024         Cost           OCO         Total         FY 2021         FY 2022         FY 2023         FY 2024         Corr							Total Cost	
Total Program Element	-	9.653	86.180	459.290	-	459.290	536.067	656.804	661.194	801.200	Continuing	Continuing	
B47: Future Vertical Lift	-	9.653	86.180	31.990	-	31.990	22.067	45.104	230.294	652.900	Continuing	Continuing	
F12: Future Attack-0.0000.000427.300Reconnaissance Aircraft					-	427.300	514.000	611.700	430.900	148.300	Continuing	Continuing	

### A. Mission Description and Budget Item Justification

Future Vertical Lift (FVL) is an initiative to develop a family of vertical lift aircraft for the United States Armed Forces. FVL was established by the Secretary of Defense to focus all Department of Defense (DoD) vertical lift capabilities and technology development as well as retain long-term engineering capabilities. The Deputy Secretary of Defense issued the FVL Strategic Plan to outline a joint approach for the next generation vertical lift aircraft for all military services. The Strategic Plan provided a foundation for replacing the current fleet with advanced capability by shaping the development of vertical lift aircraft for the next 25 to 40 years. In 2017, FVL was identified as one of the Army's eight Cross Functional Team Pilots, derived from the six Chief of Staff of the Army modernization priorities. The development and fielding of FVL will significantly improve vertical lift capabilities providing critical aviation support to the Joint warfighting community. Increases in maneuverability, range, speed, payload, survivability, reliability, and reduced logistical footprint can only be achieved through the FVL approach of developing new aircraft designs. FVL will integrate advancements in technologies and design configurations balanced with appropriate trades to ensure affordability.

Program Change Summary (\$ in Millions)	<u>FY 2018</u>	FY 2019	FY 2020 Base	FY 2020 OCO	<u>FY 2020</u>	<u>) Total</u>
Previous President's Budget	14.055	10.793	21.690	-		21.690
Current President's Budget	9.653	86.180	459.290	-	45	59.290
Total Adjustments	-4.402	75.387	437.600	-	43	37.600
<ul> <li>Congressional General Reductions</li> </ul>	-0.008	-0.013				
<ul> <li>Congressional Directed Reductions</li> </ul>	-4.000	-				
<ul> <li>Congressional Rescissions</li> </ul>	-	-				
<ul> <li>Congressional Adds</li> </ul>	-	75.400				
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-				
<ul> <li>Reprogrammings</li> </ul>	-	-				
SBIR/STTR Transfer	-0.394	-				
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	437.600	-	43	37.600
Congressional Add Details (\$ in Millions, and Inclue	les General Redu	<u>ictions)</u>			FY 2018	FY 2019
Project: B47: Future Vertical Lift						
Congressional Add: Future Attack Reconnaissance	Aircraft				-	75.400

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019						
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (Number/Name) PE 0603801A / Aviation - Adv Dev						
Congressional Add Details (\$ in Millions, and Includes General Rec	luctions)	FY 2018	FY 2019				
	Congressional Add Subtotals for Project: E	- 47	75.400				
	Congressional Add Totals for all Proje	cts -	75.400				
Change Summary Explanation The FY 2018 funding request was reduced by \$4M due to a delay in the The FY 2019 funding request was increased for the Army's future vertic (FARA) competitive prototyping effort. In FY 2020 and beyond, FARA for The FY 2020 funding request increase (\$10.300M) in PE 0603801A B4 opportunity to accelerate the FLRAA program schedule.	e FVL Project B47's Future Long Range Assault Aircraft (Fl cal lift program to initiate the Capability Set One Future Atta unds are requested under Project F12 Future Attack Recon 7 for Future Long Range Attack Aircraft is the funding requ	.RAA) Analysis of ck Reconnaissance naissance Aircraft red to support the	Alternatives. e Aircraft Army's				

Exhibit R-2A, RDT&E Project Ju	Date: March 2019											
Appropriation/Budget Activity 2040 / 4	N/Budget Activity     R-1 Program Element (Number/Name)     Project (Number/Name)       PE 0603801A / Aviation - Adv Dev     B47 / Future								l <b>umber/Name)</b> ire Vertical Lift			
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
B47: Future Vertical Lift	-	9.653	86.180	31.990	-	31.990	22.067	45.104	230.294	652.900	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

The Future Vertical Lift Project's funding provides for the development of a Future Long Range Assault Aircraft (FLRAA) Capability Set Three (CS3) aircraft system within the FVL family of systems. FVL FLRAA (CS3) aircraft will conduct Air Assault, Amphibious Assault, Urban Assault/Security, Attack, Maritime Interdiction, Medical Evacuation (MEDEVAC), Humanitarian Assistance/Disaster Relief (HA/DR), Tactical Resupply, Direct Action (DA), Non-Combatant Evacuation Operation (NEO) and Combat Search and Rescue (CSAR) operations in support of Army, including Army Special Operations Command, Marine Corps and Joint forces. The FVL FLRAA (CS3) platform will significantly increase speed, range, mobility, and payload over current US Army H-60 and US Marine Corps H-1 aircraft and provide Combatant Commanders with tactical capabilities at greatly increased operational and strategic distances. The FVL Capability Set 3 Materiel Development Decision was approved October 2016. FY 2018 funding continued to support FVL AoA modeling, simulation and analysis to include risk, cost and affordability, sustainment and trades and initiation of the Test Evaluation and Master Plan (TEMP), Draft Capability Development Document (CDD), Acquisition Strategy, Life Cycle Cost Estimate, and Life Cycle Sustainment Plan (LCSP). FY 2019 funding will complete the AoA efforts, Acquisition Planning and Strategy Development and LCSP, conduct Initial Readiness Assessments, prepare Systems Engineering decomposition and translation of Draft CDD into Weapon System Specification, and initiate the balance of Milestone A documentation to include the Acquisition Strategy, the Weapon System Specification, the Systems Engineering Plan, and the LCSP and will support the continued development of the TEMP and the CRP. The Army is continuing to seek opportunities to accelerate the FLRAA program schedule.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Future Vertical Lift (FVL) Analysis of Alternatives	2.039	1.190	-
<b>Description:</b> FVL Analysis of Alternatives modeling, simulation, and analysis performed by U.S. Army TRADOC Analysis Center, U.S. Army Materiel Systems Analysis Activity and other supporting agencies.			
<i>FY 2019 Plans:</i> Effort will be completed in FY 2019.			
FY 2019 to FY 2020 Increase/Decrease Statement: The AoA will conclude in FY 2019.			
Title: Engineering Services / Research Studies	4.431	6.296	23.032
Description: Engineering research, planning, modeling, analyses and reviews supporting the FVL acquisition program.			
FY 2019 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date:	March 2019			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603801A / Aviation - Adv Dev	Project (Number/ B47 / Future Vertic	roject (Number/Name) 47 / Future Vertical Lift			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020		
Conduct Initial Readiness Assessment, prepare Systems Engineering Decompo Development Documentation (CDD) into Weapon System Specification and init	osition and Translation of Draft Capability iate Milestone A documentation development					
<b>FY 2020 Plans:</b> Will complete and staff key Milestone A documentation to include the Weapon S Plan and continue developing the TEMP and CRP.	System Specification and Systems Engineerin	ng				
FY 2019 to FY 2020 Increase/Decrease Statement: Engineering staff ramp up to support activities leading to Milestone A and TMR	R Contract Award.					
Title: Program Management		2.448	1.695	5.280		
Description: Oversight and management of the FVL acquisition program.						
<b>FY 2019 Plans:</b> Complete Acquisition Planning and Strategy Development for FVL Capability Se documentation and TMRR Contracts Requirements Package.	et 3 aircraft. Begin development of Milestone	A				
FY 2020 Plans: Complete and staff key Milestone A documentation to include the Acquisition St	rategy and continue developing the CRP.					
FY 2019 to FY 2020 Increase/Decrease Statement: Program staff ramp up to support activities leading to Milestone A and TMRR C	ontract Award.					
Title: Supportability Analysis and Acquisition Support		0.735	1.204	3.678		
Description: Acquisition and supportability planning and development of docum	nentation on the FVL program.					
<b>FY 2019 Plans:</b> Complete the development of the Life Cycle Sustainment Plan and participate in Package to support the TMRR Request for Proposal (RFP) release.	n the development of the Contracts Requirem	ents				
<b>FY 2020 Plans:</b> Will complete the staffing of the LCSP and continue developing the CRP.						
FY 2019 to FY 2020 Increase/Decrease Statement: Staff ramp up to support activities leading to Milestone A and TMRR Contract A	ward.					
Title: FY 19 SBIR/STTR Transfer		-	0.395	-		
Description: FY 2019 SBIR/STTR Transfer						

Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: N	larch 2019		
Appropriation/Budget Activity     R-1 Program Element (Number/Name)     Pr       2040 / 4     PE 0603801A / Aviation - Adv Dev     B4								<b>Projec</b> B47 <i>I F</i>	roject (Number/Name) 47 / Future Vertical Lift			
B. Accomplishments/Planned Prog	grams (\$ in N	<u>/lillions)</u>							FY 2018	FY 2019	FY 2020	
<b>FY 2019 Plans:</b> FY 2019 SBIR/STTR Transfer												
FY 2019 to FY 2020 Increase/Decr FY 2019 SBIR/STTR Transfer	ease Statem	ent:										
				Accon	nplishment	s/Planned P	rograms Sul	ototals	9.653	10.780	31.990	
							FY 2018	FY 20	19			
Congressional Add: Future Attack	Reconnaissa	nce Aircraft					-	75.4	400			
FY 2019 Plans: Future Attack Reco	nnaissance A	ircraft										
				Cong	ressional A	dds Subtota	Is -	75.4	400			
C. Other Program Funding Summa	ary (\$ in Milli	ons)										
			FY 2020	<u>FY 2020</u>	FY 2020					Cost To	<u>.</u>	
Line Item • 313: Adv Rotarywing Veh Tech	<u>FY 2018</u> 142.093	<u>FY 2019</u> 113.678	<u>Base</u> 0.000	<u>000</u> -	<u>Total</u> 0.000	<u>FY 2021</u> -	<u>FY 2022</u> -	<u>FY 202</u>	<u>3 FY 202</u>	<u>4</u> <u>Complete</u> 0.000	<u>Total Cost</u> 255.771	
Remarks												
PE 0603003A/313 Advanced Rotary	-wing Vehicle	e Technolog	y funds Arm	y Science &	Technology	(S&T) project	ts to mature,	demons	trate and in	egrate compo	onents,	

#### D. Acquisition Strategy

An Analysis of Alternatives (AoA) was initiated in 3rd Quarter FY 2017 to assess the technical feasibility, operational feasibility, technical risk, and affordability of potential materiel solutions. The AoA will be informed by previous studies, ongoing Advanced Technology Development S&T projects, and input from government, industry and academia. The results of the AoA and Initial Readiness Assessments will be available to support a projected Milestone A decision in 4th Quarter FY 2021 and a Technology Maturation and Risk Reduction (TMRR) Request for Proposal (RFP) Release in 1st Quarter FY 2022. After a successful Source Selection Evaluation Board, the Army will award competitive TMRR contracts to complete preliminary design and risk reduction testing.

subsystems and systems for vertical lift and unmanned air vehicle technologies. This will enable Army aviation modernization and reduce risk for FVL FLRAA.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	019	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060	ogram Ele 3801A / A	ement (N Aviation -	l <b>umber/N</b> Adv Dev	ame)	Project B47 / F	(Numbe	r/Name) tical Lift		
Management Service	es (\$ in M	illions)		FY 2018		FY 2	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	FVL Program Office : Redstone Arsenal, AL	0.320	2.448	Nov 2017	1.695	Dec 2018	5.280	Dec 2019	-		5.280	Continuing	Continuing	Continuing
		Subtotal	0.320	2.448		1.695		5.280		-		5.280	Continuing	Continuing	N/A
Product Developme	nt (\$ in Mi	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Analysis of Alternatives (AoA)	TBD	TRADOC Analysis Center : Fort Leavenworth, KS	2.430	2.039	Nov 2017	1.190	Nov 2018	-		-		-	0.000	5.659	-
		Subtotal	2.430	2.039		1.190		-		-		-	0.000	5.659	N/A
Support (\$ in Million	s)			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 Services / Research Studies - Organic	MIPR	FVL Program Office : Redstone Arsenal AL	0.549	1.432	Nov 2017	5.132	Nov 2018	13.405	Nov 2019	-		13.405	Continuing	Continuing	Continuing
Engineering Services / Research Studies - Other	C/FFP	GSA : Atlanta, GA	3.978	2.999	Aug 2018	1.164	Aug 2019	9.627	Aug 2019	-		9.627	Continuing	Continuing	Continuing
Acquisition and Supportability Analysis	MIPR	Army Logistics Command / Army Contracting Command : Redstone Arsenal, AL	0.425	0.735	Nov 2017	1.204	Dec 2018	3.678	Nov 2019	-		3.678	Continuing	Continuing	Continuing
Future Attack Reconnaissance Aircraft Execution	C/Various	AMRDEC : RSA	-	-		75.400	Jun 2019	-		-		-	0.000	75.400	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.395		-		-		-	0.000	0.395	-

Exhibit R-3, RDT&E Pro	oject Co	ost Analysis: PB 2	020 Army	y								Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NPE 0603801A / Aviation - Adv DevB47 / Futu							r/ <b>Name)</b> ical Lift		
Support (\$ in Millions)				FY 2018 FY 2019			FY 2020 FY 2 Base OC		2020 CO	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 Cost Date		Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	4.952	5.166		83.295		26.710		-		26.710	Continuing	Continuing	N/A
			Prior Years	FY 2	2018	FY 2	019	FY 2 Ba	2020 se	FY 2 O	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	7.702	9.653		86.180		31.990		-		31.990	Continuing	Continuing	N/A

**Remarks** 



hibit R-4A, RDT&E Schedule Details: PB 2020 Army	Date: Mare	ch 2019				
propriation/Budget Activity 40 / 4	<b>R-1 Program</b> PE 0603801A	Element (Numbe I Aviation - Adv D	Project (Nu B47 / Future	Number/Name) ure Vertical Lift		
	Schedule Details	6				
		St	art		E	nd
Events		Quarter	Year	Qu	uarter	Year
Analysis of Alternatives		3	2017		2	2019
Weapons System Specification Development		2	2019		4	2020
Milestone A Documentation and Contracts Requirements Package		2	2019		4	2021
Projected Milestone A		4	2021		4	2021
Request for Proposal Release		1	2022		1	2022
Proposal Preparation		1	2022		2	2022
Source Selection Evaluation Board		2	2022		2	2023
Technology Maturation and Risk Reduction Contract Award		2	2023		2	2023

Exhibit R-2A, RDT&E Project J	ustification	: PB 2020 A	Army							Date: Mar	ch 2019			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)ProjePE 0603801A / Aviation - Adv DevF12 /					<b>ct (Number/Name)</b> Future Attack Reconnaissance Aircraft			
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		
F12: Future Attack Reconnaissance Aircraft	-	0.000	0.000	427.300	-	427.300	514.000	611.700	430.900	148.300	Continuing	Continuing		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				
A. Mission Description and Bu The Future Attack Reconnaissa Capability Set 1 aircraft will cond attack/reconnaissance while sig greatly increased tactical, opera the name Future Attack Reconn	dget Item J nce Aircraft duct attack/r nificantly inc tional and si aissance Air	ustification Project's fur econnaissar creasing spe trategic capa craft (FARA	nding provid nce mission red, range, s abilities. The N.	es for the d s in suppor survivability e FVL Capa	levelopment t of the Arm , and lethali ability Set 1	t of a Capab y. The FVL ty over the p Initial Capal	bility Set 1 a Capability S previously u bilities Requ	ircraft syste Set 1 platfor Ised OH-58 Jirements D	em within the rm will fill the and provide Document wa	e FVL famil e gap in ca e Combata as approve	ly of system pability for li nt Comman d in July 20	s. FVL ght weight ders with 18 under		
B. Accomplishments/Planned	Programs (	\$ in Million	<u>s)</u>						FY	2018 I	FY 2019	FY 2020		
Title: Future Attack Reconnaissa	ance Aircraf	t								-	-	427.300		
Description: Design, build, and	test compet	itive prototy	pes in prepa	aration for r	apid acquisi	ition and fiel	lding.							
FY 2020 Plans: At the completion of the initial de FY 2019 to FY 2020 Increase/D	esign phase, becrease Sta	two industry	y solutions v	will be chos	en to contin	ue to final d	lesign, build	l, and test.						
Funding in 2019 initiates the end	nt anu in 20.		Selectees De	sym to imai		hmonte	is.	arama Sub	totals			107 200		
					Accomplis			granis Sub	iulais	-	-	427.300		

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

N/A

### <u>Remarks</u>

### D. Acquisition Strategy

The Future Attack Reconnaissance Aircraft (FARA) received a Congressional plus up (\$75.4M) in FY 2019 within the Project B47 FVL line. A streamlined acquisition approach is planned by executing a competitive prototyping effort thru FY 2023 leading to entry to a formal program of record, potentially at MS B, in 2024 for an EMD phase and production. Four to six vendor solutions will be evaluated starting in FY 2019 thru FY 2020 resulting in a downselect to two vendor solutions for final design, build, and test, which will provide the required data and information to downselect to one solution for the EMD phase.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019		
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0603801A I Aviation - Adv Dev	F12 / Futu	re Attack Reconnaissance Aircraft

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date:	Date: March 2019						
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)Project (NPE 0603801A / Aviation - Adv DevF12 / Futu							<b>Jumber/Name)</b> ure Attack Reconnaissance Aircraft					
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				
Execution	C/Various	AMRDEC : Redstone Arsenal, AL	-	-		-		427.300	Mar 2020	-		427.300	Continuing	Continuing	-				
		Subtotal	-	-		-		427.300		-		427.300	Continuing	Continuing	N/A				
		Prior Years	FY	2018	FY 2019		FY 2020 Base		FY 2	2020 CO	020 FY 2020 O Total		Total Cost	Target Value of Contract					
Project Cost Totals			-	-		0.000		427.300		-		427.300	Continuing	Continuing	N/A				

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army Date: March 2019																												
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)Project (IPE 0603801A / Aviation - Adv DevF12 / Futu									(Nu iture	lumber/Name) ire Attack Reconnaissance Aircraft											
<b>F</b> (N	FY 2018 FY			Y 2	2019	FY 2020			FY 2021			FY 2022			FY 2023			3	FY 2024			4						
Event Name		1 2 3		4 1		2 3 4		1 2 3 4		4	1 2 3 4			1 2 3 4			4	1 2 3 4			4	1 2 3 4			4			
Competitve Prototype Design							Competiti	ve Prot	otype [	Design																		
Competetive Prototype Build										Com	petitiv	e Pro	ototype	e Build														
Competitve Prototype Test																				Co	ompet	titive F	Prototy	pe Te:	st			
Material Development Decision																	MDI	D										
Milestone B Document Development																	MB	DD										
Contract Requirement Package Development																	Con	tracto	Requ	iremer	nt Pa	ckage	Devek	opmer	nt			
Request for Proposal Release																								RF	1 P Rele	ase		
Proposal Submission/Evaluation																									Propos	sal Sut	omissio	n/Eva
Milestone B																											N	Ailesto

chibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	ch 2019				
opropriation/Budget Activity 40 / 4	<b>R-1 Program</b> PE 0603801A	Element (Numbe I Aviation - Adv D	<b>r/Name)</b> ev	<b>Project (Number/Name)</b> F12 <i>I Future Attack Reconnaissance Air</i>					
	Schedule Detail	S							
		Sta	art	E	nd				
Events		Quarter	Year	Quarter	Year				
Competitve Prototype Design		3	2019	2	2020				
Competetive Prototype Build		3	2020	4	2022				
Competitve Prototype Test		1	2023	4	2023				
Material Development Decision		2	2022	2	2022				
Milestone B Document Development		2	2022	4	2024				
Contract Requirement Package Development		2	2022	4	2023				
Request for Proposal Release		1	2024	1	2024				
Proposal Submission/Evaluation		1	2024	4	2024				
Milestone B		4	2024	4	2024				

Exhibit R-2, RDT&E Budget Item	n Justificat	i <b>on:</b> PB 202	20 Army					Date: March 2019				
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv 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	-	29.619	17.230	6.254	1.085	7.339	6.124	6.319	5.809	5.939	0.000	78.379
526: Marine Orien Log Eq Ad	-	3.305	3.891	2.916	1.085	4.001	2.923	2.914	2.608	2.611	0.000	22.253
EW8: Armored Engineer Vehicles	-	11.712	1.482	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	13.194
G11: Adv Elec Energy Con Ad	-	4.982	6.331	3.338	-	3.338	3.201	3.405	3.201	3.328	0.000	27.786
K39: Field Sustainment Support Ad	-	2.332	2.308	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.640
K41: Water And Petroleum Distribution - Ad	-	3.954	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.954
VR8: Combat Service Support Systems - Ad	-	3.334	3.218	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.552

#### A. Mission Description and Budget Item Justification

This Program Element (PE) supports advanced component development and prototypes of new and improved technologies for combat support and combat service support equipment essential to sustaining combat operations. Advancements in bridging, electric power generators, material-handling, environmental control, shelter systems, cargo aerial delivery, field service systems, mortuary affairs equipment and petroleum equipment are necessary to improve safety and increase the tactical mobility, operational capability, lethality and survivability on the digital battlefield and to provide for greater sustainment while reducing the logistics support burden. Army Watercraft funding supports initiatives to enhance the seaworthiness, safety, survivability, supportability, energy efficiency, environmental, regulatory compliance and reliability of existing systems.
Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Arm	C	Date: March 2019								
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	Advanced	<b>R-1 Program Element (Number/Name)</b> PE 0603804A <i>I Logistics and Engineer Equipment - Adv Dev</i>								
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	FY 2019	FY 2020 Base	FY 2020 OCC	<u>O</u> <u>FY 2020 Total</u>					
Previous President's Budget	35.333	14.248	14.387	-	14.387					
Current President's Budget	29.619	17.230	6.254	1.08	5 7.339					
Total Adjustments	-5.714	2.982	-8.133	1.08	5 -7.048					
<ul> <li>Congressional General Reductions</li> </ul>	-0.025	-0.018								
<ul> <li>Congressional Directed Reductions</li> </ul>	-4.500	-								
<ul> <li>Congressional Rescissions</li> </ul>	-	-								
<ul> <li>Congressional Adds</li> </ul>	-	3.000								
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-								
Reprogrammings	-	-								
SBIR/STTR Transfer	-1.189	-								
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-8.133	1.08	5 -7.048					

#### **Change Summary Explanation**

FY19 funding request was increased by \$3.00 million to support tactical electric program research for remote and forward operating bases FY 2020 funding requests was reduced by \$7.048 million to support the Army's modernization priorities in support of the National Defense Strategy.

Exhibit R-2A, RDT&E Project Ju		Date: March 2019										
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380 <i>Equipment</i>	a <b>m Elemen</b> 94A I Logisti - Adv Dev	t (Number/l cs and Eng	umber/Name) ne Orien Log Eq Ad				
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
526: Marine Orien Log Eq Ad	-	3.305	3.891	2.916	1.085	4.001	2.923	2.914	2.608	2.611	0.000	22.253
Quantity of RDT&E Articles   -   -   -   -								-	-	-		

### A. Mission Description and Budget Item Justification

This project supports efforts and studies for advanced component development, including prototypes of equipment and sub-systems which provide critical capabilities for Unified Land Operations (ULO), by extending the Commander's available maneuver space into and throughout the littorals, inland waterways and near coastal regions. Army watercraft equipment enables the conduct of riverine, Logistics-over-the-Shore (LOTS) and Joint Logistics-over-the-Shore (JLOTS), inter and intra-theater transport, movement and maneuver, mission command and sustainment, as identified in DODD 5100.01 (Functions of the Department of Defense and it's major components). Army Watercraft exploit the inland waterways and littoral regions as waterborne maneuver and supply routes, conducting operations through littoral entry points (developed, undeveloped, and austere access points) and in non-permissive, and/or denied access scenarios. The Army uses a spectrum of Army Watercraft systems, from heavy sustainment ocean going landing craft capable of intra-theater and ship to shore transport and undeveloped beach or harbor access, to occangoing and harbor utility tug boats and barge derricks for transport and denied port/salvage operations, and modular causeway systems for (LOTS/JLOTS). The funding supports initiatives to enhance the seaworthiness, safety, survivability, supportability, energy efficiency, environmental, regulatory compliance and reliability of existing systems. Funded efforts will address critical gaps in these areas for the current fleet, while at the same time researching, developing and testing emergent technologies. To support future acquisitions and future fleet planning, funding efforts which will include conducting trade studies, Business Case Analyses to inform the requirement development process, and support Analysis of Alternatives (AoA). The funding enables Army's compliance with the National Defense Authorization Act of 1996 and 502(6) of the Clean Water Act and compliance with Environmental protection Agency (EPA

FY20 funding supports modernization of the Legacy fleet wide systems 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.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
<i>Title:</i> At Sea Transfer Technology	2.158	2.150	1.026	-	1.026
<i>Description:</i> At Sea Transfer Technology enables roll on and roll off (RO/RO) capability from vessels at sea and causeway transport of vehicles and equipment to the beach or shore. The current effort serves to inform development of a Service Life Extension Program (SLEP) for the Modular Warping Tug (MWT) and Causeway Ferry (CF) which are principle working platforms in the Modular Causeway System (MCS).					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: Marc	h 2019			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603804A <i>I Logistics and Eng</i> <i>Equipment - Adv Dev</i>	<b>Project (N</b> 526 / Marir	<b>Project (Number/Name)</b> 526 <i>I Marine Orien Log Eq Ad</i>				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Complete SLEP design prototype; perform testing of MWT/CF SLEP prototype Production Level TDP.							
<b>FY 2020 Base Plans:</b> Perform testing of MWT/CF SLEP prototype and to complete Technical Data P Maritime workforce.	ackage for a reference for the						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> MWT initial design is planned for completion in FY19. FY20 will focus on the te to require a lower dollar value.	sting phase, which is anticipated						
Title: Environmental Compliance Projects		0.459	0.506	0.060	-	0.060	
<b>Description:</b> Environmental projects enable compliance with requirements as National Discharge Standards (UNDS) and Environmental Protection Agency (EPA reviews the UNDS Code of Federal Regulations (CFR) language in five-ye three batches (types of discharge). This is an ongoing assessment of statutory result in material solution change.	defined in law under Uniform EPA) emissions standards. The ear increments separated into / language which may or may not						
<b>FY 2019 Plans:</b> Continue identification of Environmental Compliance Technologies IAW evolvir requirements; continue MSD shipboard test and evaluation; continue OWS req and continue Clean Ballast Water requirement and capability analysis.	ng statutory and regulatory uirement and capability analysis;						
<b>FY 2020 Base Plans:</b> Identification of Environmental Compliance Technologies IAW evolving statutor and ensure ships are compliant. Will also fund Navy efforts for UNDS analysis	ry and regulatory requirements and committee representation.						
<ul> <li>FY 2019 to FY 2020 Increase/Decrease Statement:</li> <li>The following UNDS efforts meet compliance standards and will conclude in FY requirements:</li> <li>MSD shipboard test and evaluation.</li> <li>OWS requirement and capability analysis.</li> <li>Clean Ballast Water requirement and capability analysis.</li> </ul>	Y19, thereby reducing funding						
Title: Force Protection Capability		0.619	0.640	0.500	-	0.500	

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/I</b> PE 0603804A <i>I Logistics and Engli Equipment - Adv Dev</i>	Name) ineer	Project (N 526 / Marir	umber/Nan ne Orien Looุ		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Description:</b> Army Watercraft Systems (AWS) Force Protection capability is lin Current efforts include development of gunner station and weapon station local Remotely Weapon Station (CROWS) and non-lethal Escalation of Force (EoF), white light, green dazzler, an acoustic hailing device, percussion grenades, and (FLIR).	nited to defensive measures. tions, integration of Common . The EoF capability includes d Forward Looking Infra-Red					
FY 2019 Plans: Install and test CROWS aboard LSV-7 class.						
<i>FY 2020 Base Plans:</i> Will design, Install, and test CROWS aboard LCU and LSV 7 class vessels.						
FY 2019 to FY 2020 Increase/Decrease Statement: Effort funding change due to economic adjustment - no significant change in we	ork efforts.					
Title: Army Watercraft Program Support		0.069	0.370	0.300	-	0.300
<b>Description:</b> Matrix Salary Support includes Program Management and System to manage the program projects and provide contractor oversight. It also include training and other Government costs required to retain a professional acquisition	m Engineering resources required des benefits, travel, personnel on workforce.					
FY 2019 Plans: Provide engineering matrix Support and fund Navy for UNDS analysis and com	mittee representation.					
<i>FY 2020 Base Plans:</i> Will provide MWT Engineering test support as well as engineering and Naval s	upport for the Fleet.					
FY 2019 to FY 2020 Increase/Decrease Statement: Effort funding change due to economic adjustment - no significant change in we	ork efforts.					
Title: Trade Studies and Business Analyses		-	0.100	1.030	-	1.030
<b>Description:</b> Conduct Affordability and Feasibility Studies to include support of vessel platforms.	f Analysis of Alternatives for future					
FY 2019 Plans:						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/I</b> PE 0603804A / Logistics and Engli Equipment - Adv Dev	Name) ineer	Project (N 526 / Marin	ne) g Eq Ad		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Support initiation of Feasibility Study for future vessel platforms.						
<i>FY 2020 Base Plans:</i> Support the following Feasibility Studies for future vessel platforms: Initiation or analysis and initiation of electrical power studies to support Command, Control Intelligence, Surveillance and Reconnaissance (C4ISR) upgrades and joint ope vessels.	f human factor engineer , Communications, Computers, eration capabilities for legacy					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Effort increases by adding human factor engineer analysis and initiation of elector C4ISR upgrades and joint operation capabilities for Legacy Vessels.	ctrical power studies to support					
Title: SEAFLIR Integration Kits		-	-	0.000	1.085	1.085
<b>Description:</b> Integration of SEAFLIR 280 HD maritime infrared imaging system and LCU vessels. The SEAFLIR 280-HD maritime imaging system greatly red Watercraft to identify and track smugglers, terrorists, or any other threat day ar operating in support of current named operations and contingency operational USARCENT COMPLANS.	n for maritime use on LSV uces the ability for the Army nd night that they encounter requirements as part of					
<b>FY 2020 Base Plans:</b> N/A Base RDTE funds.						
<i>FY 2020 OCO Plans:</i> Initiate an effort to analyze, design, and develop a prototype for installing the S LCU.	EAFLIR on the LSV 1 Class and					
FY 2019 to FY 2020 Increase/Decrease Statement: No funding received in FY19 for SEAFLIR						
Title: FY2019 SBIR/STTR Transfer		-	0.125	-	-	-
<i>FY 2019 Plans:</i> 2019 SBIR/STTR Transfer						
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SIBR/STTR Transfer						
Accomplishme	nts/Planned Programs Subtotals	3.305	3.891	2.916	1.085	4.001

Exhibit R-2A, RDT&E Project Justi	Date: March 2019												
Appropriation/Budget Activity 2040 / 4	<b>R-1 Pr</b> PE 06 <i>Equipr</i>	r <b>ogram Elen</b> 03804A / Log ment - Adv D	n <b>ent (Numb</b> gistics and E Pev	Number/Name) rine Orien Log Eq Ad									
C. Other Program Funding Summary (\$ in Millions)													
			FY 2020	FY 2020	<u>FY 2020</u>					Cost To			
Line Item	<u>FY 2018</u>	FY 2019	Base	000	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023	FY 2024	<b>Complete</b>	<b>Total Cost</b>		
MA4501: MODIFICATION KITS	20.980	25.201	34.587	4.234	38.821	16.407	16.840	16.354	7.393	0.000	141.996		
MA4502: INSTALLATION	23.233	12.278	5.438	-	5.438	5.434	2.792	2.954	2.955	0.000	55.084		
OF MODIFICATIONS													
M11101: Army Watercraft Esp	20.110	8.508	35.194	-	35.194	40.953	36.646	33.957	30.541	0.000	205.909		
ML5355: Items Less	2.877	8.385	6.920	-	6.920	1.846	-	-	-	0.000	20.028		
Than \$5.0M (Float/Rail)													

#### **Remarks**

FY 2018 Accomplishments:

-Continue the development of the MWT/CF SLEP design solution; initiated prototype production.

-Continue EOF development on LSV CROWS.

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

-Material Sanitation Device (MSD) shipboard test and evaluation.

-Oil Water Separator (OWS) requirement and capability analysis.

-Clean Ballast Water requirement and capability analysis.

### D. Acquisition Strategy

Leverage government and public research centers (TARDEC and Naval Surface Warfare Center (NSWC) Philadelphia) and known public research institutes (Battelle) along with associated contract mechanisms to prototype, test, and evaluate component technologies that may be applicable to the current and future Army Watercraft fleet.

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	019	
Appropriation/Budge 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603804A <i>I Logistics and Engineer</i> <i>Equipment - Adv Dev</i>						<b>Project (Number/Name)</b> 526 <i>I Marine Orien Log Eq Ad</i>							
Product Developmen	nt (\$ in M	illions)	ſ	FY	2018	FY 2019		FY 2020 Base		FY 2 OC	020 FY 2020 O Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Force Protection, Escalation of Force (EoF) Development (i.e. CROWS)	MIPR	TARDEC : Warren, MI	2.649	0.619	Jul 2018	0.640	Feb 2019	0.500	Feb 2020	-		0.500	Continuing	Continuing	-
At Sea Transfer Systems (Modular Warping Tug / Causeway Ferry)	SS/CPFF	TARDEC DTIC - I, Battelle : Fort Belvoir, VA	2.216	2.158	Aug 2018	2.150	Feb 2019	1.026	Nov 2019	-		1.026	Continuing	Continuing	-
Environmental Compliance Uniform National Discharge Standards (UNDS)	MIPR	Carderock : Maryland and Pennsylvania	2.822	0.459	Feb 2018	0.506	Jan 2019	0.060	Dec 2019	-		0.060	Continuing	Continuing	-
Trade Study Analyses	TBD	TBD : TBD	-	-		0.100	Sep 2019	1.030	Feb 2020	-		1.030	Continuing	Continuing	-
SEA FLIR Integration	MIPR	TARDEC : Warren, MI	-	-		-		0.000		1.085	Oct 2019	1.085	0.000	1.085	-
2019 SIBR/STTR Transfer	TBD	TBD : TBD	-	-		0.125		-		-		-	0.000	0.125	-
Subtotal 7.687 3.236						3.521		2.616		1.085		3.701	Continuing	Continuing	N/A

#### **Remarks**

Significant Changes from FY19-20:

-MWT initial design is planned for completion in FY19. FY20 will focus on the testing phase, which is anticipated to require a lower dollar value.

-The following UNDS efforts meet compliance standards and will conclude in FY19:

- MSD shipboard test and evaluation.

- OWS requirement and capability analysis.

- Clean Ballast Water requirement and capability analysis.

- Trade Studies and Business Analyses from FY19-20 increases by adding human factor engineer analysis and initiation of electrical power studies to support C4ISR upgrades

and joint operation capabilities for Legacy Vessels.

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 Watercraft Program Support	MIPR	Detroit Arsenal PMs, TARDEC, NAVSEA Carderock :	1.358	0.069	Nov 2017	0.370	Dec 2018	0.300	Dec 2019	-		0.300	Continuing	Continuing	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	19	
Appropriation/Budge 2040 / 4		<b>R-1 Program Element (Number/Name)</b> PE 0603804A <i>I Logistics and Engineer</i> <i>Equipment - Adv Dev</i>						<b>Project (Number/Name)</b> 526 <i>I Marine Orien Log Eq</i>							
Support (\$ in Million	is)			FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
	Maryland, Warren, MI														
		Subtotal		0.370		0.300		-		0.300	Continuing	Continuing	N/A		
Remarks Matrix Employees are fund	ded through	a reimbursable MIPR an	d disbursed	monthly.											Target
			Prior Years	FY 2	018	FY 2	019	FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Value of Contract
		Project Cost Totals	9.045	3.305		3.891		2.916		1.085		4.001	Continuing	Continuing	N/A
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A				Date: March 20	19				
Appropriation/Budget Activity 2040 / 4			<b>R-1 F</b> PE 00 <i>Equip</i>	Program Elemen 603804A / Logist pment - Adv Dev	<b>Project (N</b> 526 / Mari	Number/Name) ine Orien Log Eq Ad			
Event Name	FY 2018	FY 20	19	FY 2020	FY 2021	F	Y 2022	FY 2023	FY 2024
Army Watercraft Program Support	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2	2 3 4	1 2 3 4	1 2 3 4
Force Protection: Common Remotely Operated Weapon Station									
Force Protection: CROWS on LSV-1 Class									
Force Protection: CROWS on LSV-7 Class									
Force Protection: CROWS on LCU 2000 Class									
At Sea Transfer Technology									
Modular Warping Tug (MWT) / Causeway Ferry (CF)									
MWT / CF - SLEP Development Contract	1								
MWT / CF - SLEP Prototype and Proof Concept									
MWT / CF - SLEP Testing									
Environmental Compliance									
Uniformed National Discharge Standards (UNDS)									
UNDS Batch 2				2					
				1	1				

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Date: March 20	19							
Appropriation/Budget Activity 2040 / 4		<b>R-1 I</b> PE 0 <i>Equi</i> j	Program Elemen 603804A / Logist pment - Adv Dev	it (Number/Name ics and Engineer	) Project (N 526 / Man	<b>Number/Name)</b> rine Orien Log Eq Ad			
Event Name	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
UNDS Batch 3	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1   2   3   4	1 2 3 4	1 2 3 4		
Trade Studies and Business Analyses									

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A <i>I Logistics and Engineer</i> <i>Equipment - Adv Dev</i>	Project (N 526 / Marin	umber/Name) ne Orien Log Eq Ad	
Sch	nedule Details			

	Sta	art	Er	ld
Events	Quarter	Year	Quarter	Year
Army Watercraft Program Support	1	2018	4	2024
Force Protection: Common Remotely Operated Weapon Station (CROWS)	1	2018	4	2024
Force Protection: CROWS on LSV-1 Class	1	2018	3	2020
Force Protection: CROWS on LSV-7 Class	2	2019	4	2021
Force Protection: CROWS on LCU 2000 Class	1	2018	4	2024
At Sea Transfer Technology	1	2018	4	2024
Modular Warping Tug (MWT) / Causeway Ferry (CF)	1	2018	4	2021
MWT / CF - SLEP Development Contract	4	2018	4	2018
MWT / CF - SLEP Prototype and Proof Concept	1	2018	4	2020
MWT / CF - SLEP Testing	1	2020	4	2021
Environmental Compliance	1	2018	4	2024
Uniformed National Discharge Standards (UNDS)	1	2018	4	2022
UNDS Batch 2	4	2020	4	2020
UNDS Batch 3	4	2022	4	2022
Trade Studies and Business Analyses	4	2019	4	2022

Exhibit R-2A, RDT&E Project J	ustification	: PB 2020 A	Army							Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progr</b> PE 060380 <i>Equipmen</i>	<b>am Elemen</b> 04A I Logisti t - Adv Dev	it (Number/ ics and Eng	<b>Name)</b> ineer	Project (N EW8 / Arm	umber/Nar ored Engin	<b>ne)</b> eer Vehicles	5
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
EW8: Armored Engineer Vehicles	-	11.712	1.482	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	13.194
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project supports live fire test FY 2020 funding cancelled for A Funding supports modernization military load capacities, autonom Operational Requirements and e	st and evaluation armored Motion of Army Brinous operation early user fe	ation, initial ile Earthmo dging fleets ons and oth edback to si	operational ver (AME) c by investiga er emerging upport future	test and ev levelopmer ating techno technolog e sustainmo	valuation an nt. ology insert jies. Fundin ent and ope	d productior ions includir g also suppo erational mo	n qualification ng, but not l orts develop vement ope	on testing o imited to: co bing initial p rating conc	f the Joint A ondition bas rototypes an epts.	ssault Bridg ed mainten nd testing to	ge (JAB). ance, increa o enable refi	ased nement of
B. Accomplishments/Planned	Programs (	\$ in Million	s <u>)</u>							FY 2020	FY 2020	FY 2020
Title: Joint Assault Bridge (JAB)								<b>FY 2018</b>	FY 2019	Base	000	lotal
<b>Description:</b> This effort funds the the Army Mobility Augmentation Engineer Battalions (BEBs) with JAB System will provide a Gap C on the battlefield and keep pace	e developm Companies a survivable Crossing Cap with Abrams	ent and test (MACs) and deployable dability to cr s ABCT ope	ing of the Jo d Armor Brig e and sustai oss wet or o rations.	bint Assault Jade Comb nable heav Iry gaps an	t Bridge (JA at Teams (/ /y assault b nd provide fr	B). The JAE ABCTs) Brig ridging capa reedom of m	3 provides jade ability. The naneuver					
Title: Armored Mobile Earthmov	er (AME)							-	1.435	-	-	
<b>Description:</b> This effort funds the will replace the M9 Armored Cor- units during attacks and moveme capabilities to the maneuver unit support the maneuver force?s do will be capable of supporting all of	e developm nbat Earthm ents to conta s until more efenses. It v combat force	ent and test over and wi act. The AM survivability vill operate v es and the fu	ing of the Ai Il be primari IE will provid and counted with primaril ull range of t	rmored Mo ly a mobility de hasty su er-mobility a y medium a military ope	bile Earthm y asset, ena ırvivability a assets can ı and heavy r erations.	over (AME). abling mane nd counter-i nove forwar nechanized	AME uver mobility rd to forces but					

Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: Mar	rch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 Pi</b> PE 06 <i>Equipi</i>	r <b>ogram Ele</b> r 03804A / Lo ment - Adv L	nent (Numbo gistics and E Dev	er/Name) Ingineer	Project (N EW8 / Arm	umber/Na ored Engir	me) 1eer Vehicle	s
B. Accomplishments/Planned Pro	grams (\$ in N	<u>lillions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>FY 2019 Plans:</b> Funding supports Analysis of Alterna Center.	atives (AOA) s	study to be c	onducted by	/ the Army C	apabilities Ir	ntegration					
FY 2019 to FY 2020 Increase/Decr FY 2020 funding cancelled for Mobil	ease Stateme e Armored Co	e <b>nt:</b> ombat Earthi	mover (MAC	E) developn	nent.						
Title: FY 2019 SBIR / STTR Transfe	ŗ						-	0.047	-	-	-
<b>FY 2019 Plans:</b> SBIR / STTR											
FY 2019 to FY 2020 Increase/Decr Adjusted for FY 2019 SBIR / STTR 1	ease Stateme Fransfer	ent:									
			Accomplis	hments/Plar	nned Progra	ams Subtota	ls 11.712	1.482	-	-	-
C. Other Program Funding Summa	ary (\$ in Milli	ons)									
			<u>FY 2020</u>	<u>FY 2020</u>	FY 2020					Cost To	
Line Item • GZ3001: Joint Assault Bridge <u>Remarks</u>	<u>FY 2018</u> 128.350	<u>FY 2019</u> 139.146	<u>Base</u> 205.517	<u>000</u> -	<u>Total</u> 205.517	<u>FY 2021</u> 198.392	<u>FY 2022</u> 264.044	<u>FY 2023</u> 278.931	<u>FY 2024</u> 254.406	Complete Continuing	Total Cost Continuing
D. Acquisition Strategy Funding will support RDT&E efforts E. Performance Metrics N/A	to support tes	ting and foll	ow-on produ	uction for As	sault Bridgin	g.					

Exhibit R-3, RDT&E Proje	ject Co	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budget Ac 2040 / 4	ctivity	,				R-1 Pro PE 060 Equipm	<b>ogram Ele</b> 3804A I L ent - Adv	ement (N ogistics a Dev	umber/N and Engin	ame) eer	Project EW8 / /	t <b>(Numbe</b> Armored E	r/ <b>Name)</b> Engineer V	ehicles	
Management Services (\$	\$ in Mi	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	]		
Con Me Cost Category Item &	ontract ethod Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Support N	MIPR	Various : Various	-	0.779	Oct 2017	0.150	Oct 2018	-		-		-	0.000	0.929	-
		Subtotal	-	0.779		0.150		-		-		-	0.000	0.929	N/A
Product Development (\$	6 in Mi	llions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	]		
Con Me Cost Category Item	ontract ethod Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AME Analysis of Alternatives (AOA)	C/FFP	TBD : TBD	-	-		1.285	Jan 2019	-		-		-	0.000	1.285	-
JAB Force Protection Development and SS Fabrication	S/FFP	DRS SUSTAINMENT SYSTEMS, INC. : SAINT LOUIS, MO	-	2.084	Oct 2017	-		-		-		-	0.000	2.084	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.047		-		-		-	0.000	0.047	-
		Subtotal	-	2.084		1.332		-		-		-	0.000	3.416	N/A
Remarks \$2.37M increase to FY18 produc	ıct deve	lopmental costs associa	ated with po	st Live Fire	testing Forc	e Protection	n Enhancen	nents / Live	Fire Remed	liation.		_	1		
Test and Evaluation (\$ in	n Millie	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 O	2020 CO	FY 2020 Total			
Con Me Cost Category Item	ontract ethod Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
JAB Initial Operational Test & Evaluation (IOTE)	MIPR	Operational Test Command : Ft. Hood, TX	-	3.143	Mar 2018	-		-		-		-	0.000	3.143	-
JAB Production Qualification Testing (PQT)	MIPR	Aberdeen Test Center : Aberdeen Proving Grounds, MD	-	3.936	Nov 2017	-		-		-		-	0.000	3.936	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (Number/Name)PE 0603804A / Logistics and EngineerEW8 / Armored Engineer VerEquipment - Adv DevEW8 / Armored Engineer Ver									
Test and Evaluation	(\$ in Milli	ions)	ſ	FY	2018	FY 2	2019	FY	2020 ase	FY 2	2020 CO	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
JAB Prototype Live Fire Validation	MIPR	Aberdeen Test Center : Aberdeen Proving Grounds, MD	-	1.500	Feb 2018	-		-		-		-	0.000	1.500	-
JAB Logistics Demonstration	TBD	Army Operational Test Command (AOTC) : Ft. Hood, TX	-	0.270	Aug 2018	-		-		-		-	0.000	0.270	-
		Subtotal	-	8.849		-		-		-		-	0.000	8.849	N/A
<u>Remarks</u> FY18 Test and Evaluation	s costs have	also been adjusted to re	eflect actual	test costs.								-	1 1		
			Prior Years	FY	2018	FY 2	2019	FY Ba	2020 ase	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	11.712		1.482		-		-		-	0.000	13.194	N/A
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٩rmy	/																		Dat	te: N	larcl	ר 20 <sup>-</sup>	19			
Appropriation/Budget Activity 2040 / 4							<b>R-1</b> PE ( <i>Equ</i>	<b>Pro</b> g 0603 ipme	<b>gran</b> 8804/ ent -	n Ele A / Lo Adv	e <b>me</b> n ogist Dev	nt (N tics a	uml and	ber/l Engi	Name ineer	<del>)</del> )	Pi E\	r <b>oje</b> W8 /	ct (N Arm	luml	oer/l d En	<b>Nam</b> gine	<b>e)</b> er Ve	ehicle	s		
Event Name		FY	2018	_	F	Y 20	019		FY	202	0		FY	202	21		FY	202	2		FY	202	3	-	FY 2	2024	
Joint Assault Bridge Development & Testing	1	2	3	4	1	2 3	3 4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Live Fire Test & Eval Force Protection Enhancements	LFT8	E Forc	e Protecti	on Enh	ancer	ments																					
Live Fire Remediation Testing					LF F	Remedia	ation Tes	sting																			
Live Fire Test & Eval	LFT8	E																									
Production Qualification Test		PQ	т																								
Logistics Demonstration				Log De	≥mo																						
Initial Operational Test & Eval						IOT&	E																				
Full Rate Production																											
Armored Mobile Earthmover (AME)																											
AME - Analysis of Alternatives (AOA)					A.C	24																					

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: N	larch 2019
ppropriation/Budget Activity 040 / 4	<b>R-1 Program</b> PE 0603804A <i>Equipment - A</i>	Element (Numbe I Logistics and E dv Dev	er/Name) ngineer	Project (Number/I EW8 / Armored En	Name) gineer Vehicles
	Schedule Detail	S			
		Si	tart		End
Events		Quarter	Year	Quarter	Year
Joint Assault Bridge Development & Testing		1	2016	1	2019
Live Fire Test & Eval Force Protection Enhancements		1	2017	3	2018
Live Fire Remediation Testing		1	2019	2	2019
Live Fire Test & Eval		4	2016	3	2018
Production Qualification Test		2	2018	1	2019
Logistics Demonstration		4	2018	1	2019
Initial Operational Test & Eval		2	2019	3	2019
Full Rate Production		1	2020	1	2020
Armored Mobile Earthmover (AME)		1	2018	4	2026
AME - Analysis of Alternatives (AOA)		2	2019	4	2019

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380 Equipment	<b>am Elemen</b> )4A / Logisti : - Adv Dev	t (Number/ ics and Eng	Name) ineer	<b>Project (N</b> G11 <i>I Adv</i>	umber/Nan Elec Energy	ne) y Con Ad	
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
G11: Adv Elec Energy Con Ad	-	4.982	6.331	3.338	-	3.338	3.201	3.405	3.201	3.328	0.000	27.786
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### A. Mission Description and Budget Item Justification

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

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

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

FY20 funding will continue to support the Small Tactical Electric Power (STEP), Power Distribution Illumination System, Electrical (PDISE) and Command Post Integrated Infrastructure (CPI2) programs.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Contract Activity	1.982	-	0.620	-	0.620
<b>Description:</b> Continue maturation and integration of technology supporting the STEP, CPI2 and PDISE programs.					
<i>FY 2020 Base Plans:</i> Build infrastructure prototypes to enable optimized use of existing microgrid technologies. Build prototypes to integrate command post vehicle power with Tactical Electric Power systems. Build prototypes to validate feasibility of integrating energy storage with existing TEP systems to address areas of efficiency, reliability, and footprint. Perform front end analysis to assess viability of forward-deployed, mobile nuclear power plants.					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number</b> PE 0603804A <i>I Logistics and Eng</i> <i>Equipment - Adv Dev</i>	<b>/Name)</b> gineer	<b>Project (N</b> G11 / Adv I	u <b>mber/Nan</b> Elec Energy	<b>ie)</b> ⁄ Con Ad	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY20 efforts to build infrastructure prototypes to enable optimized use of existi prototypes to integrate command post vehicle power with Tactical Electric Pow to validate feasibility of integrating energy storage with existing TEP systems a FY19 which had no contract activity. This funding also is used to leverage ext efforts.	ing microgrid technologies, build ver systems, and build prototypes accounted for the increase from ernal funding in collaborative					
Title: Government System Test and Evaluation		0.400	0.200	1.048	-	1.048
<b>Description:</b> Supports in house and external performance tests of concept has of systems at Network Integration Evaluation (NIE). Also supports evaluation as AEWE and JWA.	rdware. Also supports evaluation of systems at larger events such					
<b>FY 2019 Plans:</b> Continue evaluation and testing of various technologies related to tactical elect and management across the DoD power spectrum. Efforts will support the TEL performance testing of hybrid energy power sources.	tric power and power distribution P CPD. Specific efforts will include					
<b>FY 2020 Base Plans:</b> Test and evaluate government developed hybrid architectures that will inform the performance of developed prototypes to identify and reduce risks of select tech program.	the STEP program. Validate hnology elements of the STEP					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 funding is higher than FY19 funding to cover additional test, demonstrati available technologies that support hybrid and microgrid programs across the gauge suitability and effectiveness of candidate technologies for follow-on dev	ion, and user feedback on TEP spectrum. These efforts will elopment.					
Title: Other Contracts and Government agencies		1.300	4.389	1.410	-	1.410
<b>Description:</b> Matrix engineering and analysis support for continued developm STEP program, PDISE, and CPI2, as well as analysis and data management.	ent of technology supporting the					
<b>FY 2019 Plans:</b> Continue evaluation and testing of various technologies related to tactical elect and management across the DoD power spectrum. Efforts will be aimed at res Army User requirements. Efforts will support the TEP CPD. Specific efforts will and testing of hybrid/alternative energy power sources and power distribution/	tric power and power distribution solving technology gaps to meet I include contract management management system. Includes					

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

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603804A <i>I Logistics and Eng</i> <i>Equipment - Adv Dev</i>	<b>Name)</b> nineer	<b>Project (N</b> G11 / Adv	umber/Nam Elec Energy	<b>1e)</b> ⁄ Con Ad	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
oversight, analysis and management of Operational Energy-related impacts, sy reduce Army's energy dependence and improve operational capabilities. Include support of tactical nuclear electric power program research for remote and forw	stems and improvements to des \$3.0M Congressional add in ard operating bases.					
<b>FY 2020 Base Plans:</b> Support partnering efforts of power stakeholders including other services and o Provide support to Army demonstrations and exercises to evaluate power techn and to gather Soldier feedback. System technologies will include hybrid technol power and operational use of microgrids.	ther Army program offices. nologies under development ologies within small and medium					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY20 is lower than FY19 due to one year congressional add in FY19.						
Title: Government Program Management		1.300	1.635	0.260	-	0.260
Description: Continue development of technology supporting the STEP progra	m, PDISE and CPI2.					
<b>FY 2019 Plans:</b> Oversight and management of various technology projects related to Tactical E distribution/management across the DoD power spectrum. Efforts will be aimed to meet Army User requirements. Efforts will support the CPI2 Capabilities Dev Specific efforts will include support of CPI2, and power MDC systems. Oversigh of Operational Energy-related impacts, systems and improvements to reduce A improve operational capabilities.	lectric Power and power l at resolving technology gaps elopment Document (CDD). nt, analysis and management rmy's energy dependence and					
<b>FY 2020 Base Plans:</b> Continue oversight and management of various technology projects related to distribution/management across the DoD power spectrum. Specific efforts will i defense systems, and other Army power consumers. Additional efforts include capability gaps and associated solutions across DoD and to OSD energy office	Factical Electric Power and power nclude support of CPI2, missile communicating power-related s.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY19 included additional management support due to ramped up support for th FY20.	e CPI2 program compared to					
Title: FY 2019 SBIR/ STTR Transfer		-	0.107	-	-	-
FY 2019 Plans:						

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

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Exhibit R-2A, RDT&E Project Just	ification: PB		Date: March 2019								
Appropriation/Budget Activity 2040 / 4	nent (Number gistics and Eng Dev	/ <b>Name)</b> gineer	<b>Project (N</b> G11 <i>I Adv</i>	umber/Nar Elec Energ	<b>ne)</b> y Con Ad						
B. Accomplishments/Planned Pro	grams (\$ in N	<u>/lillions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2019 SBIR/STTR Transfer											
FY 2019 to FY 2020 Increase/Decr FY 2019 SIBR/STTR transfer .	rease Statem	ent:									
			Accomplis	hments/Pla	nned Progra	ams Subtotals	4.982	6.331	3.338	-	3.338
C. Other Program Funding Summ	ary (\$ in Milli	<u>ons)</u>	EV 2020	EV 2020	EV 2020					Cost To	
Line Item	FY 2022	FY 2023	FY 2024	Complete	Total Cost						
• 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
MA9800: Generators     And Associated Equip	62.126	75.155	73.228	76.022	0.000	597.578					

**Remarks** 

### D. Acquisition Strategy

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

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 0603 <i>Equipm</i>	<b>gram Ele</b> 3804A I L ent - Adv	ement (N .ogistics a <sup>.</sup> Dev	umber/N and Engin	<b>ame)</b> eer	Project G11 / Ad	<b>(Number</b> dv Elec E	/Name) nergy Col	n Ad	
Management Service	es (\$ in M	lillions)	ſ	FY 2	018	FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	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
Platoon Power Generation	MIPR	PM E2S2 : Ft. Belvoir, VA	-	0.100		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	PM E2S2 : Fort Belvoir, VA	0.733	0.082		0.175		0.054		-		0.054	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	PM E2S2 : Ft. Belvoir, VA	0.596	0.096		0.250		0.091		-		0.091	Continuing	Continuing	Continuing
Power Management and Distribution Systems	MIPR	PM E2S2 : Ft. Belvoir, VA	1.508	0.125		0.250		0.115		-		0.115	Continuing	Continuing	Continuing
Operational Energy	MIPR	PM E2S2 : Fort Belvoir, VA	1.528	0.132		0.150		-		-		-	Continuing	Continuing	Continuing
		Subtotal	4.365	0.535		0.825		0.260		-		0.260	Continuing	Continuing	N/A
Product Developmer	nt (\$ in M	illions)		FY 2	018	FY 2	019	FY 2 Ba	2020 se	FY 2 O	2020 CO	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
Platoon Power Generation	MIPR	CERDEC : Fort Belvoir, VA	-	0.750		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	Various	CERDEC : Fort Belvoir, VA	3.281	0.750		0.300		0.104		-		0.104	Continuing	Continuing	Continuing
Hybrid Power Sources Components	Various	Multiple Vendors : TBD	2.370	0.305		0.200		0.183		-		0.183	Continuing	Continuing	Continuing
Power Management and Distribution Systems	Various	CERDEC : Fort Belvoir, VA	4.726	0.621		0.589		0.333		-		0.333	Continuing	Continuing	Continuing
Operational Energy	TBD	TBD : TBD (FY15)	2.409	0.500		0.249		-		-		-	Continuing	Continuing	Continuing
Metering and Monitoring Demo	Various	TBD : TBD	0.205	0.250		-		-		-		-	Continuing	Continuing	Continuing
FY 2019 SIBR/STTR Transfer	TBD	TBD : TBD	-	-		0.107		-		-		-	0.000	0.107	-
	Subtotal 12.					1.445		0.620		-		0.620	Continuing	Continuing	N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Equipm	ogram Ele 3804A / L ent - Adv	ement (N .ogistics a ' Dev	umber/N and Engin	ame) eer	Project G11 / A	(Number dv Elec E	r/ <b>Name)</b> inergy Co	n Ad	
Support (\$ in Million	s)			FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	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
Small Tactical Electric Power (STEP) Components	MIPR	CERDEC : Fort Belvoir, VA	1.706	0.168		0.385		0.250		-		0.250	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	CERDEC : Fort Belvoir, VA	1.721	0.098		-		0.450		-		0.450	Continuing	Continuing	Continuing
Power Management and Distribution Control Systems	MIPR	CERDEC : Fort Belvoir, VA	1.750	0.110		0.376		0.710		-		0.710	Continuing	Continuing	Continuing
Platoon Power Generation	MIPR	CERDEC : Fort Belvoir, VA	-	0.101		-		-		-		-	Continuing	Continuing	Continuing
Modular Power	MIPR	Idaho National Labs; Air Force Civil Engineer Center : xxxx	-	-		3.000		-		-		-	Continuing	Continuing	Continuing
Operational Energy	MIPR	Dept of Energy Sandia National Labs : Washington DC	1.663	0.094		0.100		-		-		-	Continuing	Continuing	Continuing
		Subtotal	6.840	0.571		3.861		1.410		-		1.410	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	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
Platoon Power Generation (PPG)	MIPR	CERDEC : Fort Belvoir, VA	-	0.250		-		-		-		-	Continuing	Continuing	Continuing
Small Tactical Electric Power (STEP) Components	MIPR	CERDEC : Fort Belvoir, VA	1.130	0.200		0.200		0.453		-		0.453	Continuing	Continuing	Continuing
Hybrid Power Sources Components	MIPR	CERDEC : Fort Belvoir, VA	0.829	-		-		0.595		-		0.595	Continuing	Continuing	Continuing
Power Management and Distribution Systems	MIPR	CERDEC : Fort Belvoir, VA	1.761	0.250		-		-		-		-	Continuing	Continuing	Continuing

chibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019		
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 040 / 4						umber/Na and Engin	<b>ame)</b> eer	Project G11 / A	(Number dv Elec E	r/ <b>Name)</b> nergy Col	n Ad		
Test and Evaluation (\$ in Millions)		FY 2	018	FY 2019 Bas			020 se	20 FY 2020 e OCO						
Contract Method Performing Cost Category Item & Type Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Cost Category item         & Type         Activity & Location         Years         Cost         Date           Subtotal         3.720         0.700         <						1.048		-		1.048	Continuing	Continuing	N/A	
	Prior Years	FY 2	018	FY 2	019	FY 2 Bas	020 se	FY 2 O(	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals 27.916 4.982					6.331 3.338 -					3.338	Continuing	Continuing	N/A	

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army										Date: March 2019					
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 040 / 4							<del>)</del> )	Projec G11 /	<b>ct (Number/Name)</b> Adv Elec Energy Con Ad						
Event Name	FY 2018	FY 20	019	FY	2020	F١	2021		FY 202	2		FY 2	023	F	Y 202	24
SMALL TACTICAL ELECTRIC POWER (STEP) PROGRAM	1 2 3 4	1 2 3	3 4	1 2	3 4	1 2	3 4	1	2 3	4	1	2	3 4	1 2	3	4
Assess Technologies, such as STEP, to Meet Gaps-STEP																
Develop prototypes for modular, scalable STEP systems																
Transfer to Engineering and Manufacturing Development-ST	EP															
AMMPS Hybrid Power Integration																
AMMPS Hybrid Technology Assessment																
AMMPS Hybrid Prototype Development																
AMMPS Hybrid Prototype Test and Evaluation																
AMMPS Hybrid Transfer to AMMPS POR																
PDISE Expansion																
Test Technologies (Intelligent distro. controls) to Meet Gaps-F	DISE Expansion															
Develop and Test Ruggedized PDISE Expansion prototypes	with AMMPS Microgric															
Transfer to Engineering and Manufacturing Development-PD	ISE Expansion															
L						1					<u>I</u>			1		

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy						Date: March 2019				
Appropriation/Budget Activity 2040 / 4		Ĩ	<b>R-1 P</b> PE 06 <i>Equip</i>	<b>rogram Elemen</b> 603804A I Logisti ment - Adv Dev	it (Number/Name ics and Engineer	<del>)</del> )	Project (N G11 / Adv	ect (Number/Name) I Adv Elec Energy Con Ad			
								1			
Event Name	FY 2018	FY 201	19	FY 2020	FY 2021	I	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		
ASSESSMENT OF TECHNOLOGIES Across TEP line											
Assess Technologies (remote start adapter) to Meet Gaps and											
OPERATIONAL ENERGY (OE)											
Evaluation of OE-Related Impacts, Systems and Improvement											

khibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Marc	n 2019
ppropriation/Budget Activity 040 / 4	R-1 Program Element (Numb PE 0603804A / Logistics and E Equipment - Adv Dev	er/Name) Ingineer	Project (Number/Nam G11 / Adv Elec Energy	<b>e)</b> Con Ad
Sche	edule Details			
	S	tart	En	d
Events	Quarter	Year	Quarter	Year
SMALL TACTICAL ELECTRIC POWER (STEP) PROGRAM	1	2016	2	2021
Assess Technologies, such as STEP, to Meet Gaps-STEP	1	2016	2	2020
Develop prototypes for modular, scalable STEP systems	2	2020	2	2021
Transfer to Engineering and Manufacturing Development-STEP	2	2021	2	2021
AMMPS Hybrid Power Integration	1	2020	3	2022
AMMPS Hybrid Technology Assessment	1	2020	4	2020
AMMPS Hybrid Prototype Development	3	2019	3	2021
AMMPS Hybrid Prototype Test and Evaluation	3	2021	3	2022
AMMPS Hybrid Transfer to AMMPS POR	3	2022	4	2022
PDISE Expansion	1	2017	2	2023
Test Technologies (Intelligent distro. controls) to Meet Gaps-PDISE Expans	ion 1	2019	2	2020
Develop and Test Ruggedized PDISE Expansion prototypes with AMMPS M	1 ficrogrid	2021	1	2023
Transfer to Engineering and Manufacturing Development-PDISE Expansion	2	2023	2	2023
ASSESSMENT OF TECHNOLOGIES Across TEP line	1	2017	4	2024
Assess Technologies (remote start adapter) to Meet Gaps and Improve Efficiency	ciencies 1	2017	4	2024
OPERATIONAL ENERGY (OE)	1	2016	4	2019
Evaluation of OE-Related Impacts, Systems and Improvements	1	2016	4	2019

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Exhibit R-2A, RDT&E Project Ju	hibit R-2A, RDT&E Project Justification: PB 2020 Army												
Appropriation/Budget Activity 2040 / 4		<b>R-1 Progra</b> PE 060380 <i>Equipment</i>	n <b>e)</b> nt Support Ad	d									
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2023	FY 2024	Cost To Complete	Total Cost		
K39: Field Sustainment Support Ad	-	2.332	2.308	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.640	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### <u>Note</u>

Project K39 completes in FY19

### A. Mission Description and Budget Item Justification

This Project supports development of critical cargo aerial delivery capabilities. These systems will fill identified theater distribution and services capability gaps, improve unit sustainability, and increase combat effectiveness. This Project supports Advanced Component Development and Prototyping of Critical Distribution Capabilities which provide improved safety and accuracy while increasing survivability of aircraft, personnel, and equipment. This Project develops critical enablers that support the Army in executing future movement and maneuver operations and distributed sustainment support by maintaining readiness through fielding and integrating new equipment. This Project also ensures Army Expeditionary Forces are capable of rapid deployment through aerial delivery initiatives and reduces sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands in lift, combat zone footprint, and costs for logistical support.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: Rapid Rigging and DeRigging Airdrop System (RRDAS) Phase I	1.821	1.277	-	-	-
<b>Description:</b> Effort to reduce 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 System (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. RRDAS is a three phase Research, Development, Testing and Engineering (RDT&E) effort, Phase I will focus on loads up to 20,000 pounds and platform lengths up to 20 feet and will include prime movers such as HMMWV.					
<ul> <li>FY 2019 Plans:</li> <li>Complete component evaluation in realistic airdrop environment and transition to Engineering and Manufacturing Development (EMD).</li> <li>FY 2019 to FY 2020 Increase/Decrease Statement:</li> </ul>					
	1	1	1	1	1

Exhibit R-2A, RDT&E Project Justif	ication: PB	2020 Army				Date: Mar	ch 2019					
Appropriation/Budget Activity 2040 / 4				<b>R-1 Pr</b> PE 060 <i>Equipr</i>	<b>ogram Eler</b> 03804A / Lo ment - Adv L	nent (Numbe gistics and Er Dev	e <b>r/Name)</b> ngineer	Project (N K39 / Field	t (Number/Name) Field Sustainment Support Ad			
B. Accomplishments/Planned Prog	rams (\$ in N	<u>/lillions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Army efforts complete in FY19 and the in support of the National Defense Str	ereafter fund ategy.	ding realloca	ted to suppo	ort the Army's	s moderniza	tion priorities						
<i>Title:</i> Advanced Low Velocity Airdrop Application	System (AL	VADS) - Lig	ht and Heav	y/ Dual Row	Airdrop Sys	tem (DRAS)	0.511	0.957	-	-	-	
<b>Description:</b> ALVADS provides the a shocks associated with heavy equipm battlefield.	bility to drop nent drops at	me opening ipment on the	9									
<b>FY 2019 Plans:</b> Conduct evaluation of established AL Milestone C.	VADS DRAS	S configurati	ent. Conduct									
<b>FY 2019 to FY 2020 Increase/Decre</b> Army efforts complete in FY19 and the in support of the National Defense Str	<b>ase Statem</b> ereafter fund rategy.	e <i>nt:</i> ding realloca	ted to suppo	ort the Army's	s moderniza	tion priorities						
Title: SBIR/STTR							-	0.074	-	-	-	
<b>FY 2019 Plans:</b> SBIR/STTR												
FY 2019 to FY 2020 Increase/Decrease/SBIR/STTR	ase Statem	ent:										
			Accomplis	hments/Plan	ned Progra	ams Subtotal	<b>s</b> 2.332	2.308	_	-	-	
C. Other Program Funding Summar	y (\$ in Milli	ons)										
			FY 2020	FY 2020	<u>FY 2020</u>					Cost To		
Line Item	FY 2018	FY 2019	Base	000	<u>Total</u>	<u>FY 2021</u>	FY 2022	FY 2023	FY 2024	Complete	Total Cost	
• IVIA / 800: Precision Airdrop	4.14/	5./31	0.000 1.675	2.040	∠.040 1.675	∠.040 1 720	- 1 772	- 1 207	- 1 900	0.000	13.958	
	4.750	2.220	1.075	-	1.073	1.720	1.775	1.007	1.000	0.000	15.745	
<u>remarks</u>												
D. Acquisition Strategy												

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

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	t R-2A, RDT&E Project Justification: PB 2020 Army         priation/Budget Activity         4         PE 0603804A / Logistics and Enginee         Equipment - Adv Dev						
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A <i>I Logistics and Engineer</i> <i>Equipment - Adv Dev</i>	Project (Number/Name) K39 / Field Sustainment Support Ad					
E. Performance Metrics	· · · · · ·						
N/A							
DE 0602904A: Logistics and Engineer Equipment Adv D							

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Equipm	ogram Ele 3804A / L pent - Adv	ement (N .ogistics a Dev	lumber/N and Engin	<b>ame)</b> beer	Project K39 / F	ield Susta	r/Name) hinment Su	ıpport Aa	1
Management Service	es (\$ in M	lillions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	PMFSS : Natick, MA	6.610	0.400		0.202		-		-		-	0.000	7.212	-
SBIR+STTR	TBD	Various : Various	0.090	-		0.074		-		-		-	0.000	0.164	-
		Subtotal	6.700	0.400		0.276		-		-		-	0.000	7.376	N/A
Product Developme	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY : O	2020 CO	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
Extracted High and Low Speed Container Delivery System (EHLSCDS)	Various	Various : Various	1.861	-		-		-		-	-		0.000	1.861	-
ALVADS-L/H DRAS	Various	Various : Various	0.500	0.437		-		-		-		-	0.000	0.937	-
JPADS Block 1 upgrade	Various	Various : Various	16.434	-		-		-		-		-	0.000	16.434	-
Rapid Rigging/Derigging	Various	Various : Various	-	0.495		0.250		-		-		-	0.000	0.745	-
Advanced Low Velocity Airdrop System-L/H	Various	Various : Various	1.300	-		0.295		-		-		-	0.000	1.595	-
		Subtotal	20.095	0.932		0.545		-		-		-	0.000	21.572	N/A
Support (\$ in Million	s)			EV (	2018	EV	2010	FY	2020	FY	2020	FY 2020	]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award	Cost	Cost To Complete	Total Cost	Target Value of Contract
JPADS Block 1 upgrade	Various	Various : Various	0.110	-		-		-		-		-	0.000	0.110	-
ALVADS-L/H DRAS	Various	Various : Various	0.050	0.250		-		-		-		-	0.000	0.300	-
Rapid Riggind/DeRigging	Various	Various : Various	-	0.200		-		-		-		-	0.000	0.200	-
		Subtotal	0.160	0.450		-		-		-		-	0.000	0.610	N/A
PE 0603804A: <i>Logistic</i> Army	cs and En		UN	NCLASS Page 32 (	SIFIED of 50		R	-1 Line #	85				295		

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army											Date:	March 20	19				
Appropriation/Budget Activity 2040 / 4						<b>R-1 Pro</b> PE 0603 <i>Equipm</i>	<b>gram El</b> 3804A / L ent - Adv	e <b>ment (N</b> .ogistics a Dev	umber/N and Engin	ame) eer	<b>Project</b> K39 <i>I Fi</i>	<b>ct (Number/Name)</b> Field Sustainment Support Ad					
Test and Evaluation (\$ in Millions)			ſ	FY 2018 F		FY 2	FY 2019		FY 2020 Base		2020 CO	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 DRAS	Various	YPG, AZ : YPG, AZ	0.500	-		-		-		-		-	0.000	0.500	-		
Extracted High and Low Speed Container Delivery System (EHLSCDS)	Various	YPG, AZ : YPG, AZ	1.000	-		-		-		-		-	0.000	1.000	-		
JPADS Block 1 upgrade	Various	YPG, AZ : YPG, AZ	0.600	0.350		-		-		-		-	0.000	0.950	-		
Rapid Rigging/DeRigging	Various	Various : Various	-	0.200		0.737		-		-		-	0.000	0.937	-		
Advanced Low Velocity Airdrop System	Various	Various : Various	-	-		0.750		-		-		-	0.000	0.750	-		
Subtotal 2.100			0.550		1.487		-		-		-	0.000	4.137	N/A			
		Prior					FY 2	2020	FY	2020	FY 2020	Cost To	Total	Target Value of			
		Project Cost Totals	Years 29.055	EY 2	2018	<b>FY 2</b> 2.308	019	Ва	ISE	-		Iotal	0.000	33.695	Contract N/A		

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy				Date: March 2019			
Appropriation/Budget Activity 2040 / 4		R Pl Ed	R-1 Program Element (Number/Name)Project (Number/Name)PE 0603804A I Logistics and EngineerK39 I Field Sustainment Support AdEquipment - Adv DevField Sustainment Support Ad					
	FY 2018	FY 2019	EY 2020	EX 2021	FY 2022	EY 2023	FY 2024	
Event Name	1 2 3 4	1 2 3	4 1 2 3 4	1 2 3 4 1	2 3 4	1 2 3 4	1 2 3 4	
Conduct RRDAS Phase I market research and acquire prototype	com							
Conduct RRDAS Phase I component development/integration								
Conduct RRDAS prototype design, fabrication, and demonstration	n							
Conduct ALVADS/DRAS feasibility study								
Conduct ALVADS/DRAS baseline evaluations								
Conduct ALVADS/DRAS prototype flight tests								
Evalaute Integrated RRDAS technology								
						1		

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army	Date: March 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603804A / Logistics and Engineer Equipment - Adv Dev	Project (Number/Name) K39 / Field Sustainment Support Ad

# Schedule Details

	St	art	E	nd
Events	Quarter	Year	Quarter	Year
Conduct EHLSCDS validation testing	1	2016	1	2016
Conduct RRDAS Phase I market research and acquire prototype components	2	2018	3	2018
Conduct RRDAS Phase I component development/integration	3	2018	4	2018
JPADS Block I upgrade component development and risk reduction	1	2017	4	2017
Conduct RRDAS prototype design, fabrication, and demonstration	3	2019	4	2019
Conduct ALVADS/DRAS feasibility study	3	2017	1	2019
Conduct ALVADS/DRAS baseline evaluations	2	2018	3	2018
Conduct ALVADS/DRAS prototype flight tests	3	2018	4	2019
Evalaute Integrated RRDAS technology	1	2019	2	2019

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380 Equipment	am Element 04A / Logisti - Adv Dev	t <b>(Number</b> /l cs and Eng	Name) ineer	<b>Project (Number/Name)</b> K41 / Water And Petroleum Distribution - Ad			
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
K41: Water And Petroleum Distribution - Ad	-	3.954	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.954
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

Project funding ends after FY 2018 to support the Army's modernization priorities in support of the National Defense Strategy.

### A. Mission Description and Budget Item Justification

This Project develops and demonstrates the potential of prototype equipment and technologies to satisfy petroleum storage, distribution, and quality surveillance system requirements. The Technology Development programs support the development and enhancement of rapidly deployable Petroleum and Water equipment. The mission includes developing fuel quality analysis systems; achieving greater capabilities in the removal of Nuclear, Biological, Chemical (NBC) and other contaminants from water sources; reducing the logistics footprint; alternative source water acquisition, reutilization and disposal systems to reduce the requirement for transport of water into the theater; water purification and waste water treatment and material systems to decrease the logistics footprint and employment time for the transfer of liquid logistics in joint operations area. This vital equipment enables the Army to achieve its mission by providing the the means to be highly mobile and self-sustaining in very hostile joint operations areas. Future Force operations demand that combat systems be rapidly deployable to the theater, rapidly emplaced upon arrival, and rapidly relocated to support a fast moving non-linear battlefield.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
<i>Title:</i> 3K Tactical Water Purification System (3K TWPS)	0.969	-	-	-	-
<b>Description:</b> 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 m g/L 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 LH S/PLS compatible via C HU/ E-CHU.					
Title: Early Entry Fluid Distribution System (E2FDS)	2.985	-	-	-	-

Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: Mar	ch 2019	
Appropriation/Budget Activity       R-1 Program Element (Nu         2040 / 4       PE 0603804A / Logistics and Equipment - Adv Dev							<b>r/Name)</b> ngineer	Project (N K41 / Wate	lumber/Na er And Petr	<b>me)</b> oleum Distri	bution - Ad
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Description:</b> The Early Entry Fluid Distribution System (E2FDS) is a rapidly emplaced, high-throughput petroleum distribution conduit system. The E2FDS consists of 5-mile systems that can be connected to each other to form a pipeline trace up to 50 miles long. It can throughput 850,000 gallons of petroleum or 650,000 gallons of raw/non-potable water per day. E2FDS is emplacement at a rate of 25 miles per day and retrieved at a rate of 10 miles per day. The components are configured in stackable International Standards Organization (ISO) 20-foot equivalent units (TEU) for deployment and is Heavy Expanded Mobility Tactical Truck-Load Handling System (HEMTT-LHS), Palletized Load System (PLS) and PLS Trailer transportable. It includes a Command and Control Module (C2M) that allows for central control of the pipeline trace from a single location. The E2FDS complements the Inland Petroleum Distribution System (IPDS) by adding an early entry capability as well as a means for rapidly extending existing pipeline.							s				
			Accomplis	hments/Plai	nned Progra	ams Subtotal	<b>s</b> 3.954	4 -	-	-	-
C. Other Program Funding Summa	ary (\$ in Milli	<u>ons)</u>	EV 2020	EV 2020	EV 2020					Cost To	
Line Item	EV 2018	EV 2019	<u>FT 2020</u> Baso	000	Total	EV 2021	EV 2022	EV 2023	EV 2024	Complete	Total Cost
•   41: Water And	6 127	10 761	7 540	-	7 540	7 559	7 620	7 935	5 685	0 000	53 227
Petroleum Distribution - Ed	021							1.000	0.000	0.000	00.221
MA6000: Distribution	41.622	26.471	74.867	13.986	88.853	76.583	54.169	27.142	37.552	0.000	352.392
Systems, Petroleum & Water											
• R67500: PETROLEUM QUALITY ANALYSIS SYSTEM	6.903	-	0.000	-	0.000	-	-	-	-	0.000	6.903

#### Remarks

### D. Acquisition Strategy

Develop engineering prototypes for the 3K Tactical Water Purification System (3K TWPS), Army Fuels Automated Management System (AFAMS), and select Non-Development Item (NDI) based on market surveys and proposals from industry. Based on market research findings, award a competitive or sole source contract. Early Entry Fluid Distribution System (E2FDS) will conduct Developmental Testing (DT) and will test data to inform a fair opportunity decision for production. Army Fuels Automated Management System (AFAMS) sensors will require the development and testing of self-reporting sensors for all fuel storage tanks.

### E. Performance Metrics

N/A
Exhibit R-3, RDT&E Pro	oject Co	ost Analysis: PB 2	020 Arm	y								Date:	March 20	)19	
Appropriation/Budget / 2040 / 4	Activity	,				<b>R-1 Pro</b> PE 060 <i>Equipm</i>	ogram Ele 3804A / L aent - Adv	ement (N .ogistics a Dev	lumber/N and Engin	ame) eer	Project K41 / W	(Numbe /ater And	r/Name) Petroleur	n Distribu	tion - Ad
Product Development	(\$ in Mi	llions)		FY 2	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	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)	Various	TARDEC : Warren, MI	1.030	0.969		-		-		-		-	0.000	1.999	Continuing
Early Entry Fluid Distribution System (E2FDS)	C/FFP	DRS : West Plains, IL	5.888	-		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	6.918	0.969		-		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2	2018	FY :	2019	FY : Ba	2020 ase	FY 2	2020 CO	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
Early Entry Fluid Distribution System (E2FDS)	MIPR	TARDEC & PM, PAWS : Warren, MI	3.147	-		-		-		-		-	0.000	3.147	Continuing
3K TWPS	MIPR	TARDEC : Warren, MI	0.273	-		-		-		-		-	0.000	0.273	-
		Subtotal	3.420	-		-		-		-		-	0.000	3.420	N/A
Test and Evaluation (\$	in Milli	ons)		FY 2	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Modular Fuel System (MFS)	MIPR	Yuma Proving Ground : Yuma, AZ	0.750	-		-		-		-		-	0.000	0.750	Continuing
3K Tactical Water Purification System (3K TWPS)	MIPR	TARDEC : Warren, MI	1.312	-		-		-		-		-	0.000	1.312	Continuing
Early Entry Fluid Distribution System (E2FDS)	MIPR	Aberdeen Proving Groung : APG, MD	-	2.985		-		-		-		-	0.000	2.985	-
		Subtotal	2.062	2.985		-		-		-		-	0.000	5.047	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2	020 Army	/							Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4				R-1 Pro PE 0603 Equipm	<b>gram El</b> 3804A / I ent - Adv	l <b>ement (N</b> Logistics a / Dev	u <b>mber/Name)</b> nd Engineer	<b>Project</b> K41 / И	(Number ater And	r/ <b>Name)</b> Petroleun	n Distribu	tion - Ad
	Prior Years	FY 2	2018	FY 2	019	FY 2 Bas	020 se	FY 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	12.400	3.954		0.000		-		-	-	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٩rm	y																				Da	ate:	Mai	rch 2	201	9			
Appropriation/Budget Activity 2040 / 4							<b>i</b> F <i>L</i>	<b>R-1 I</b> PE 0 <i>Equij</i>	Prog 6038 pme	<b>Jram</b> 804 <i>/</i> nt - 7	A / Lo A / Lo Adv	e <b>men</b> ogist Dev	nt (N hics a	lum and	ber Eng	/Na gine	me) er	)	P K	<b>roje</b> 41 /	ct (l Wai	Num ter A	nd	r/Na Petr	<b>me)</b> roleu	ım I	Distr	ibut	tion -	· Ad
<b>-</b>	Γ	F١	2018	3		FY	201	9		FY	202	0		F	Y 20	21			FY	202	2		F	Y 20	23			FY	2024	1
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3		4	1	2	3	4	1	2	2 3	6 4	1	1	2	3	4
3K Tactical Water Purification System (3K TWPS)																														
3K TWPS Milestone B		M	S B																											
3K TWPS Premilinary Design Review					PD	R																								
3K TWPS CDR									9	R																				
3K TWPS Developmental Testing							DT																							
3K TWPS Milestone C											MS	0. 5 C																		
3K TWPS Production Qualification Testing / Operational Testi	ing														PQ	т/от														
Black Water Treatment (BWT)																														
Black Water Treatment Materiel Development Decision				3 MDD																										
Black Water Treatment Milestone B							6 MS B																							
Black Water Treatment Premilinary Design Review							4																							
Black Water Treatment Critical Design Review																	4	1 R												
Black Water Treatment Development Testing														DT																

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy							Date: March 20	)19
Appropriation/Budget Activity 2040 / 4			<b>R-1 I</b> PE 0 <i>Equi</i>	Program Elemen 603804A / Logist pment - Adv Dev	nt (Number/Name tics and Engineer	e)	Project (N K41 / Wate	lumber/Name) er And Petroleur	n Distribution - Ad
Event Name	FY 2018	FY 20	19	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
Early Entry Fluid Distribution System (E2FDS)									
E2FDS Premilinary Design Review (PDR)									
E2FDS Critical Design Review (CDR)									
E2FDS Developmental Testing		DT							
E2FDS Milestone C			8 MS C						
E2FDS First Article Test / Initial Operational Testing					FAT/IOT				

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Ma	rch 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Ele</b> PE 0603804A / L Equipment - Adv	ement (Numbe ogistics and E Dev	er/Name) ngineer	Project (Number/Na K41 / Water And Pet	n <b>me)</b> roleum Distribution - Ac
	Schedule Details				
		S	tart		End
Events		Quarter	Year	Quarter	Year
3K Tactical Water Purification System (3K TWPS)		4	2016	2	2022
3K TWPS Milestone B		2	2018	2	2018
3K TWPS Premilinary Design Review		1	2019	1	2019
3K TWPS CDR		1	2020	1	2020
3K TWPS Developmental Testing		3	2019	4	2019
3K TWPS Milestone C		3	2020	3	2020
3K TWPS Production Qualification Testing / Operational Testing		3	2021	3	2022
Black Water Treatment (BWT)		1	2019	1	2019
Black Water Treatment Materiel Development Decision		4	2018	4	2018
Black Water Treatment Milestone B		3	2019	3	2019
Black Water Treatment Premilinary Design Review		4	2019	4	2019
Black Water Treatment Critical Design Review		1	2022	1	2022
Black Water Treatment Development Testing		2	2021	4	2021
Early Entry Fluid Distribution System (E2FDS)		1	2017	4	2020
E2FDS Premilinary Design Review (PDR)		2	2018	2	2018
E2FDS Critical Design Review (CDR)		4	2018	4	2018
E2FDS Developmental Testing		1	2019	3	2019
E2FDS Milestone C		4	2019	4	2019
E2FDS First Article Test / Initial Operational Testing		1	2021	3	2021

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060380 Equipment	a <b>m Elemen</b> 94A / Logisti 7 - Adv Dev	t (Number/ ics and Eng	Name) ineer	<b>Project (N</b> VR8 I Com Ad	umber/Nan abat Service	ne) Support Sy	rstems -
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
VR8: Combat Service Support Systems - Ad	-	3.334	3.218	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.552
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

Project VR8 completes in FY19

#### A. Mission Description and Budget Item Justification

This Project supports Advanced Component Development and Prototyping of critical soldier support and sustainment systems that provide more endurance and agility to combat operations enabling success of Army Expeditionary Forces in future multi-domain scenarios. Project includes shelter systems (rigid and soft wall), expeditionary base camp subsystems, field service systems, mortuary affairs equipment, field heaters, and other combat service support equipment. These systems will fill identified theater capability gaps, improve unit sustainability, improve resource and energy efficiency and increase combat effectiveness. This Project supports Advanced Component Development and Prototyping of critical tactical support systems that support mobile Joint Service command and control, medical, and maintenance platforms. This Project develops critical enablers that support the Army Campaign Plan and Army Modernization Strategy by maintaining readiness through fielding and integrating new equipment.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Resource and Energy Efficiency Enabling Solutions	0.964	1.409	-	-	-
<b>Description:</b> 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.					
<i>FY 2019 Plans:</i> Conduct evaluation of integrated technologies that are transitioning from RDECOM 6.3 programs in a realistic operational environment utilizing the Base Camp Integration Laboratory (BCIL). Focus efforts on technologies that will make the greatest impact on reducing resource and operational energy demands of current and developing critical enabling soldier support and sustainment platforms that support multi-domain operations to include integrated Command Posts and expeditionary sustainment systems. Identify promising alternative					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number</b> PE 0603804A <i>I Logistics and Eng</i> <i>Equipment - Adv Dev</i>	/ <b>Name)</b> gineer	<b>Project (N</b> VR8 / Com Ad	umber/Nan abat Service	n <b>e)</b> Support Sj	ystems -
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
energy sources, renewable energy collection and storage capabilities for Collect data from evaluations to inform and support Decision Points for t	rintegration and conduct evaluations. ransition into EMD.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Army efforts complete in FY19 and funding thereafter reallocated to suppin support of the National Defense Strategy.	port the Army's modernization priorities					
<i>Title:</i> Black Waste Elimination for Small Base Camps (150 personnel)		0.670	-	-	-	-
<b>Description:</b> Provides the capability to reduce/eliminate the black water objective capability will reduce our sustainment requirements for backha our risk of contaminating the environment with biological contaminants. reliance on external support and is a key capability required to reduce support.	generated by small base camps. The uling black waste water as well as Fhis capability will significantly reduce ustainment requirements.					
Title: Expeditionary Waste to Energy System		0.200	-	-	-	-
<b>Description:</b> The Expeditionary Waste to Energy System reduces the op of the expeditionary base camp system with the goal of providing an inter- process add-on capability that can safely process up to two tons of mixe on site with the energy associated with the management process being of of fuel, heat and/or electric power. This capability will provide a safe and remote expeditionary base camps while reducing the fuel and power req field. This capability provides a substantial improvement over the current associated vulnerabilities and safety issues.	perational energy and logistics footprint grated waste management and disposal d solid organic waste in a single day converted to usable energy in the form suitable means to dispose of waste in uirements to sustain operations in the t practice of burn pits and backhaul with					
Title: Army Standard Family of Soft Wall Shelters (ASF-SWS)		-	0.891	-	-	-
<b>Description:</b> The ASF-SWS program will conduct formal development to into a fully supportable and modernized family. The intent is to eliminate shelters and their associated logistics burden, thereby reducing the lifecy. The program will produce approved Technical Data Packages (TDPs) to developers and Program Managers (PMs) requiring SWS. ASF-SWS pro PMs as a cost under their program(s).	o incorporate the latest technologies the proliferation of non-standard ycle cost of SWS across the Services. support procurements by materiel ocurements are customer funded by					
FY 2019 Plans:						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0603804A / Logistics and Eng. Equipment - Adv Dev	Name) ineer	<b>Project (N</b> VR8 / Com Ad	umber/Nan bat Service	<b>1e)</b> Support Sy	/stems -
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
No FY 2019 Plans as ASF-SWS program is not being funded in FY19.						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Army efforts complete in FY19 and funding thereafter reallocated to support the in support of the National Defense Strategy.	Army's modernization priorities					
Title: Army Standard Family of Rigid Wall Shelters (ASF-RWS)		1.500	0.815	-	-	-
<b>Description:</b> The ASF-RWS program will conduct formal development to incorrinto a fully supportable and modernized family. The intent is to eliminate the prosperities and their associated logistics burden, thereby reducing the lifecycle contract program will produce approved Technical Data Packages (TDPs) to support developers and Program Managers (PMs) requiring RWS. ASF-RWS procurem by PMs as a cost under their program(s). The ASF-RWS will consist of three values and a cost under their program(s). The ASF-RWS will consist of three values are cost, reduced weight, improved energy efficiency, imprimproved transportability.	porate the latest technologies oliferation of non-standard st of RWS across the Services. In procurements by materiel ments are customer funded ariants: (1) Expandable/Non- in the following features and oved corrosion resistance, and					
<b>FY 2019 Plans:</b> Award OTA Project for Expandable/Non-Expandable ASF-RWS Variant develo development, and prototype test items build for Expandable/Non-Expandable s development of Technical Data Package (TDP) for Expandable/Non-Expandab	pment. Conduct design, helter variant. Initiate le shelter variant					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Army efforts complete in FY19 and funding thereafter reallocated to support the in support of the National Defense Strategy.	e Army's modernization priorities					
Title: SBIR/STTR		-	0.103	-	-	-
<b>FY 2019 Plans:</b> SBIR/STTR						
FY 2019 to FY 2020 Increase/Decrease Statement: SBIR/STTR						
Accomplishmer	ts/Planned Programs Subtotals	3.334	3.218	-	-	-
						,

Exhibit R-2A, RDT&E Project Jus	tification: PB	2020 Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> PE 06 <i>Equip</i>	r <b>ogram Elen</b> 03804A / Log ment - Adv D	n <b>ent (Numb</b> gistics and E Pev	e <b>r/Name)</b> Ingineer	Project (N VR8 / Cor Ad	lumber/Na nbat Servic	<b>me)</b> e Support S	ystems -
C. Other Program Funding Summ	ary (\$ in Milli	ons <u>)</u>									
			<u>FY 2020</u>	FY 2020	<u>FY 2020</u>					<u>Cost To</u>	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	Base	<u>000</u>	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Complete</u>	Total Cost
<ul> <li>VR7: Combat Service Support Systems</li> </ul>	3.594	4.527	0.000	-	0.000	-	-	-	-	0.000	8.121

#### <u>Remarks</u>

#### D. Acquisition Strategy

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

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 060 Equipm	ogram Ele 3804A / L bent - Adv	ement (N ogistics a Dev	lumber/N and Engin	<b>ame)</b> beer	Project VR8 / C Ad	<b>(Numbe</b> Combat Se	r/ <b>Name)</b> ervice Sup	port Syst	ems -
Management Service	s (\$ in M	illions)		FY 2	018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	1.847	0.429		0.365	Nov 2018	-		-		-	0.000	2.641	-
SBIR+STTR	TBD	various : Various	0.062	-		0.103		-		-		-	0.000	0.165	-
		Subtotal	1.909	0.429		0.468		-		-		-	0.000	2.806	N/A
Product Developmen	it (\$ in M	illions)		FY 2	018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Soldier Support Equipment	Various	Various : Various	8.057	2.050		-		-		-		-	0.000	10.107	-
Energy Efficiency Enabling Solutions	Various	Various : Various	0.191	-		0.681	Jan 2019	-		-		-	0.000	0.872	-
Army Standard Family of Soft Wall Shelters (ASF- SWS)	Various	Various : Various	-	-		0.746	Mar 2019	-		-		-	0.000	0.746	-
Army Standard Family of Rigid Wall Shelters (ASF- RWS)	Various	Various : Various	-	-		0.295	Dec 2018	-		-		-	0.000	0.295	-
		Subtotal	8.248	2.050		1.722		-		-		-	0.000	12.020	N/A
Test and Evaluation (	(\$ in Milli	ons)		FY 2	018	FY 2	2019	FY : Ba	2020 ase	FY 2	2020 CO	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
Soldier Support Equipment	Various	Various : Various	4.795	0.855		-		-		-		-	0.000	5.650	-
Energy Efficiency Enabling Solutions	Various	Various : Various	0.715	-		0.478	Feb 2019	-		-		-	0.000	1.193	-
Army Standard Family of Soft Wall Shelters (ASF- SWS)	Various	Various : Various	-	-		0.100	Mar 2019	-		-		-	0.000	0.100	-

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 060 Equipm	ogram Ele 3804A / L vent - Adv	e <b>ment (N</b> ogistics a Dev	lumber/N and Engin	<b>ame)</b> beer	Project VR8 / C Ad	(Numbe Combat Se	r/ <b>Name)</b> ervice Sup	port Syst	'ems -
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 ase	FY :	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost Date		Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Standard Family of Rigid Wall Shelters (ASF- RWS)	Various	Various : Various	-	-		0.450	Nov 2018	-		-		-	0.000	0.450	-
		Subtotal	5.510	0.855		1.028		-		-		-	0.000	7.393	N/A
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	15.667	3.334		3.218		-		-		-	0.000	22.219	N/A		

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army Date: March 2019												
Appropriation/Budget Activity 2040 / 4			<b>R-1 F</b> PE 0 <i>Equi</i>	Program Elemen 603804A I Logist pment - Adv Dev	nt (Number/Name tics and Engineer	e) Project (N VR8 / Con Ad	Project (Number/Name) VR8 / Combat Service Support Systems - Ad					
	EV 2018	EX 20	10	EV 2020	EV 2021	EV 2022	EV 2023	EX 2024				
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4				
Conduct evaluation on resource & energy efficiency enabling so												
Conduct evaluation and demonstration of Black Waste Eliminati												
Conduct technology assessment on Waste to Energy capabilitie												
Evaluate integrated ASF-RWS technologies for all variants												
Prepare for and conduct ASF-RWS Materiel Development Decis	(םי											
Prepare for Milestone B and transition ASF-RWS (Exp/Non-Exp)	to EMD											

Appropriation/Budget ActivityR-1 Program Element (Number/Name)Project (Normality)2040 / 4PE 0603804A / Logistics and EngineerVR8 / ContEquipment - Adv DevAd	Number/Name) nbat Service Support Systems -

## Schedule Details

	St	art	E	nd
Events	Quarter	Year	Quarter	Year
Conduct evaluation on resource & energy efficiency enabling solutions	1	2016	4	2019
Conduct evaluation and demonstration of Black Waste Elimination technologies	1	2016	4	2018
Complete and transition ESPS to EMD development	1	2015	3	2015
Evaluate Solid waste Disposal Technologies for small base camps	1	2017	4	2017
Conduct demonstration of ULCANS technology enhancements	1	2016	4	2017
Conduct technology assessment on Waste to Energy capabilities	1	2016	4	2018
Evaluate integrated ASF-RWS technologies for all variants	1	2016	4	2019
Prepare for and conduct ASF-RWS Materiel Development Decision (MDD)	3	2017	1	2018
Prepare for Milestone B and transition ASF-RWS (Exp/Non-Exp) to EMD	1	2019	2	2019

Exhibit R-2, RDT&E Budget Item		Date: March 2019												
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	Appropriation/Budget Activity 040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv 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	-	36.279	39.244	31.175	-	31.175	30.785	35.315	26.491	27.500	0.000	226.789		
808: DoD Drug & Vacc Ad	-	13.305	13.988	11.315	-	11.315	11.781	9.329	8.884	9.432	0.000	78.034		
811: Mil HIV Vac&Drug Dev	-	5.022	5.289	5.460	-	5.460	5.603	5.973	1.110	1.146	0.000	29.603		
836: Field Medical Systems Advanced Development	-	13.678	14.674	14.107	-	14.107	13.099	19.702	16.497	16.922	0.000	108.679		
CS4: MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)	-	0.000	5.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000		
FF4: Counterdrug, DDR, Sys Development & Demonstration	-	4.000	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.000		
VS7: MEDEVAC Mission Equipment Package (MEP) - Adv Dev	-	0.274	0.293	0.293	-	0.293	0.302	0.311	0.000	0.000	0.000	1.473		

#### A. Mission Description and Budget Item Justification

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Arm	ny			te: March 2019		
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	: Advanced	<b>R-1 Program</b> PE 0603807 <i>F</i>	Element (Number/Name A / Medical Systems - Adv	e) Dev		
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	<u>FY 202</u>	<u>0 Total</u>
Previous President's Budget	33.491	34.284	39.477	-		39.477
Current President's Budget	36.279	39.244	31.175	-		31.175
Total Adjustments	2.788	4.960	-8.302	-		-8.302
<ul> <li>Congressional General Reductions</li> </ul>	-0.025	-0.040				
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-				
<ul> <li>Congressional Rescissions</li> </ul>	-	-				
Congressional Adds	-	5.000				
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-				
Reprogrammings	4.000	-				
SBIR/STTR Transfer	-1.187	-				
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-8.302	-		-8.302
Congressional Add Details (\$ in Millions, and Includ	les General Red	ductions)			FY 2018	FY 2019
Project: CS4: MEDICAL SYSTEMS ADV DEV INITIATI	IVES (CA)					
Congressional Add: Transport Telemedicine					-	5.000
			Congressional Add Subt	otals for Project: CS4	-	5.000
			Congressional Add	Totals for all Projects	-	5.000

#### Change Summary Explanation

Funding reduced in FY 2020 to support the Army's modernization priorities in support of the National Defense Strategy.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4		<b>R-1 Progra</b> PE 060380	am Elemen 07A / Medica	<b>t (Number</b> / al Systems	Project (N 808 / DoD	t (Number/Name) DoD Drug & Vacc Ad						
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
808: DoD Drug & Vacc Ad	-	13.305	13.988	11.315	-	11.315	11.781	9.329	8.884	9.432	0.000	78.034
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

This Project funds development of candidate medical countermeasures for infectious diseases of military relevance. These efforts are in: vaccines, drugs, diagnostic kits/ devices, and studies to determine if insects infected with pathogenic organisms are capable of infecting service members/preventive medicine measures. These funds support human clinical effectiveness (capacity to produce a desired size of an effect under ideal or optimal conditions) trials of the drug/vaccine in larger groups that are designed to assess how well the drug/vaccine works and continue safety assessments in a larger group of volunteers. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of medical diagnostic kits and devices. This work, which is performed in military laboratories or civilian pharmaceutical firms, is directed toward the prevention of disease, early diagnosis, and accelerated recovery time once diagnosed to enhance battlefield readiness. All clinical trials are conducted in accordance with United States (U.S.) Food and Drug Administration (FDA) regulations, a mandatory obligation for all military products placed into the hands of medical providers or service members. Product development priorities are determined based upon four major factors: (1) the extent and threat of the disease within the Combatant Commands theater of operations, (2) the clinical severity of the disease, (3) the technical maturity of the proposed solution, and (4) the affordability of the solution (development and production). Products from this Project will transition to PE 0604807A/Project 849.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: DoD Drug and Vaccine Advanced Development	13.305	13.511	11.315
<b>Description:</b> Funding is provided for the development of candidate medical countermeasures for military relevant infectious disease focusing on prevention, early diagnosis and accelerated recovery time. Funding supports both technical evaluations and human clinical testing to assure the safety and effectiveness of medical diagnostic kits and devices			
FY 2019 Plans: Dengue Vaccine Block II: Will continue the clinical development of the dengue human infection model (DHIM), a tool for rapid evaluation of efficacy of dengue vaccines and therapeutics.			
Treatment for Resistant Wound Infections: Will monitor technical maturity of candidate treatments for evidence of safety and efficacy in relevant animal models. Proposed solutions could be stand-alone treatments or adjuncts to established medical practice. Candidate treatments could be small-molecule drugs, biologicals such as bacteriophages, or antibodies.			
Next Generation Malaria Prophylaxis: Will continue the retinal (eye) safety study (3 year study) started in FY17. Address any FDA post-marketing approval requirements.			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/l	Name)	
204074	PE 0603807AT Medical Systems - Adv Dev	8081 DOD	Drug &	vacc Ad	
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2018	FY 2019	FY 2020
Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (Multi continue to be developed and evaluated. Clinical testing will be conducted for d	ple)): The dengue and chikungunya assays w engue and clinical sites identified for chikungu	ll inya.			
<b>FY 2020 Plans:</b> Dengue Vaccine Block II: Will continue the clinical development of the dengue heraluation of efficacy of dengue vaccines and therapeutics.	numan infection model (DHIM), a tool for rapio	1			
Treatment for Resistant Wound Infections: Will monitor technical maturity of car efficacy in relevant animal models.	ndidate treatments for evidence of safety and				
Malaria Chemoprophylaxis ?Tafenoquine (formerly Next Generation Malaria Prostudy (3 year study) started in FY17. Address any FDA post-marketing approva	ophylaxis): Will continue the retinal (eye) safe I requirements.	ty			
Rapid Diagnostic and Detection Devices (Infectious Disease Diagnostics (Multi 0604807A Project 849 in FY19. The chikungunya assays will continue to be de conducted for chikungunya.	ple)): The dengue assay transitioned to PE eveloped and evaluated. Clinical testing will be				
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease in FY20 to support the Army's modernization priorities in sup	port of the National Defense Strategy.				
Title: FY19 SBIR/ STTR Transfer			-	0.477	-
Description: FY19 SBIR/STTR Transfer					
<b>FY 2019 Plans:</b> FY19 SBIR/STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY19 SBIR/STTR Transfer					
	Accomplishments/Planned Programs Sub	totals	13.305	13.988	11.315
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>		,		I	

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
204074	PE 0603807A / Medical Systems - Adv Dev	808 I DoD	Drug & Vacc Ad

#### D. Acquisition Strategy

Test and evaluate in-house and commercially developed products in extensive commercial partner or government-managed clinical trials to gather data required for FDA licensure and Environmental Protection Agency registration ensuring government (military) requirements are met with judicious investment.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	roject C	<b>ost Analysis:</b> PB 2	020 Army	/								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	t Activity	1				<b>R-1 Pro</b> PE 0603	<b>gram El</b> 3807A / <i>N</i>	ement (N Aedical Sy	u <b>mber/N</b> /stems - /	<b>ame)</b> Adv Dev	<b>Project</b> 808 / <i>D</i>	(Number D Drug 8 סכ	r/ <b>Name)</b> & Vacc Ac	I	
Management Service	s (\$ in M	illions)	[	FY 2	2018	FY 2	019	FY 2 Ba	020 se	FY 2 O	2020 CO	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	Not Applicable : Not applicable	21.565	2.480		2.411		0.724		-		0.724	Continuing	Continuing	Continuing
Medical Product Development Management Services Cost	PO	General Dynamics Information Technology, : Frederick MD	4.579	2.409		2.322		0.774		-		0.774	0.000	10.084	-
		Subtotal	26.144	4.889		4.733		1.498		-		1.498	Continuing	Continuing	N/A
Product Developmen	t (\$ in Mi	illions)	ſ	FY 2	2018	FY 2	019	FY 2 Ba	020 se	FY 2 O(	2020 CO	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	Not applicable : Not applicable	30.466	2.753		-		5.373		-		5.373	Continuing	Continuing	Continuing
Rapid Diagnostic and Detection Devices	C/Various	Inbios, Inc : Seattle WA	-	-		2.051		2.428		-		2.428	0.000	4.479	-
FY19 SBIR/ STTR Transfer	TBD	N/A : N/A	-	-		0.477		-		-		-	0.000	0.477	-
		Subtotal	30.466	2.753		2.528		7.801		-		7.801	Continuing	Continuing	N/A
Support (\$ in Millions	;)		[	FY 2	2018	FY 2	019	FY 2020 Base		FY 2	2020 CO	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	Not Applicable : Not applicable	15.721	-		1.020		0.107		-		0.107	Continuing	Continuing	Continuing
		Subtotal	15.721	-		1.020		0.107		-		0.107	Continuing	Continuing	N/A
E 0603807A: <i>Medical Systems - Adv Dev</i> rmy					Ur	Page 6 o	f 38		R	-1 Line #	86				319

Exhibit R-3, RDT&E P	chibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												March 20	19	
Appropriation/Budge 2040 / 4	t Activity	1				<b>R-1 Pro</b> PE 0603	R-1 Program Element (Number/Name)Project (NPE 0603807A / Medical Systems - Adv Dev808 / DoD						r/ <b>Name)</b> & Vacc Ad		
Test and Evaluation (	\$ in Milli	ons)		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	Not applicable : Not applicable	53.852	2.867		0.548		-		-		-	Continuing	Continuing	Continuing
Dengue Block II	IA	WRAIR and AFRIMS : Silver Spring MD	0.800	0.920		3.209		0.877		-		0.877	0.000	5.806	-
Malaria Prophylaxis clinical trial	TBD	TBD : TBD	7.299	1.876		1.950		1.032		-		1.032	0.000	12.157	-
		Subtotal	61.951	5.663		5.707		1.909		-		1.909	Continuing	Continuing	N/A
Prior Years			Prior Years	FY 2	018	FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals 134.2					13.988		11.315		-		11.315	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army       Date: March 2019												
Appropriation/Budget Activity 2040 / 4		<b>R</b> P	2-1 Program Elemer PE 0603807A / Medic	n <b>t (Number/Name</b> ) cal Systems - Adv I	) Project (N Dev 808 / DoD	lumber/Name) Drug & Vacc Ad						
	<b>T</b> V 0040	=	<b>-</b>	<b>EV 0004</b>	51/ 0000	=	<b>T</b> V 0004					
Event Name	FY 2018 1 2 3 4	FY 2019	FY 2020           4         1         2         3         4	FY 2021           1         2         3         4	FY 2022 1 2 3 4	FY 2023 1 2 3 4	FY 2024 1 2 3 4					
Dengue Vaccine Block II Human Infection model studies	FY16-FY20											
Treatment for Resistant Wound Infections Antifungal Drug Phas	FY16-FY19											
D5P Next Generation Malaria Drug Phase 2 Safety trial				FY 16	-FY17							
Rapid Human Diagnostic Devices	EY17-EY22											

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date	: March 2019
Appropriation/Budget ActivityR-12040 / 4PE	Program Element (Numbe 0603807A / Medical System	r <b>/Name)</b> s - Adv Dev	Project (Numbe 808 / DoD Drug	r/Name) & Vacc Ad
Schedu	ıle Details			
	St	art		End
Events	Quarter	Year	Quarte	r Year
Dengue Vaccine Block II Human Infection model studies	1	2016	4	2021
		1		
Ireatment for Resistant Wound Infections Antifungal Drug Phase 2 safety trial	1	2016	4	2020
D5P Next Generation Malaria Drug Phase 2 Safety trial	<u> </u>	2016 2021	4	2020 2023

Exhibit R-2A, RDT&E Project J	ustification	: PB 2020 A	vrmy							Date: Mai	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060380	am Elemen )7A / Medica	<b>t (Number</b> / al Systems ·	Name) · Adv Dev	Project (N 811 / Mil H	umber/Na IV Vac&Dr	<b>me)</b> ug 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
811: Mil HIV Vac&Drug Dev	-	5.022	5.289	5.460	-	5.460	5.603	5.973	1.110	1.146	6 0.000	29.60
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Research efforts are coordinate Deficiency Syndrome (DAIDS).	d with the Na	HIV-positive ulations. Pro	DoD perso oducts from utes of Hea	onnel is esti this Project	imated to be t will transiti National Ins	e \$16.6 billic on to PE 06	on for 3000 04807A/Pro	personnel o pject 812. ectious Dis	eases (NIAI	D), Divisio	All clinical f	rials are
B. Accomplishments/Planned	Programs (S	\$ in Millions	<u>6)</u>						FY	2018	FY 2019	FY 2020
<i>Title:</i> Military HIV Vaccine & Dru	ıg Developm	ent								5.022	5.095	5.460
<b>Description:</b> This Project funds	advanced de	evelopment	research to	develop ca	andidate HIV	✓ vaccines,	assess thei	r safety and	d k			
	human subj	ects, and pr	otect militar	y personne	el from risks	associated	with HIV inf	ection.				

The cohort studies in Thailand and Germany will be completed in FY19, with results available by the end of the FY. Selection of clinical sites for future effectiveness studies will be initiated.

FY 2020 Plans:

Regional Vaccine Candidate: Effort will not be funded in this BA until FY23 when the effort transitions to advanced development.

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

#### FY 2019 to FY 2020 Increase/Decrease Statement:

The increase of funding in FY20 was due to the inflation factor.

Title: FY 2019 SBIR/ STTR Transfer

-

0.194

-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev	Project ( 811 / Mil	Number/N HIV Vac&	<b>lame)</b> Drug Dev	
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2018	FY 2019	FY 2020
Description: FY19 SBIR/STTR Transfer					
<i>FY 2019 Plans:</i> FY19 SBIR/STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY19 SBIR/STTR Transfer					
	Accomplishments/Planned Programs Sub	ototals	5.022	5.289	5.460
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy Test and evaluate commercially developed drug/vaccine candidates in govern E. Performance Metrics N/A	nment-managed trials.				

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	019	
Appropriation/Budge 2040 / 4	t Activity	1				<b>R-1 Pro</b> PE 0603	<b>gram El</b> 3807A / <i>N</i>	ement (N Aedical S	l <b>umber/N</b> Systems - J	<b>ame)</b> Adv Dev	<b>Project</b> 811 / <i>M</i>	(Numbe il HIV Vac	<b>r/Name)</b> c&Drug De	ev	
Management Service	s (\$ in M	illions)		FY 2	018	FY 2	019	FY 2 Ba	2020 ase	FY 2	2020 CO	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	TBD	Not Applicable : Not Applicable	3.280	0.852		-		-		-		-	Continuing	Continuing	Continuing
		Subtotal	3.280	0.852		-		-		-		-	Continuing	Continuing	N/A
Remarks Not Applicable	t (\$ in Mi	illions)						FY	2020	FY	2020	FY 2020	]		
Product Developmen	ונ (סוו ועו	inions)		FY 2	018	FY 2	019	Ba	ase	0	co	Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Medical Product Development Cost	TBD	Not applicable : Not applicable	4.081	0.997		-		-		-		-	Continuing	Continuing	Continuing
FY19 SBIR/STTR Transfer	TBD	N/A : N/A	-	-		0.194		-		-		-	0.000	0.194	-
		Subtotal	4.081	0.997		0.194		-		-		-	Continuing	Continuing	N/A
Support (\$ in Millions	5)			FY 2	018	FY 2	019	FY 2 Ba	2020 ise	FY 2	2020 CO	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	TBD	TBD : TBD	2.439	1.112		-		-		-		-	0.000	3.551	-
		Subtotal	2.439	1.112		-		-		-		-	0.000	3.551	N/A
Remarks Not Applicable												_			

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EXHIBIL R-3, RUI GE Pr	roject Co	ost Analysis: PB 2	020 Army	/								Date:	March 20	)19	
Appropriation/Budget 2040 / 4	Activity					<b>R-1 Pro</b> PE 0603	<b>gram Ele</b> 3807A / <b>/</b>	ement (Ni Medical Sy	u <b>mber/N</b> /stems - /	<b>ame)</b> Adv Dev	<b>Project</b> 811 / <i>M</i>	(Number I HIV Vac	r/ <b>Name)</b> &Drug De	ev	
Test and Evaluation (\$	6 in Milli	ons)		FY 2	:018	FY 2	019	FY 2 Bas	020 se	FY 2 O	2020 CO	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	TBD	Not applicable : Not Applicable	23.538	2.061		5.095		5.460		-		5.460	0.000	36.154	-
		Subtotal	23.538	2.061		5.095		5.460		-		5.460	0.000	36.154	N/A
Remarks Not Applicable															
			Prior Years	FY 2	018	FY 2	019	FY 2 Bas	020 se	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		<b>Project Cost Totals</b>	33.338	5.022		5.289		5.460		-		5.460	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army Date: March 2019 Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name)																									
Appropriation/Budget Activity 2040 / 4							<b>R-1</b> PE	l <b>Pro</b> 0603	<b>gran</b> 3807/	n Eler A / <i>M</i> e	nen edica	<b>t (N</b> u al Sy	i <b>mbe</b> stem	r/Nam s - Adv	<b>e)</b> ' Dev	<b>Pr</b> ⁄ 81	o <b>ject</b> 1 / Mil	(Nun I HIV	ו <b>be</b> Vac	<b>r/Na</b> c&Di	<b>me)</b> rug De	ev			
		FY	2018	2	F	Y 2	019		FY	2020	,		FY 2	021		FY	2022		F	Y 20	123		FY	202	4
Event Name	1	2	3	4	1	2	3 4	4 1	2	3	4	1	2	3 4	1	2	3 4	4 1		2 :	3 4	1	2	3	4
Global HIV (Ad26/Ad26+gp140) Phase 2B Clinical Trial					FY18-FY	20																			
Global HIV (Ad26/Ad26+gp140) Phase 3 Efficacy Clinical Trial											FY20-	FY23													

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				D	ate: Marc	h 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program</b> PE 0603807A	Element (Number I Medical System	e <b>r/Name)</b> s - Adv Dev	Project (Nun 811 / Mil HIV	n <b>ber/Nam</b> ′Vac&Druថ	<b>e)</b> g Dev
	Schedule Detail	S				
		St	art		En	d
Events		Quarter	Year	Qua	arter	Year
Global HIV (Ad26/Ad26+gp140) Enters TMMR		2	2017		3	2017
Global HIV (Ad26/Ad26+gp140) Phase 2B Clinical Trial		1	2019		1	2021
Global HIV (Ad26/Ad26+ap140) Phase 3 Efficacy Clinical Trial		4	2020		4	0004

Exhibit R-2A, RDT&E Project J	ustification	: PB 2020 A	Army							Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progr</b> PE 060380	<b>am Elemen</b> D7A <i>I Medic</i>	<b>t (Number</b> / al Systems	Name) - Adv Dev	<b>Project (N</b> 836 / Field Developm	umber/Na Medical S ent	<b>me)</b> ystems Adva	anced
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
836: Field Medical Systems Advanced Development	-	13.678	14.674	14.107	-	14.107	13.099	19.702	16.497	16.922	2 0.000	108.679
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
funds human clinical trials to tes When available, commercial-off- Consideration is also given to re clinical trials are conducted in ac <b>B. Accomplishments/Planned I</b>	t the safety a the-shelf (C ducing the r ccordance w <b>Programs (</b>	and effective OTS) medic nedical logis ith U.S. FDA ith <b>Millions</b>	eness of bic cal products stics footprin A regulation s)	blogics (pro are also te nt through s is. Products	ducts derive ested and ev smaller weig s from this p	ed from living valuated for ght, volume, project will tra	g organisms transition to and equipn ansition to F	s) and device engineerin nent indepe PE 0604807	ces necessa ig and mani indence fror 7A/Project 8 FY	ary to meet ufacturing c m supportin 32. 7 <b>2018</b>	medical rec levelopmen lg materials. FY 2019	All FY 2020
Title: Field Medical Systems Adv	anced Deve	elopment - F	Program Ma	inagement	(PM) Medic	al Devices				10.991	8.249	2.982
<i>Description:</i> Advanced Concept enhanced combat casualty care. <i>FY 2019 Plans:</i>	t Developme	ent funding i	s provided t	for the follo	wing develo	pment of m	edical devic	es in suppo	ort of			
Field Anesthesia: Will continue c	linical trials	and prototyp	pe comparis	son.								
Temporary Corneal Repair (TCR	?): Will contir	nue down se	elect activition	es.								
Extracorporeal Life Support ? Lu	ng/Renal (fo	ormerly Port	able ECMO	): Will conti	inue clinical	trials and d	evice refine	ment.				
NINAD: Will continue FDA clinica	al trial for the	e indication f	for use of di	iagnosing n	nild traumat	ic brain inju	ry.					
<b>FY 2020 Plans:</b> Temporary Corneal Repair (TCR contract along with all of the Pha	:): Continue se II SBIR?s	down-selec s supporting	t activities. I the TCR co	Initiate pre-	clinical segr be complete	ment of the <sup>-</sup> ed.	Temporary	Corneal Re	pair			
Extracorporeal Life Support ?Lur MS B review, down select to mos	ng/Renal (E0 st promising	CLS ?L/R) C device and	Continue clir conduct FE	nical trials a DA pre-subr	and device r mission mee	efinement. ( eting to final	Conduct MS ize regulato	B review. ry strategy.	Post			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	Project (Number/I 836 / Field Medical Development	Name) I Systems Adv	/anced
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Non-invasive neuro assessment device (NINAD): Will complete FD, efforts for NINAD device. Field Anesthesia: Product development el	A clinical trial. If trial is successful, will initiate manufacturi liminated due to CSA priorities.	ng		
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease in FY20 to support the Army's modernization price	prities in support of the National Defense Strategy.			
Title: Field Medical Systems Advanced Development - PM Medical	Support Systems	2.462	2.556	4.604
<b>Description:</b> Funding is provided for efforts to develop products the health care operations.	at support the medical mission in combat casualty care ar	nd		
<b>FY 2019 Plans:</b> Nett Warrior Enhanced Wearable Sensors: Will continue to collabor of wearable sensors.	rate with Program Executive Office Soldier on the develop	oment		
Semi-autonomous casualty evacuation (CASEVAC) Ground Platfor Combat Support Systems on the Ground Mobility Vehicle Infantry S	rm (S-MET): Will collaborate with PEO Combat Systems & Squad Variant (GMVISV).	k l		
<b>FY 2020 Plans:</b> Nett Warrior Enhanced Physiological Sensors (Wearable): Will cont the development of wearable sensors. Will develop a concussion de	tinue to collaborate with Program Executive Office Soldier osimeter which is part of the Integrated Soldier Sensor Sy	on stem.		
Semi-autonomous casualty evacuation (CASEVAC) Ground Platfor a standardized Army Platform for the transport of a single casualty.	m (S-MET): Will be adapting a medical evacuation packa Will transition to PE 0604807A Project 832	ge to		
Transport Telemedicine Systems (TTS) (Formerly named Operation develops MEDHUB (Medical Hands-free Ultra Wideband Broadcast data to provide lifesaving situational awareness of patient vitals en- prototype design and operational test for the MEDHUB platform. Mil awareness. Continue development of MEDHUB Drug Safety and Tu	nal Virtual Health): The Transport Telemedicine system t), which will automatically capture, store, and forward me route to the Medical Treatment Facility (MTF). Complete EDHUB supports Medical Treatment Facilities (MTF) situa racking peripheral.	dical ational		
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase of funding in FY20 is due to the planned progression of telemedicine.	of medical products under development including transpo	rt		
Title: Field Medical Systems Advanced Development - PM Tissue I	njury and Regenerative Medicine	0.225	2.250	1.880

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	Project (Number/I 836 / Field Medica Development	Name) Systems Adv	vanced
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<b>Description:</b> Funding for engineering and manufacturing development of tissur for enhanced medical capability and readiness.	e injury and regenerative medicine health proc	ducts		
<b>FY 2019 Plans:</b> Topical Burn Conversion Prevention Product: Will submit an Investigational De effectiveness trials for a product to prevent superficial burn wounds from devel injuries.	evice Exemption, and will prepare for safety an oping into deep partial and full thickness burn	d		
Systemic Burn Conversion Prevention Product: Will initiate manufacturing of m effectiveness) for a product used as an intravenous treatment in burn injuries.	naterial and Phase 2 clinical trial (safety and			
Permanent Acellular Arterial Graft: Will initiate manufacturing of material and a support vascular grafting for extremity repair and reconstruction.	Phase 2 (safety and efficacy) clinical trial to			
<b>FY 2020 Plans:</b> Field Expedient Large Defect Bone Repair: Will initiate manufacturing of mater injured bones.	ial and pilot efficacy study for repair of damage	ed or		
Topical Burn Conversion Prevention Product: Continue to prepare for safety ar will be combined with Systemic Burn Conversion Prevention Product.	nd effectiveness trials. Product development e	fforts		
Systemic Burn Conversion Prevention Product: Continue to prepare for Phase Depending on FDA guidance at completion of Phase 2, will initiate pivotal stud patients are enrolled in and followed up outside of a randomized clinical trial.	2 clinical trial. Permanent Acellular Arterial Gr y and/or develop trauma registry (database the	aft: at		
FY 2019 to FY 2020 Increase/Decrease Statement: Funding decrease in FY20 to support the Army's modernization priorities in sup	pport of the National Defense Strategy.			
Title: Field Medical Systems Advanced Development - PM Pharmaceutical Systems	stems	-	1.121	4.641
<b>Description:</b> Funding is provided for engineering and manufacturing developm Manager (PM) Pharmaceuticals for enhanced combat casualty care and follow	nent of medical products managed by Progran -on care, including rehabilitation.	1		
FY 2019 Plans:				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603807A / Medical Systems - Adv Dev	<b>Projec</b> 836 / F Develc	t (Number/N Field Medical opment	<b>lame)</b> Systems Adv	vanced
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
Cold Stored Platelets in Platelet Additive Solution: Will complete studies for pr effectiveness.	oduct characterization and labeling information	and			
<b>FY 2020 Plans:</b> Cold Stored Platelets in Platelet Additive Solution: Will begin Phase II clinical to (type of injury/surgical procedure) and numbers to assess safety, effectiveness progression of medical products under development.	trial based on FDA guidance as to patient popu s and dose of candidate product. FY20 is a pla	lation nned			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase of funding in FY20 is due to the planned progression of medical	products under development.				
Title: FY 2019 SBIR/ STTR Transfer			-	0.498	-
Description: FY19 SBIR/STTR Transfer					
<b>FY 2019 Plans:</b> FY19 SBIR/STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY19 SBIR/STTR Transfer					
	Accomplishments/Planned Programs Sub	totals	13.678	14.674	14.107
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					
<b>D. Acquisition Strategy</b> Develop in-house or industrial prototypes in government-managed programs	to meet military and regulatory requirements fo	r produc	ction and fiel	ding.	
E. Performance Metrics N/A					

Project C	ost Analysis: PB 2	2020 Army	y								Date:	March 20	019		
t Activity	/				<b>R-1 Pro</b> PE 060	<b>ogram El</b> 3807A / <i>N</i>	ement (N Medical S <u>j</u>	umber/N ystems - ,	<b>ame)</b> A <i>dv Dev</i>	<b>Project</b> 836 / Fi Develop	(Number eld Medic oment	r <b>/Name)</b> al Systen	ns Advan	ced	
es (\$ in M	lillions)	ſ	FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total				
Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Various	Not Applicable : Not applicable	44.935	1.009		0.974		0.996		-		0.996	Continuing	Continuing	Continuing	
C/IDIQ	Not applicable : Not applicable	1.200	-		1.185		-		-		-	0.000	2.385	-	
	Subtotal	46.135	1.009		2.159		0.996		-		0.996	Continuing	Continuing	N/A	
nt (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	]			
Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
TBD	TBD : TBD	0.932	-		-		-		-		-	0.000	0.932	-	
TBD	ALL Product : Various	3.014	0.895		2.263		-		-		-	Continuing	Continuing	Continuing	
TBD	TBD : TBD	8.778	-		-		-		-		-	Continuing	Continuing	Continuing	
TBD	TBD : TBD	0.385	-		-		-		-		-	0.000	0.385	-	
TBD	Banyan BioMarkers, Inc : Alachua FL	15.814	-		-		-		-		-	0.000	15.814	-	
TBD	Advance Circulatory Systems Inc. : Roseville, MN	2.322	0.726		-		-		-		-	0.000	3.048	-	
TBD	Twinstar : Minniapolis, MN	1.871	-		-		-		-		-	0.000	1.871	-	
TBD	Gaia Medical : LaJolla CA	0.841	-		-		-		-		-	0.000	0.841	-	
TBD	TBD : TBD	2.036	2.241		-		-		-		-	0.000	4.277	-	
	Project C t Activity es (\$ in M Contract Method & Type Various C/IDIQ t (\$ in M Contract Method & Type TBD TBD TBD TBD TBD TBD TBD TBD TBD TBD	Project Cost Analysis: PB 2at Activityas (\$ in Millions)Contract Method & TypePerforming Activity & LocationVariousNot Applicable : Not applicableC/IDIQNot applicable : Not applicableTBDNot applicable : Not applicableTBDTBD : TBDTBDTBD : TBDTBDTBD : TBDTBDTBD : TBDTBDBanyan BioMarkers, Inc : Alachua FLTBDAdvance Circulatory Systems Inc : Roseville, MNTBDTBDTBDTwinstar : Minniapolis, MNTBDGaia Medical : LaJolla CATBDTBD : TBD	Project Cost Analysis: PB 2020 Army t Activityt Activityes (\$ in Millions)Contract Method & TypePerforming Activity & LocationVariousNot Applicable : Not applicableVariousNot applicable : Not applicableC/IDIQNot applicable : Not applicableContract Method & TBDPerforming Activity & LocationTBDTBD : TBDTBDALL Product : VariousTBDALL Product : VariousTBDTBD : TBDTBDTBD : TBDTBDTBD : TBDTBDIBD : TBDTBDSystems Inc. : Roseville, MNTBDTwinstar : Minniapolis, MNTBDTBD: TBDTBDTBD: Advance Circulatory Not Alachua FLTBDTBD : TBDTBDTBD : Alachua FLTBDTastar : Minniapolis, MNTBDTBD : TBDTBDCaia Medical : LaJolla CATBDTBD : TBDTBDTBD : TBDTBDCaia Medical : LaJolla CATBDTBD : TBDTBDTBD : TBDTBDCaia Medical : LaJolla CATBDTBD : TBDTBDCaia Medical : LaJolla CATBDTBD : TBDTBDTBD : TBDTBD <t< td=""><td>Project Cost Analysis: PB 2020 Armyt ActivityFY 2Contract Method &amp; TypePerforming Activity &amp; LocationPrior YearsVariousNot Applicable : Not applicable44.9351.009C/IDIQNot applicable : Not applicable1.200-Subtotal46.1351.009C/IDIQNot applicable : Not applicablePrior YearsCostSubtotal46.1351.009C/IDIQNot applicable : Not applicablePrior 1.200CostSubtotal46.1351.009At \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$</td><td>Project Cost Analysis: PB 2020 Armyt Activityt Activityt Activityt Activityt Activityt Activityt Activityt ActivityContract Method &amp; TypePerforming Activity &amp; LocationPrior YearsCostVariousNot Applicable : Not applicableVariousNot Applicable : Not applicableC/IDIQNot applicable : Not applicableC/IDIQNot applicable : Not applicablet (\$ in Millions)Fry 2018Contract Method &amp; TypePerforming Activity &amp; LocationTBDPerforming Activity &amp; LocationPrior YearsContract Method &amp; TypePerforming Activity &amp; LocationTBDTBD : TBD0.932-TBDALL Product : Various3.0140.895TBDTBD : TBD0.385-TBDTBD : TBD0.385-TBDBanyan BioMarkers, Inc : Alachua FL15.814-TBDAdvance Circulatory Systems Inc. : Roseville, MN2.3220.726TBDTwinstar : Minniapolis, MN1.871-TBDGaia Medical : LaJolia CA0.841-TBDTBD : TBD2.0362.241</td><td>Project Cost Analysis: PB 2020 ArmyR-1 Pro PE 060R-1 Pro PE 060FY 2018FY 2060FY 2018FY 2018FY 2018FY 2018Contract Method &amp; TypePerforming Activity &amp; Location applicable : Not applicable : Not applicable : Not applicable : Not app</br></br></br></br></br></br></br></br></br></br></br></br></br></br></br></br></br></br></td><td>Project Cost Analysis: PB 2020 ArmyR-1 Program Ele PE 0603807A / / Performing Activity &amp; Location Perfor Method &amp; TypeR-1 Program Ele PE 0603807A / / Struct Struct Activity &amp; Location Activity &amp; Location applicable : Not applicable : Not struct : Not struct : Subtotal 1.200 Performing Activity &amp; Location Performing Activity &amp; Location Performing Activity &amp; Location Struct : Not activity &amp; LocationPrior Cost CostAward Award DateAward CostAward Award DateContract Method % et applicable : Not applicable : Not</td><td>Project Cost Analysis: PB 2020 ArmyR-1 Program Element (N PE 0603807A / Medical S PE 0603807A / Medical SFY 2018FY 2019FY 2 Bacontract MethodPerforming Activity &amp; LocationPrior YearsAward DateCostAward DateCostVariousNot Applicable : Not applicable : Not applicabl</td><td>Project Cost Analysis: PB 2020 Army         R-1 Program Element (Number/N PE 0603807A / Medical Systems - / PE 070001 Systems Inc.: Machua FL 15.814         Pe 0707 FF 2018         Pe 0707 FF 2019         Pe 0707 FF 2019         Pe 0707 FF 2019           TBD         TBD         0.932         -         -         -         -         -           TBD         TBD         0.932         -         -         -         -         -           TBD         TBD         0.932         -         -         -         -         -           TBD         TBD         0.935         -         -         -         -         <td< td=""><td>Project Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev           FY 2019         FY 2020 Base         FY 2000 Base         Cost         Award Date         Cost         FY 2000 FY 2000         FY 2000 FY 2000         FY 2000 FY 2000         FY 2000 Base         FY 2000 FY 2000         FY 2000 Base         FY 2000 FY 2000           FY 2019         FY 2000         FY 2000<td>Project Cost Analysis: PB 2020 Army       R-1 Program Element (Number/Name) Rote of Sig Fri Develop         t Activity &amp; Sig Fri Develop         S in Hiltons)       Fy 2019       FY 2020 Base       Project Cost Analysis: PB 2020 Army         S in Hiltons)       FY 2019       FY 2020 Base       FY 2020 Coco         Contract Method Applicable: Not Applicable: Not Applicable: Not applicable       1.000       0.9774       Award Cost       Award Date         Contract Method Applicable: Not applicable       1.000       Contract March Applicable Not applicable       Award Date       Award Cost       Award Date       Award Cost       Award Date         Contract Method Signame March Signam Applicable       FY 2020       FY 2020       FY 2020       <th colsp<="" td=""><td>Project Cost Analysis: PB 2020 Army       Date:         Project Cost Analysis: PB 2020 Army       Project Number Section 1000000000000000000000000000000000000</td><td>Project Cost Analysis: PB 2020 Army       Date: March 20 Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) Project (Number/Name) PS 0 / Fried Medical Systems - Adv Date         contract       Prior: Number Name)       Prior: Number Name) Prior       Prior: Number Name)       Prior: Number Name)<!--</td--><td>Project Cost Analysis: PB 2020 Army         Totat: March 2019           t Activity:         R-1 Program Element Number/Numbe</td></td></th></td></td></td<></td></t<>	Project Cost Analysis: PB 2020 Armyt ActivityFY 2Contract Method & TypePerforming Activity & LocationPrior YearsVariousNot Applicable : Not applicable44.9351.009C/IDIQNot applicable : Not applicable1.200-Subtotal46.1351.009C/IDIQNot applicable : Not applicablePrior YearsCostSubtotal46.1351.009C/IDIQNot applicable : Not applicablePrior 1.200CostSubtotal46.1351.009At \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$ \$\$	Project Cost Analysis: PB 2020 Armyt Activityt Activityt Activityt Activityt Activityt Activityt Activityt ActivityContract Method & TypePerforming Activity & LocationPrior YearsCostVariousNot Applicable : Not applicableVariousNot Applicable : Not applicableC/IDIQNot applicable : Not applicableC/IDIQNot applicable : Not applicablet (\$ in Millions)Fry 2018Contract Method & TypePerforming Activity & LocationTBDPerforming Activity & LocationPrior YearsContract Method & TypePerforming Activity & LocationTBDTBD : TBD0.932-TBDALL Product : Various3.0140.895TBDTBD : TBD0.385-TBDTBD : TBD0.385-TBDBanyan BioMarkers, Inc : Alachua FL15.814-TBDAdvance Circulatory Systems Inc. : Roseville, MN2.3220.726TBDTwinstar : Minniapolis, MN1.871-TBDGaia Medical : LaJolia CA0.841-TBDTBD : TBD2.0362.241	Project Cost Analysis: PB 2020 ArmyR-1 Pro PE 060R-1 Pro PE 060FY 2018FY 2060FY 2018FY 2018FY 2018FY 2018Contract Method & TypePerforming Activity & Location applicable : Not applicable : Not 	Project Cost Analysis: PB 2020 ArmyR-1 Program Ele PE 0603807A / / Performing Activity & Location Perfor Method & TypeR-1 Program Ele PE 0603807A / / Struct Struct Activity & Location Activity & Location applicable : Not applicable : Not struct : Not struct : Subtotal 1.200 Performing Activity & Location Performing Activity & Location Performing Activity & Location Struct : Not activity & LocationPrior Cost CostAward Award DateAward CostAward Award DateContract Method % et applicable : Not applicable : Not	Project Cost Analysis: PB 2020 ArmyR-1 Program Element (N PE 0603807A / Medical S PE 0603807A / Medical SFY 2018FY 2019FY 2 Bacontract MethodPerforming Activity & LocationPrior YearsAward DateCostAward DateCostVariousNot Applicable : Not applicable : Not applicabl	Project Cost Analysis: PB 2020 Army         R-1 Program Element (Number/N PE 0603807A / Medical Systems - / PE 070001 Systems Inc.: Machua FL 15.814         Pe 0707 FF 2018         Pe 0707 FF 2019         Pe 0707 FF 2019         Pe 0707 FF 2019           TBD         TBD         0.932         -         -         -         -         -           TBD         TBD         0.932         -         -         -         -         -           TBD         TBD         0.932         -         -         -         -         -           TBD         TBD         0.935         -         -         -         - <td< td=""><td>Project Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev           FY 2019         FY 2020 Base         FY 2000 Base         Cost         Award Date         Cost         FY 2000 FY 2000         FY 2000 FY 2000         FY 2000 FY 2000         FY 2000 Base         FY 2000 FY 2000         FY 2000 Base         FY 2000 FY 2000           FY 2019         FY 2000         FY 2000<td>Project Cost Analysis: PB 2020 Army       R-1 Program Element (Number/Name) Rote of Sig Fri Develop         t Activity &amp; Sig Fri Develop         S in Hiltons)       Fy 2019       FY 2020 Base       Project Cost Analysis: PB 2020 Army         S in Hiltons)       FY 2019       FY 2020 Base       FY 2020 Coco         Contract Method Applicable: Not Applicable: Not Applicable: Not applicable       1.000       0.9774       Award Cost       Award Date         Contract Method Applicable: Not applicable       1.000       Contract March Applicable Not applicable       Award Date       Award Cost       Award Date       Award Cost       Award Date         Contract Method Signame March Signam Applicable       FY 2020       FY 2020       FY 2020       <th colsp<="" td=""><td>Project Cost Analysis: PB 2020 Army       Date:         Project Cost Analysis: PB 2020 Army       Project Number Section 1000000000000000000000000000000000000</td><td>Project Cost Analysis: PB 2020 Army       Date: March 20 Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) Project (Number/Name) PS 0 / Fried Medical Systems - Adv Date         contract       Prior: Number Name)       Prior: Number Name) Prior       Prior: Number Name)       Prior: Number Name)<!--</td--><td>Project Cost Analysis: PB 2020 Army         Totat: March 2019           t Activity:         R-1 Program Element Number/Numbe</td></td></th></td></td></td<>	Project Cost Analysis: PB 2020 Army           R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev           FY 2019         FY 2020 Base         FY 2000 Base         Cost         Award Date         Cost         FY 2000 FY 2000         FY 2000 FY 2000         FY 2000 FY 2000         FY 2000 Base         FY 2000 FY 2000         FY 2000 Base         FY 2000 FY 2000           FY 2019         FY 2000         FY 2000 <td>Project Cost Analysis: PB 2020 Army       R-1 Program Element (Number/Name) Rote of Sig Fri Develop         t Activity &amp; Sig Fri Develop         S in Hiltons)       Fy 2019       FY 2020 Base       Project Cost Analysis: PB 2020 Army         S in Hiltons)       FY 2019       FY 2020 Base       FY 2020 Coco         Contract Method Applicable: Not Applicable: Not Applicable: Not applicable       1.000       0.9774       Award Cost       Award Date         Contract Method Applicable: Not applicable       1.000       Contract March Applicable Not applicable       Award Date       Award Cost       Award Date       Award Cost       Award Date         Contract Method Signame March Signam Applicable       FY 2020       FY 2020       FY 2020       <th colsp<="" td=""><td>Project Cost Analysis: PB 2020 Army       Date:         Project Cost Analysis: PB 2020 Army       Project Number Section 1000000000000000000000000000000000000</td><td>Project Cost Analysis: PB 2020 Army       Date: March 20 Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) Project (Number/Name) PS 0 / Fried Medical Systems - Adv Date         contract       Prior: Number Name)       Prior: Number Name) Prior       Prior: Number Name)       Prior: Number Name)<!--</td--><td>Project Cost Analysis: PB 2020 Army         Totat: March 2019           t Activity:         R-1 Program Element Number/Numbe</td></td></th></td>	Project Cost Analysis: PB 2020 Army       R-1 Program Element (Number/Name) Rote of Sig Fri Develop         t Activity & Sig Fri Develop         S in Hiltons)       Fy 2019       FY 2020 Base       Project Cost Analysis: PB 2020 Army         S in Hiltons)       FY 2019       FY 2020 Base       FY 2020 Coco         Contract Method Applicable: Not Applicable: Not Applicable: Not applicable       1.000       0.9774       Award Cost       Award Date         Contract Method Applicable: Not applicable       1.000       Contract March Applicable Not applicable       Award Date       Award Cost       Award Date       Award Cost       Award Date         Contract Method Signame March Signam Applicable       FY 2020       FY 2020       FY 2020 <th colsp<="" td=""><td>Project Cost Analysis: PB 2020 Army       Date:         Project Cost Analysis: PB 2020 Army       Project Number Section 1000000000000000000000000000000000000</td><td>Project Cost Analysis: PB 2020 Army       Date: March 20 Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) Project (Number/Name) PS 0 / Fried Medical Systems - Adv Date         contract       Prior: Number Name)       Prior: Number Name) Prior       Prior: Number Name)       Prior: Number Name)<!--</td--><td>Project Cost Analysis: PB 2020 Army         Totat: March 2019           t Activity:         R-1 Program Element Number/Numbe</td></td></th>	<td>Project Cost Analysis: PB 2020 Army       Date:         Project Cost Analysis: PB 2020 Army       Project Number Section 1000000000000000000000000000000000000</td> <td>Project Cost Analysis: PB 2020 Army       Date: March 20 Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) Project (Number/Name) PS 0 / Fried Medical Systems - Adv Date         contract       Prior: Number Name)       Prior: Number Name) Prior       Prior: Number Name)       Prior: Number Name)<!--</td--><td>Project Cost Analysis: PB 2020 Army         Totat: March 2019           t Activity:         R-1 Program Element Number/Numbe</td></td>	Project Cost Analysis: PB 2020 Army       Date:         Project Cost Analysis: PB 2020 Army       Project Number Section 1000000000000000000000000000000000000	Project Cost Analysis: PB 2020 Army       Date: March 20 Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) PE 0603807A / Medical Systems - Adv Date       Project (Number/Name) Project (Number/Name) PS 0 / Fried Medical Systems - Adv Date         contract       Prior: Number Name)       Prior: Number Name) Prior       Prior: Number Name)       Prior: Number Name) </td <td>Project Cost Analysis: PB 2020 Army         Totat: March 2019           t Activity:         R-1 Program Element Number/Numbe</td>	Project Cost Analysis: PB 2020 Army         Totat: March 2019           t Activity:         R-1 Program Element Number/Numbe

Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	2020 Army	y								Date:	March 20	)19			
Appropriation/Budge 2040 / 4		R-1 Program Element (Number/Name)Project (PE 0603807A / Medical Systems - Adv Dev836 / FielDevelopr								Number/Name) Id Medical Systems Advanced ment							
Product Development (\$ in Millions)				FY 2018		FY 2	019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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		
PTSD	Various	TBD : Various locations	2.032	2.243		-		-		-		-	0.000	4.275	-		
Temporary Corneal Repair	Various	TBD : TBD	2.479	2.561		-		2.364		-		2.364	0.000	7.404	-		
Field Anesthesia	TBD	TBD : Various	2.568	3.205		1.020		-		-		-	0.000	6.793	-		
Field Sterilizer	TBD	TBD : TBD	3.515	-		3.121		-		-		-	0.000	6.636	-		
Product Development	TBD	HemCon Medical Technologies : Tigard, Oregon	9.720	-		-		-		-		-	Continuing	Continuing	Continuing		
Product Development	TBD	Banyan BioMarkers, Inc : Alachua FL	31.514	-		-		-		-		-	Continuing	Continuing	Continuing		
Development of Platelet Derived Hemostatic agent	TBD	Fast Track Drugs & Biologics : Frederick, MD	1.800	-		-		-		-		-	Continuing	Continuing	Continuing		
Non-invasive neuro assessment device (NINAD)	C/Various	TBD : TBD	0.800	-		2.874		-		-		-	0.000	3.674	-		
Cold Stored Platelets in Platelet Additive Solution (CSP-PAS) (Formerly Advanced Refrigerated Platel	C/Various	TBD : TBD	-	-		0.975		4.641		-		4.641	0.000	5.616	-		
Transport Telemedicine Systems (TTS) - MEDHUB Platform (Formerly named Operational Virtual Health)	TBD	TBD : TBD	-	-		-		2.000		-		2.000	Continuing	Continuing	Continuing		
Permanent Acellular Graft (formerly Extremity Injury Repair - Vascular Graft)	TBD	SS/CPFF : HumaCyte: Morrisville, NC	-	-		-		1.003		-		1.003	Continuing	Continuing	Continuing		
Nett Warrior Enhanced Physiological Sensors (Wearable)	TBD	Various : Various	-	-		-		1.153		-		1.153	Continuing	Continuing	Continuing		
FY19 SBIR/ STTR Transfer	TBD	N/A : N/A	-	-		0.498		-		-		-	0.000	0.498	-		

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	)19	
Appropriation/Budge 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0603807A / Medical Systems - Adv Dev836 / Field Medical Systems Advanced Development													
Product Development (\$ in Millions)					2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	90.421	11.871		10.751		11.161		-		11.161	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2 Ba	2020 se	FY	2020 CO	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	Not Applicable : Not applicable	46.464	0.548		1.152		1.200		-		1.200	Continuing	Continuing	Continuing
Subtotal		46.464	0.548		1.152		1.200		-		1.200	Continuing	Continuing	N/A	
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Cotorory Hom	Contract Method	Performing	Prior	Cont	Award	Cost	Award	Cost	Award	Cont	Award	Coot	Cost To	Total	Target Value of
Medical Product Development T&E Cost	TBD	Not applicable : Not applicable	38.414	0.250	Date	0.612	Date	0.750	Date	-	Date	0.750	Continuing	Continuing	Continuing
	<u> </u>	Subtotal	38.414	0.250		0.612		0.750		-		0.750	Continuing	Continuing	N/A
Remarks No product/contract costs o	greater than	\$1M individually.										_			
	Prior Years		Prior Years	5 FY 2018		FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals 221.434			221.434	13.678		14.674		14.107		-		14.107	Continuing	Continuing	N/A
<u>Remarks</u>															

ppropriation/Budget Activity 040 / 4							D																							
Appropriation/Budget Activity 2040 / 4									R-1 Program Element (Number/Name)Project (NPE 0603807A / Medical Systems - Adv Dev836 / FieldDevelopm														lumber/Name) I Medical Systems Advanced ent							
Event Name		FY	2018	:		FY:	2019	9		FY	2020		F	Y 20	21		FY	2022			FY 2	2023		F	Y 20	024				
Event Name		2	3	4	1	2	3	4	1	2	3 4	1 1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4				
Temporary Corneal Repair	R&D	develo	pment																											
Noninvasive Neuro Assessment Device development	R&D	develo	pment																											
Cold Stored Platelets in Platelet Additive solution	R&D	develo	pment																											
Transport Telemedicine Systems (TTS)- MEDHUB Platform	R&D	develo	pment																											
Transport Telemedicine Systems (TTS)- MEDHUB Drug Safety	R&D	develo	pment																											
Permanent Acellular Arterial Graft - Vascular Pivotal Study												RAL	) devel	oomaa	+															
Permanent Acellular Arterial Graft - Vascular MS B												Rat	devel	8 D dev																
														3.D GEV	elopinel															
Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army					Date: Marc	ch 2019																								
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Appropriation/Budget Activity 2040 / 4	<b>R-1 Program</b> PE 0603807A	Element (Numbe I Medical System	<b>r/Name)</b> s - Adv Dev	<b>Project (N</b> 836 / Field Developme	umber/Nam Medical Systemt	ne) stems Advanced																								
S	chedule Details	3																												
		St	art		Er	nd																								
Events		Quarter	Year	C	uarter	Year																								

Events	Quarter	Year	Quarter	Year
Temporary Corneal Repair	2	2016	1	2022
Noninvasive Neuro Assessment Device development	1	2017	1	2024
Cold Stored Platelets in Platelet Additive solution	4	2017	4	2023
Transport Telemedicine Systems (TTS)- MEDHUB Platform	3	2013	3	2020
Transport Telemedicine Systems (TTS)- MEDHUB Drug Safety and Tracking	4	2017	3	2024
Permanent Acellular Arterial Graft - Vascular Pivotal Study	1	2021	3	2023
Permanent Acellular Arterial Graft - Vascular MS B	2	2021	2	2021

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 /	Army							Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progr</b> PE 060380	<b>am Elemen</b> 07A <i>I Medic</i>	t (Number/ al Systems	lumber/Name) DICAL SYSTEMS ADV DEV ES (CA)				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
CS4: MEDICAL SYSTEMS ADV DEV INITIATIVES (CA)	-	0.000	5.000	0.000	_	0.000	0.000	0.000	0.000	0.000	0.000	5.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Demonstration for MEDHUB to pr paramedic tasks. <b>B. Accomplishments/Planned P</b>	rovide Med P <b>rograms (</b> S	ical Treatme <u>\$ in Million</u> :	ent Facility ( <u>s)</u>	(MTF) autor	matic situati	ional awarei	ness system	to identify FY 2018	patients en	-route to M	FFs and auto	omate
Congressional Add: Transport T	elemedicin	ie						-	5.000			
FY 2019 Plans: Transport Teleme	edicine											
					Congress	sional Adds	Subtotals	-	5.000			
C. Other Program Funding Sum N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A	imary (\$ in	<u>Millions</u> )										

Exhibit R-3, RDT&E	nibit R-3, RDT&E Project Cost Analysis: PB 2020 Army											Date: March 2019					
Appropriation/Budg 2040 / 4	et Activity	,		<b>R-1 Program Element (Number/Name)</b> PE 0603807A <i>I Medical Systems - Adv Dev</i>							Project CS4 / M INITIAT	<b>(Numbe</b> IEDICAL IVES (CA	r <b>/Name)</b> SYSTEMS )	S ADV DI	EV		
Product Developme	nt (\$ in Mi	llions)	ſ	FY 2018		FY 2	FY 2019		FY 2020 Base		2020 CO	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		
Telemedicine product development	C/TBD	TBD/ : TBD	7.500	-		5.000		-		-		-	0.000	12.500	-		
		Subtotal	7.500	-		5.000		-		-		-	0.000	12.500	N/A		
			Prior Years	FY 2	2018	FY 2	019	FY 2 Ba	2020 ase	FY 2 00	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
		Project Cost Totals	7.500	-		5.000		-		-		-	0.000	12.500	N/A		

**Remarks** 

Appropriation/Budget Activity       R-1 Program Element (Number/Name)       Project (Number/Name)       Project (Number/Name)         2040 / 4       PE 0603807A / Medical Systems - Adv Dev       CS4 / MEDICAL SYSTEMS ADV DEV       INTIATIVES (CA)         Event Name       FY 2018       FY 2019       FY 2020       FY 2021       FY 2022       FY 2023       FY 2024         Telemedicine product development (MEDHUB) - Develop MEDHUB i       Image: Comparison of the comparison of t	Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army			Date: March 20	)19
Event Name         FY 2018         FY 2019         FY 2020         FY 2021         FY 2023         FY 2023         FY 2023         FY 2023         FY 2024           1         2         3         4         1 </th <th>Appropriation/Budget Activity 2040 / 4</th> <th></th> <th>R-1 Program Eleme PE 0603807A / Medi</th> <th>ent (Number/Name) ical Systems - Adv Dev</th> <th>Project (Number/Name) CS4 / MEDICAL SYSTEM INITIATIVES (CA)</th> <th>S ADV DEV</th>	Appropriation/Budget Activity 2040 / 4		R-1 Program Eleme PE 0603807A / Medi	ent (Number/Name) ical Systems - Adv Dev	Project (Number/Name) CS4 / MEDICAL SYSTEM INITIATIVES (CA)	S ADV DEV
Event Name       1       2       3       4       1		FY 2018 FY	( 2019 FY 2020	FY 2021	FY 2022 FY 2023	FY 2024
Telemedicine product development (MEDHUB) - Develop MEDHUB H	Event Name	1 2 3 4 1 2	3 4 1 2 3 4	1 2 3 4 1	2 3 4 1 2 3 4	1 2 3 4
Telemedicine product development (MEDHUB) - Peripheral Inte Telemedicine product development (MEDHUB) - Software Deve	Telemedicine product development (MEDHUB) - Develop MEDI	ЭНОВ Р				
Telemedicine product development (MEDHUB) - Software Deve	Telemedicine product development (MEDHUB) - Peripheral Inte	te				
	Telemedicine product development (MEDHUB) - Software Deve	/e				
				· · ·		<u>.</u>

hibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019		
opropriation/Budget ActivityR-140 / 4PE	Program Element (Number 0603807A / Medical Systems	r/ <b>Name)</b> s - Adv Dev	Project (Number/ CS4 / MEDICAL S INITIATIVES (CA)	Name) YSTEMS ADV DEV	
Schedu	ule Details			Fad	
Events	Quarter	Year	Quarter	Year	
Telemedicine product development (MEDHUB) - Develop MEDHUB Prototype	2	2018	1	2019	
Telemedicine product development (MEDHUB) - Peripheral Integration	1	2018	1	2019	

Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2020 A	Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progr</b> PE 060380	<b>am Elemen</b> )7A <i>I Medic</i>	<b>t (Number</b> / al Systems	<b>Name)</b> - Adv Dev	Project ( FF4 / Co & Demor	Number/Na unterdrug, D stration	<b>me)</b> DR, Sys De	velopment
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	6 FY 2024	Cost To Complete	Total Cost
FF4: Counterdrug, DDR, Sys Development & Demonstration	-	4.000	0.000	0.000	-	0.000	0.000	0.000	0.00	0.00	0.000	4.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
is comprised of several variations corresponding chain-of-custody of B. Accomplishments/Planned F	s of a deskt documents. Programs (S	op applicatio This Projec <b>\$ in Million</b>	on used to s at will standa <u>s)</u>	select servic ardize DTP-	CSS across	s for random all services	n drug testin s and migra	ig, prepare te it to a We	labels for eb-based	urine specin system.	FY 2019	FY 2020
<i>Title:</i> Counterdrug, DDR System	Developme	ent								4.000	-	-
					Accomplis	shments/PI	anned Prog	grams Sub	totals	4.000	-	-
<u>C. Other Program Funding Sum</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u>	nmary (\$ in	<u>Millions)</u>										
N/A												
<u>E. Performance Metrics</u> N/A												

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date:	March 20	19		
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Program Element (Number/Name)Project (NPE 0603807A / Medical Systems - Adv DevFF4 / Cou& Demons						(Number ounterdru nstration	<b>Jumber/Name)</b> Interdrug, DDR, Sys Development stration			
Product Developmer	nt (\$ in Mi	llions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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/UCA	Alliant Corps LLC : San Antonio, TX	8.400	4.000		-		-		-		-	0.000	12.400	-	
		Subtotal	8.400	4.000		-		-		-		-	0.000	12.400	N/A	
			Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	8.400	4.000		0.000		-		-		-	0.000	12.400	N/A	

**Remarks** 

Appropriation/Budget Activity 2040 / 4         R-1 Program Element (Number/Name) PE 0603807A / Medical Systems - Adv Dev Be 0603807A / Medical Systems - Adv Dev Development Testing         Project (Number/Name) FF4 / Counterdrug, DDR, Sys Development T 2 3 4 1	Exhibit R-4, RDT&E Schedule Profile: PB 2020	Army							Date: March	2019
Event Name         FY 2018         FY 2019         FY 2020         FY 2021         FY 2022         FY 2023         FY 2024           1         2         3         4         1         2         3        <	Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06	Program Elemen 603807A / Medica	<b>t (Number/Nam</b> e al Systems - Adv	e) F Dev F &	Project (N FF4 / Cour & Demons	umber/Name) nterdrug, DDR tration	) , Sys Development
1       2       3       4       1       2       3	Event Name	FY 2018	FY 20	19	FY 2020	FY 2021	F١	( 2022	FY 2023	FY 2024
Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Development Testing         User Testing       Image: Coding and Development Testing       Image: Coding and Development Testing       Image: Coding and Testing         Us		1 2 3 4	1 2 3	3 4	1 2 3 4	1 2 3 4	1 2	3 4	1 2 3	4 1 2 3 4
User Testing	Coding and Development Testing									
	User Testing									

R-4A, RDT&E Schedule Details: PB 2020 Army riation/Budget Activity S Events ding and Development Testing			Date: Marc	h 2019
ppropriation/Budget Activity 040 / 4	R-1 Program Element (Number PE 0603807A / Medical Systems	/ <b>Name)</b> - Adv Dev	Project (Number/Nam FF4 / Counterdrug, DD & Demonstration	<b>e)</b> R, Sys Development
:	Schedule Details			
	Sta	rt	En	d
Events	Quarter	Year	Quarter	Year
Coding and Development Testing	3	2017	1	2019
User Testing	1	2019	2	2019

Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060380	am Element 07A / Medica	t (Number/l al Systems -	Name) - Adv Dev	Project (No VS7 / MED Package (N	u <mark>mber/Na</mark> n EVAC Miss MEP) - Adv	n <b>e)</b> sion Equipm Dev	ent
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
VS7: MEDEVAC Mission Equipment Package (MEP) - Adv Dev	-	0.274	0.293	0.293	-	0.293	0.302	0.311	0.000	0.000	0.000	1.473
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
This Project is funded to achieve retrofits MEDEVAC legacy helicop Medevac Mission Equipment on t wounded troops quickly while pro design update increasing the num the MEDEVAC MEP from PEO An products from this Project will tran	the require pters to ach he Army M viding good ber of air f viation. On haition to Pl	d operationa nieve the me EDEVAC he d care enrou rames for M ngoing resea E 0604807A	al capability edical capab elicopters is te. To bette EDEVAC co rch and des /Project VS	and commo pility provide critical to m er meet ope ompanies. I sign efforts 8.	on capabilit ed by a limit naintaining erational ne In 2010, the are require	y across the ed number high US troc eds, in 2009 Army Medi d to prepare	MEDEVAC of mission s op survival r the Vice C cal Departm and optimize	C fleet. The specific MEI rates during hief of Staff nent (US Ar ze the MED	MEDEVAC DEVAC heli current and f of the Army my) accepte DEVAC fleet	MEP progr copters, mo I future con y (VCSA) a ed life-cycle with missio	am modern odel HH-60N flicts by eva pproved the manageme on equipmer	izes and I. The icuating force ent of ht. All
B. Accomplishments/Planned P	rograms (§	in Millions	5)						FY	2018 F	Y 2019	FY 2020
Title: Medical Evacuation Develop	oment									0.274	0.293	0.293
<b>Description:</b> This effort involves A configuration for performing necess and prototypes to ensure parameter MEDEVAC Missions.	Aeromedica ssary life-sa dic skills an	al Evacuatio aving param id tasks are	n Cabin and edic-level ta performed t	d Technolog asks. Efforts to standard	gy Researcl s will develc to save Sol	n to determin op patient ha diers? lives	ne the optin andling syste during poin	num space em compor t of injury	and ients			
FY 2019 Plans: Future Vertical Lift (FVL) Aeromeon Development): Determine optimur evacuation platforms. Will develop performed to standard to save Sol	dical Evacu n space an patient ha ldiers? lives	ation Cabin d configurat ndling syste s during ME	Space and ion to perfo em compone DEVAC Mis	Technology rm life-savin ents and prossions.	y Research ng parameo ototypes to	and Design dic-level tasl ensure para	(Medical E ks in curren medic skills	vacuation t and future and tasks	are			
<b>FY 2020 Plans:</b> Future Vertical Lift (FVL) and UH6 System Design (Medical Evacuati Continue to develop and design o patients during MEDEVAC Missio paramedics have the ability to per	60 Aeromed on Advance ptimum hel ns. Contine form life-sa	dical Evacua ed Developr icopter cabi ue to develo wing tasks in	tion Cabin S nent): n space cor p patient ha n both curre	Space and nfiguration a andling syst ent and futu	Technology and illumina tem compor re evacuatio	r Research a tion so med nents and pr on platforms	and Patient ics can effe rototypes to a. Initiate pla	Handling ctively trea ensure anning for	t			

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

Date: March 2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: M	larch 2019			
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)ProjePE 0603807A / Medical Systems - Adv DevVS7 / Packa	<b>roject (Number/Name)</b> S7 I MEDEVAC Mission Equipment ackage (MEP) - Adv Dev				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020		
modernization of the UH60 helicopter medical interior system mission flexibility.	by reducing weight and designing modularity allowing greater					
	Accomplishments/Planned Programs Subtotals	0.274	0.293	0.293		
Remarks D. Acquisition Strategy Develop in-house or industrial prototypes in government-man E. Performance Metrics N/A	haged programs to meet military MEDEVAC and regulatory requirement	nts for produc	tion and fieldi	ing.		

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	y				<b>R-1 Pro</b> PE 060	ogram El 3807A / /	ement (N Medical S	umber/N ystems	<b>ame)</b> Adv Dev	<b>Project</b> VS7 / M Packag	(Numbe MEDEVAC e (MEP) -	r <b>/Name)</b> Mission E Adv Dev	Equipmei	nt
Management Service	es (\$ in N	lillions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY	2020 CO	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	TBD	APM MEDEVAC : Huntsville, AL	0.189	0.129		0.293		0.161		-		0.161	0.000	0.772	-
		Subtotal	0.189	0.129		0.293		0.161		-		0.161	0.000	0.772	N/A
Product Developmen	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY	2020 CO	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	TBD	APM MEDEVAC PEO Aviation : Huntsville AL	1.479	0.145		-		0.132		-		0.132	0.000	1.756	-
		Subtotal	1.479	0.145		-		0.132		-		0.132	0.000	1.756	N/A
Support (\$ in Millions	5)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY	2020 CO	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	TBD	APM MEDEVAC : Huntsville, AL	0.911	-		-		-		-		-	0.000	0.911	-
		Subtotal	0.911	-		-		-		-		-	0.000	0.911	N/A
Test and Evaluation (	(\$ in Mill	ions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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	MIPR	APM MEDEVAC PEO Aviation : Huntsville, AL	0.199	-		-		-		-		-	0.000	0.199	-
		Subtotal	0.199	-		-		-		-		-	0.000	0.199	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	2020 Arm	y							Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Pro</b> PE 0603	<b>gram Ele</b> 3807A / A	ement (N Medical S	umber/N ystems - J	<b>ame)</b> Adv Dev	<b>Project (Number/Name)</b> VS7 I MEDEVAC Mission Equipment Package (MEP) - Adv Dev						
	Prior Years	FY 2018	FY 2	019	FY 2 Ba	2020 se	FY 2 OC	020 :O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.778	0.274	0.293		0.293		-		0.293	0.000	3.638	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	4rmy	'																		Date	: Ma	arch 2	201	9			
ppropriation/Budget Activity 040 / 4							R-1 Program Element (Number/Name)ProjectPE 0603807A / Medical Systems - Adv DevVS7 / MPackag								<b>oject</b> 57 I M ickagi	j <b>ect (Number/Name)</b> 7 I MEDEVAC Mission Equipment kage (MEP) - Adv Dev											
Event Name		FY	2018		F١	( 201	9		FY	202	0		FY	202	1		FY :	2022		F	Y 2	023	Τ		FY 2	024	
Event Name	1	2	3 4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4	1
Future Vertical Lift (FVL) and UH60 Aeromedical Evac Cabin Sp																											
	Rese	arch a	nd develop	ment																							
								•																			

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	ch 2019
Appropriation/Budget ActivityR2040 / 4P	2-1 Program El 2E 0603807A / /	ement (Number Medical Systems	r/ <b>Name)</b> : - Adv Dev	<b>Project (Number/Nar</b> VS7 / MEDEVAC Miss Package (MEP) - Adv	<b>ne)</b> sion Equipment Dev
Schee	dule Details				
		Sta	rt	E	nd
Events		Quarter	Year	Quarter	Year
Future Vertical Lift (FVL) and UH60 Aeromedical Evac Cabin Space and Tec	chnology	1	2017	4	2024

Exhibit R-2, RDT&E Budget Item	Justificat	ion: PB 202	20 Army						Date: March 2019				
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Protot	anced	R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development											
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
Total Program Element	-	60.774	31.022	22.113	-	22.113	26.161	30.974	33.992	28.562	Continuing	Continuing	
CF2: Integrated Soldier Systems Prototyping (SL CFT)	-	0.000	0.000	1.959	-	1.959	2.543	3.152	3.774	3.847	0.000	15.275	
ET8: Personnel Airdrop System Development	-	0.476	0.396	0.297	-	0.297	1.267	1.265	1.813	1.000	Continuing	Continuing	
S53: Clothing And Equipment	-	2.532	1.823	2.466	-	2.466	1.810	2.416	4.478	5.078	Continuing	Continuing	
S54: Small Arms Improvement	-	27.832	7.677	14.555	-	14.555	16.097	19.232	17.439	10.487	0.000	113.319	
VS4: Soldier Protective Equipment	-	29.934	21.126	2.836	-	2.836	4.444	4.909	6.488	8.150	Continuing	Continuing	

#### A. Mission Description and Budget Item Justification

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

### CF2

The Integrated Squad effort includes the completion of the Adaptive Squad Architecture (ASA) and Squad Performance Model (SPM) programs. Both of these efforts are Program Executive Office-Soldier (PEO-S) led and will develop a full system architecture for the Soldier and the Squad. This will be accomplished by developing Interface Control Documents (ICDs) in order to provide common established interfaces for internal and external stakeholders who will interface on or with the Soldier platform. A critical part of this effort is development of the "Squad as an Integrated Platform" vision based on threat, operational environment and collaboration with internal and external stakeholders to inform investment decisions out to FY2050. The ASA will develop a metric-based approach that will include live, virtual and constructive evaluations and tools across the DoD, academia and industry which will be used for senior leaders to make deliberate decisions based on the analysis of Soldier/ Squad performance

### ET8

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

#### S53

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

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	
2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced	PE 0603827A I Soldier Systems - Advanced Developmen	nt
Component Development & Prototypes (ACD&P)		

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

#### S54

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

#### VS4

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

. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	20.239	18.044	16.165	-	16.165
Current President's Budget	60.774	31.022	22.113	-	22.113
Total Adjustments	40.535	12.978	5.948	-	5.948
Congressional General Reductions	-0.014	-0.022			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
Congressional Adds	35.000	13.000			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	6.248	-			
SBIR/STTR Transfer	-0.699	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	5.948	-	5.948

FY 2018 funding includes a \$20.000 million congressional add for Project S54 and a \$15.000 million congressional add for Project VS4.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / Soldier Systems - Advanced Developme	ent
FY 2019 funding includes a \$13.000 million congressional add for Pro FY 2020 funding request reflects an increase of \$5.948 million to acco	ject VS4. ount for the new start of Project CF2 and increased funding	in Project S53.
PE 0602827A: Soldier Systems Advanced Development		

Exhibit R-2A, RDT&E Project Ju	Date: Marc	ch 2019										
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060382 Developme	am Elemen 27A / Soldie ent	<b>t (Number</b> /l r Systems -	Project (N CF2 / Integ Prototyping	Number/Name)           grated Soldier Systems           1g (SL CFT)						
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
CF2: Integrated Soldier Systems Prototyping (SL CFT)	-	0.000	0.000	1.959	-	1.959	2.543	3.152	3.774	3.847	0.000	15.275
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

Project CF2 is a new start beginning in FY 2020. This program supports the Cross Functional Team (CFT).

#### A. Mission Description and Budget Item Justification

The Integrated Squad effort includes the completion of the Adaptive Squad Architecture (ASA) and Squad Performance Model (SPM) programs. Both of these efforts are Program Executive Office-Soldier (PEO-S) led and will develop a full system architecture for the Soldier and the Squad. This will be accomplished by developing Interface Control Documents (ICDs) in order to provide common established interfaces for internal and external stakeholders who will interface on or with the Soldier platform. A critical part of this effort is development of the "Squad as an Integrated Platform" vision based on threat, operational environment and collaboration with internal and external stakeholders to inform investment decisions out to FY2050. The ASA will develop a metric-based approach that will include live, virtual and constructive evaluations and tools across the DoD, academia and industry which will be used for senior leaders to make deliberate decisions based on the analysis of Soldier/ Squad performance.

FY20 RDTE funding in the amount of \$1.959M will finalize an initial ASA and SPM, consisting of 3 critical products: the Configuration Database (CD), the Architectural Assessment Tool (AAT) and the SPM.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Integrated Soldier Systems Prototyping	-	-	1.959
<b>Description:</b> Verify and maintain tools that provide Systems Engineering, Configuration Management, and Evaluations in a virtual and physical environment. Verify and maintain the ASA and SPM with emphasis on development of ICDs, specifically to support the rapid integration of the Soldier Lethality Cross Functional Team (SL CFT) priority programs with all other equipment the dismounted Soldier will use. Provide prototyping of capabilities for evaluation and integration. Execute evaluation of new measurements and methodologies from the S&T community, execute system level evaluation environments, and support Soldier system modeling.			
<i>FY 2020 Plans:</i> FY 2020 Plans: Finalize operational version of ASA and SPM			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Jus	stification: PB	2020 Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4				R-1 Pr PE 06 Develo	r <b>ogram Ele</b> r 03827A / So opment	nent (Numb Idier System	<b>Project (</b> CF2 / Inte Prototypi	<b>ime)</b> dier Systems )	3		
B. Accomplishments/Planned Pr	ograms (\$ in N	<u>/iillions)</u>						F	Y 2018	FY 2019	FY 2020
New start. Critical task of Adaptive Team, and PEO Soldier leadership future body-armor, etc) for acquisit	e Squad Archite to make imme ion.	cture will be diate quanti	e to allow Arr tative analys	ny Futures C is of propos	Command, S ed compone	oldier Lethal nts (ie next-ç	ity Cross Fund gen weapons,	ctional			
				Accon	nplishments	s/Planned P	rograms Sub	totals	-	-	1.959
C. Other Program Funding Sumr	nary (\$ in Milli	ons)									
Line Item	FY 2018	FY 2019	<u>FY 2020</u> Base	<u>FY 2020</u> OCO	<u>FY 2020</u> Total	FY 2021	FY 2022	FY 2023	FY 2024	<u>Cost To</u> Complete	Total Cost
• CF3: Integrated Soldier Systems (SL CFT)	-	<u> 1010</u> -	4.504	-	4.504	4.601	4.429	4.502	4.584	0.000	22.620
<u>Remarks</u>											
D. Acquisition Strategy											

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

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	)19			
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Program Element (Number/Name)ProjectPE 0603827A / Soldier Systems - AdvancedCF2 / IrDevelopmentPrototype							<b>ject (Number/Name)</b> 2 I Integrated Soldier Systems totyping (SL CFT)				
Product Developmer	nt (\$ in Mi	illions)		FY 2	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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		
Adaptive Soldier Architecture (ASA) Squad Performance Model (SPM)	C/FFP	TBD : TBD	-	-		-		0.500	Jan 2020	-		0.500	Continuing	Continuing	Continuing		
		Subtotal	-	-		-		0.500		-		0.500	Continuing	Continuing	N/A		
Test and Evaluation (	(\$ in Milli	ons)		FY 2	2018	FY 2019		FY 2020 Base		FY 2 OC	2020 FY 2020 CO Total						
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract		
ASA/SPM Test & Eval	C/FFP	TBD : TBD	-	-		-		1.459		-		1.459	Continuing	Continuing	Continuing		
		Subtotal	-	-		-		1.459		-		1.459	Continuing	Continuing	N/A		
		Broiget Cost Totale	Prior Years	FY 2	2018	FY 2	019	FY 2 Ba	2020 ISE	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
	Project Cost Totals							0.000 1.959 -				1.959	Continuing	Continuing	IN/A		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 /	Army	/																		Da	te: I	Marc	h 20′	19			
Appropriation/Budget Activity 2040 / 4			<b>i</b> F <i>1</i>	<b>R-1 I</b> PE 0 <i>Deve</i>	Prog 6038 elopn	<b>Jram</b> 827 <i>F</i> ment	Ele A/S	men oldie	<b>it (Nu</b> er Sys	umb sterr	er/N ns - A	ame Adva	) nced	Pro CF2 Pro	<b>ject (</b> 2 I Inte totypi	Num egrate ng (S	<b>ber</b> / ed S SL C	<b>Nam</b> Soldie FT)	er Sy	stem	S						
Event Name		FY	201	B		FY	201	9		FY	202	20		FY	202	1		FY 2	022		FY	202	3		FY	2024	٦
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4	1	2	3	4	1	2	3 4	
Soldier Lethality Support																											

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: March	ר 2019
ppropriation/Budget Activity 040 / 4	<b>R-1 Program E</b> PE 0603827A / <i>Development</i>	lement (Number Soldier Systems	r/Name) Pro - Advanced CF2 Pro	ject (Number/Nam 2 I Integrated Soldie totyping (SL CFT)	<b>e)</b> r Systems
	Schedule Details				
		Sta	art	En	d
Events		Quarter	Year	Quarter	Year
Soldier Lethality Support		2	2020	4	2024

Appropriation/Budget Activity 2040 / 4       R-1 Program Element (Number/Name) PE 6003927 / 3 / Soldier Systems - Advanced Development       Project (Number/Name) ET8 / Personnel Alrdrop System       Project (Number/Name) ET8 / Personnel Alrdrop System         COST (\$ in Millions)       Prior Years       FY 2018       FY 2019       FY 2020       FY 2020       FY 2021       FY 2022       FY 2023       FY 2024       Cost To Complete       Tc         ET8: Personnel Alrdrop System       0.476       0.396       0.297       0.297       1.267       1.265       1.813       1.000       Continuing       Co	Exhibit R-2A, RDT&E Project Ju	ustification	: PB 2020 A	Army							Date: Ma	arch 2019	
COST (\$ in Millions)Prior YearsFY 2018FY 2019FY 2020FY 2020FY 2020FY 2021FY 2021FY 2022FY 2023FY 2024Cost To CompleteTc CompleteET8: Personnel Airdrop System-0.4760.3960.297-0.2971.2671.2661.8131.000ContinuingContinuingQuantity of RDT&E Articles </th <th>Appropriation/Budget Activity 2040 / 4</th> <th></th> <th></th> <th></th> <th></th> <th>R-1 Progr PE 060382 Developm</th> <th><b>am Elemen</b> 27A I Soldie ent</th> <th>i<b>t (Number</b>/ er Systems -</th> <th><b>Name)</b> - Advanced</th> <th>Project ET8 / Pe Develop</th> <th>(Number/Na ersonnel Airo ment</th> <th>ame) drop System</th> <th></th>	Appropriation/Budget Activity 2040 / 4					R-1 Progr PE 060382 Developm	<b>am Elemen</b> 27A I Soldie ent	i <b>t (Number</b> / er Systems -	<b>Name)</b> - Advanced	Project ET8 / Pe Develop	(Number/Na ersonnel Airo ment	ame) drop System	
ET8: Personnel Airdrop System       -       0.476       0.396       0.297       -       0.297       1.267       1.265       1.813       1.000       Continuing	COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 202	3 FY 2024	Cost To Complete	Total Cost
Quantity of RDT&E Articles       -	ET8: Personnel Airdrop System Development	-	0.476	0.396	0.297	-	0.297	1.267	1.265	1.8	13 1.00	0 Continuing	Continuing
Note         This program supports the Cross Functional Team (CFT).         A. Mission Description and Budget Item Justification         Project ET8, Personnel Airdrop System, supports efforts to improve Low Altitude and High Altitude personnel parachutes and associated equipment to include canop improvement based on integration of new technology with the goal of enhancing the insertion capability of the airborne Soldier and increasing the performance, safe and durability of personnel airdrop equipment.         B. Accomplishments/Planned Programs (\$ in Millions)       FY 2018       FY 2019       FY 2019       FY 2         Title: Personnel Airdrop System Development       0.476       0.396       0.396       0.476       0.396       0.476       0.396       0.476       0.396       0.476	Quantity of RDT&E Articles	-	-	-	-	-	-	-	-				
B. Accomplishments/Planned Programs (\$ in Millions)FY 2018FY 2019FY 2019Title: Personnel Airdrop System Development0.4760.396Description: Effort to improve Low Altitude and High Altitude personnel parachutes and associated equipment to include canopy improvements based on integration of new technology with the goal of enhancing the insertion capability of the airborne soldier and increasing the performance, safety and durability of personnel airdrop equipment.0.4760.4760.396FY 2019 Plans: Continue to investigate and initiate improvements to address reduced signature of parachute systems for high altitude operations. FY 2020 Plans: Evaluate Low Altitude Static Line Automatic Activation Devices as well as Universal Static Line smart snap hook and Jumper Recovery Systems.Image: Continue to investigate and infinite extra the performance operation of the airborne soldier FY 2019 to FY 2020 Increase/Decrease Statement: Funding change in Personnel Airdrop System Development portfolio is due to anticipated requirement changes in FY 2019 and FY 2020.Image: Continue to investigate and infinite performance operation is due to anticipated requirement changes in FY 2019 and FY 2020.Image: Continue to investigate and infinite performance operation ope	<b>A. Mission Description and Bud</b> Project ET8, Personnel Airdrop S improvement based on integratio and durability of personnel airdro	<b>lget Item J</b> System, sup on of new te op equipmer	ustification ports efforts chnology wi nt.	i s to improve ith the goal	e Low Altitue of enhancir	de and High ng the insert	n Altitude pe tion capabili	rsonnel par ty of the air	achutes and borne Soldie	d associa er and inc	ted equipme creasing the	ent to include performance	canopy e, safety,
Title: Personnel Airdrop System Development0.4760.396Description: Effort to improve Low Altitude and High Altitude personnel parachutes and associated equipment to include canopy improvements based on integration of new technology with the goal of enhancing the insertion capability of the airborne soldier and increasing the performance, safety and durability of personnel airdrop equipment.0.4760.396FY 2019 Plans: Continue to investigate and initiate improvements to address reduced signature of parachute systems for high altitude operations.FY 2020 Plans: Evaluate Low Altitude Static Line Automatic Activation Devices as well as Universal Static Line smart snap hook and Jumper Recovery Systems.FY 2019 to FY 2020 Increase/Decrease Statement: Funding change in Personnel Airdrop System Development portfolio is due to anticipated requirement changes in FY 2019 and FY 2020.Static Line Automatic Activation Devices as well as Universal Static Line smart snap hook and FY 2019 and FY 2020.Static Line Static Li	B. Accomplishments/Planned F	Programs (	\$ in Million	<u>s)</u>							FY 2018	FY 2019	FY 2020
Description:       Effort to improve Low Altitude and High Altitude personnel parachutes and associated equipment to include canopy improvements based on integration of new technology with the goal of enhancing the insertion capability of the airborne soldier and increasing the performance, safety and durability of personnel airdrop equipment.         FY 2019 Plans:       Continue to investigate and initiate improvements to address reduced signature of parachute systems for high altitude operations.         FY 2020 Plans:       Evaluate Low Altitude Static Line Automatic Activation Devices as well as Universal Static Line smart snap hook and Jumper Recovery Systems.         FY 2019 to FY 2020 Increase/Decrease Statement:         Funding change in Personnel Airdrop System Development portfolio is due to anticipated requirement changes in FY 2019 and FY 2020.	Title: Personnel Airdrop System	Developme	nt								0.476	0.396	0.297
FY 2019 Plans:         Continue to investigate and initiate improvements to address reduced signature of parachute systems for high altitude operations.         FY 2020 Plans:         Evaluate Low Altitude Static Line Automatic Activation Devices as well as Universal Static Line smart snap hook and Jumper         Recovery Systems.         FY 2019 to FY 2020 Increase/Decrease Statement:         Funding change in Personnel Airdrop System Development portfolio is due to anticipated requirement changes in FY 2019 and FY 2020.	<b>Description:</b> Effort to improve Lo improvements based on integration and increasing the performance,	ow Altitude a on of new te safety and o	and High Ali echnology w durability of	titude perso vith the goal personnel a	nnel parach of enhanci airdrop equi	nutes and a ng the insei ipment.	ssociated e rtion capabi	quipment to lity of the ai	include can rborne soldi	nopy er			
<ul> <li>FY 2020 Plans:</li> <li>Evaluate Low Altitude Static Line Automatic Activation Devices as well as Universal Static Line smart snap hook and Jumper Recovery Systems.</li> <li>FY 2019 to FY 2020 Increase/Decrease Statement:</li> <li>Funding change in Personnel Airdrop System Development portfolio is due to anticipated requirement changes in FY 2019 and FY 2020.</li> </ul>	Continue to investigate and initiat	e improven	nents to add	lress reduce	ed signature	e of parachu	ute systems	for high alti	itude operati	ions.			
FY 2019 to FY 2020 Increase/Decrease Statement: Funding change in Personnel Airdrop System Development portfolio is due to anticipated requirement changes in FY 2019 and FY 2020.	FY 2020 Plans: Evaluate Low Altitude Static Line Recovery Systems.	Automatic	Activation D	)evices as w	vell as Univ	ersal Static	Line smart	snap hook a	and Jumper				
	FY 2019 to FY 2020 Increase/De Funding change in Personnel Airo 2020.	e <b>crease Sta</b> drop Syster	a <b>tement:</b> n Developm	ient portfolio	o is due to a	anticipated r	requirement	changes in	ı FY 2019 ar	nd FY			
Accomplishments/Planned Programs Subtotals 0.476 0.396						Accomplis	shments/Pl	anned Prog	grams Subt	totals	0.476	0.396	0.297

Exhibit R-2A, RDT&E Project Just	tification: PB	2020 Army							Date: Mai	rch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 Pi</b> PE 06 <i>Devel</i>	r <b>ogram Ele</b> n 03827A / So opment	nent (Numb Idier System	<b>er/Name)</b> as - Advanced	Project (N ET8 / Pers Developm	lumber/Na sonnel Airdi ent	<b>me)</b> rop System	
C. Other Program Funding Summ	ary (\$ in Milli	ons <u>)</u>									
			FY 2020	FY 2020	FY 2020					Cost To	
Line Item	<u>FY 2018</u>	FY 2019	<b>Base</b>	000	<u>Total</u>	<u>FY 2021</u>	FY 2022	FY 2023	FY 2024	<b>Complete</b>	<b>Total Cost</b>
<ul> <li>ES9: Advanced Tactical Parachute System</li> </ul>	5.607	6.702	6.617	-	6.617	1.829	2.965	2.964	3.000	0.000	29.684
• MA7801: Advanced Tactical Parachute System	28.440	41.104	43.622	-	43.622	53.077	47.805	39.849	39.017	0.000	292.914

#### **Remarks**

### D. Acquisition Strategy

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

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 0603 Develop	<b>gram El</b> 3827A / S oment	<b>ement (N</b> Soldier Sy	umber/N stems - A	ame) Idvanced	Project ET8 / P Develoj	ersonnel	r/ <b>Name)</b> Airdrop Sy	/stem	
Product Developme	nt (\$ in M	illions)		FY 2	2018	FY 2	019	FY 2 Ba	2020 se	FY 2 OC	020 CO	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
Developmental Contracts	C/FFP	TBD : TBD	-	-		-		0.098		-		0.098	2.605	2.703	-
Engineering Support	MIPR	NSRDEC Natick, MA : various	0.234	0.226		-		0.100		-		0.100	1.404	1.964	-
	- <u>u</u>	Subtotal	0.234	0.226		-		0.198		-		0.198	4.009	4.667	N/A
Support (\$ in Million	s)			FY 2	2018	FY 2	:019	FY 2 Ba	2020 se	FY 2 OC	:020 :O	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	Allot	PM SCIE : Belvoir	0.180	0.065		0.040		0.099		-		0.099	1.336	1.720	-
	- <u>u</u>	Subtotal	0.180	0.065		0.040		0.099		-		0.099	1.336	1.720	N/A
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	019	FY 2 Ba	2020 se	FY 2 OC	020 CO	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
Bench top testing	MIPR	TBD : TBD	0.250	0.185		0.356		-		-		-	0.000	0.791	-
		Subtotal	0.250	0.185		0.356		-		-		-	0.000	0.791	N/A
	Pi Ye				2018	FY 2	:019	FY 2 Ba	2020 se	FY 2 OC	020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	0.664	0.476		0.396		0.297		-		0.297	5.345	7.178	N/A
						,				·			·I		

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	rmy							Dat	te: March 20	19
Appropriation/Budget Activity 2040 / 4			R-1 Pro PE 0603 Develop	<b>gram Elemen</b> 3827A / Soldie oment	<b>it (Number/Name</b> er Systems - Adva	e) I nced I I	<b>Project (N</b> ET8 / Pers Developm	lumt sonn nent	<b>ber/Name)</b> el Airdrop Sy	vstem
Event Name	FY 2018	FY 201	19	FY 2020	FY 2021	F)	Y 2022	1	FY 2023	FY 2024
Evaluate component and subsystem technologies	1 Z J 4	1 2 3	4	Z J 4	1 Z J 4	1 2	J 4		Z J 4	1 2 3 4
RA-1 Signature Reduction Testing										
SL Canopy Release Assembly Testing										
Next Generation O2 Laboratory Testing										
Transition S&T for USL snap hook towed Jumper recovery syste	m				2					
Evaluate USL & Jumper Recovery Systems										
S&T transition of Alternative Materiel Hardware for RA-1, T-11 &	MC-6						4			
Evaluate new composite material for lighter weight parachute ha	ardware									
Transition Parachutist Non-GPS Naviagftion Aid										4
Evaluate Transition Parachutist Non-GPS Navigation Aid										
Transition High Altitude Combo Drops						3				
Evaluate High Altitude Combo Drops										
Transition S&T for Low Altitude Static Line Automatic Activation	Devices			4						

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A																Dat	te: N	/larcl	20 <sup>י</sup>	19								
Appropriation/Budget Activity 2040 / 4				<b>R-1 I</b> PE 0 <i>Deve</i>	Prog 6038 elopri	<b>Jram</b> B27 <i>F</i> ment	Ele A/So	men oldie	<b>t (Nu</b> r Sys	imb tem	er/Na s - A	ame dva	e) nceo	d E1 De	ojec 18 / F evelo	<b>t (N</b> Pers	lumt sonn ent	oer/l el Ai	Nam irdroj	<b>e)</b> 5 Sy	stem							
Event News		F	Y 201	8		FY	201	19		FY	202	0		FY :	2021			FY	2022	2		FY	202	3		FY 2	2024	L
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Evaluate Low Altitude Static Line Automatic Activation Devices																												
									•							1								1				

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mare	ch 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Elemen</b> PE 0603827A / Soldie Development	nt (Number er Systems	r/ <b>Name)</b> - Advanced	<b>Project (Number/Nar</b> ET8 / Personnel Airdro Development	<b>ne)</b> op System
	Schedule Details				
		Sta	art	E	nd
Events	Q	uarter	Year	Quarter	Year
Evaluate component and subsystem technologies		1	2018	4	2023
RA-1 Signature Reduction Testing		1	2018	4	2020
SL Canopy Release Assembly Testing		1	2023	4	2023
Next Generation O2 Laboratory Testing		1	2023	3	2025
Transition S&T for USL snap hook towed Jumper recove	ry system	4	2021	4	2021
Evaluate USL & Jumper Recovery Systems		4	2021	2	2022
S&T transition of Alternative Materiel Hardware for RA-1,	T-11 & MC-6	4	2022	4	2022
Evaluate new composite material for lighter weight parac	hute hardware	1	2022	4	2023
Evaluate Transition Parachutist Non-GPS Navigation Aid		1	2021	1	2026
Transition High Altitude Combo Drops		1	2022	1	2022
Evaluate High Altitude Combo Drops		1	2022	3	2022
Transition S&T for Low Altitude Static Line Automatic Act	ivation Devices	2	2020	2	2020
Evaluate Low Altitude Static Line Automatic Activation De	evices	2	2020	4	2021

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060382 Developme	am Element 27A / Soldier ent	t <b>(Number</b> /l <sup>-</sup> Systems -	Name) Advanced	Project (N S53 / Cloth	umber/Nan hing And Eq	<b>1e)</b> uipment	
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
S53: Clothing And Equipment	-	2.532	1.823	2.466	-	2.466	1.810	2.416	4.478	5.078	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

This program supports the Cross Functional Team (CFT).

#### A. Mission Description and Budget Item Justification

This Project supports efforts to evaluate and integrate technologies and representative or prototype systems that help expedite Soldier Clothing and Individual Equipment technology transition from the laboratory to operational use. Efforts focus on proving out commonality across as broad a spectrum of users as possible to provide a modular, integrated uniform/clothing system from skin out and head-to-toe. It funds efforts to transition new technologies and domestically available fabrics with Flame Resistant (FR), moisture wicking, insect protection and camouflage technologies, including integration of fabrics appropriate for uniforms and equipment used in jungle/tropical and arctic environments. New technologies are indentified to monitor health and improve Soldier survivability, reduce weight, and improve affordability, mobility and comfort in combat and training/administrative environments. Includes integration and interface on the Soldier system.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Soldier Uniforms and Clothing	1.962	1.765	1.972
Description: Develop superior and sustainable integrated clothing for the Soldier in a rapidly changing global environment.			
<i>FY 2019 Plans:</i> Develop improved Boot Water Absorption test methodology. Evaluate improved lighter weight textiles which incorporate improved vector protection, FR protection, and environmental protection while providing comfort, utility, and functionality. Evaluate materials to support extreme cold temperature protection for military free fall parachutists. Standardize test methodology for cold weather glove system. Improve Hot Weather Combat Uniform Female (IHWCU-F) Pattern adjustment for creation of female sizes.			
<i>FY 2020 Plans:</i> Continue Flame Resistant clothing upgrades. Continue Signature Management evaluation in Camouflage equipment. Continue to evaluate improved lighter weight textiles which incorporate improved vector protection, FR protection, and environmental protection while providing comfort, utility, and functionality. Also, continue to evaluate materials to support extreme cold temperature protection for military free fall parachutists. The S&T transition for environmental cold/wet protection clothing system is planned.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Jus	tification: PB	2020 Army							Date: M	arch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> PE 06 <i>Devel</i>	rogram Eler 03827A / Sc opment	nent (Numb Idier System	<b>er/Name)</b> Is - Advanced	Proje S53 /	ct (Number/N Clothing And	<b>lame)</b> Equipment	
B. Accomplishments/Planned Pro	ograms (\$ in N	<u>/lillions)</u>						[	FY 2018	FY 2019	FY 2020
Funding change in Soldier Uniforms	s and Clothing	portfolio is c	due to anticip	pated require	ement chang	es in FY 201	9 and FY 202	20.			
Title: Individual Equipment									0.570	-	0.494
<b>Description:</b> Develop and provide global environment.	superior and s	ustainable ir	ntegrated inc	dividual equi	pment for the	e Soldier in a	rapidly chan	ging			
<i>FY 2020 Plans:</i> Develop process and procedures for	or the Dyeing c	of Aramid Ble	ends, used ir	n environme	ntal clothing.						
FY 2019 to FY 2020 Increase/Dec Minor increase to support testing.	rease Statem	ent:									
Title: FY 2019 SBIR/STTR TRANS	FER								-	0.058	-
Description: FY 2019 SBIR/STTR	TRANSFER										
<b>FY 2019 Plans:</b> FY 2019 SBIR/STTR TRANSFER											
FY 2019 to FY 2020 Increase/Dec FY 2019 SBIR/STTR TRANSFER	rease Statem	ent:									
				Accor	nplishment	s/Planned P	rograms Sub	ototals	2.532	1.823	2.466
C. Other Program Funding Summ	ary (\$ in Milli	<u>ons)</u>	<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2020</u>					<u>Cost To</u>	
Line Item	FY 2018	FY 2019	Base	000	<u>Total</u>	FY 2021	FY 2022	<u>FY 202</u>	23 FY 2024	4 Complete	Total Cost
• S60: Clothing & Equipment <u>Remarks</u>	6.780	8.348	6.453	-	6.453	6.724	5.015	4.8	50 3.70	0.000	41.870
D. Acquisition Strategy Programs pursue technology matur Systems Development and Demon	ration and prot stration. This	otype develo Project cont	opment, culr inues to exe	ninating in th rcise compe	ne transition atitively awar	of mature te ded contract	chnologies (T s using best v	echnolo value so	gy Readiness urce selectior	s Level (TRL) n procedures.	6-7) to
E. Performance Metrics N/A											

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	)19	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Pro PE 060 Develop	ogram Ele 3827A / S oment	<b>ement (N</b> Soldier Sy	<b>umber/N</b> stems - A	<b>ame)</b> Idvanced	Project S53 / C	(Number lothing Ar	r/ <b>Name)</b> nd Equipn	nent	
Management Servic	es (\$ in N	lillions)	ĺ	FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	:020 :O	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	TBD	PM SPIE : Ft. Belvoir, VA	15.287	0.208		0.235		0.296		-		0.296	Continuing	Continuing	Continuing
		Subtotal	15.287	0.208		0.235		0.296		-		0.296	Continuing	Continuing	N/A
Product Developme	nt (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	020 CO	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	NSRDEC : Natick, MA	15.928	0.410		-		0.441		-		0.441	Continuing	Continuing	Continuing
Development Contracts	C/FFP	Various : Various	33.725	0.724		-		0.588		-		0.588	Continuing	Continuing	Continuing
FY 2019 SBIR /STTR Transfer	TBD	TBD : TBD	-	-		0.058		-		-		-	0.000	0.058	-
		Subtotal	49.653	1.134		0.058		1.029		-		1.029	Continuing	Continuing	N/A
Support (\$ in Millior	ıs)			FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	:020 :O	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
Misc Support Costs	MIPR	Natick,MA : Natick, MA	8.077	0.325		0.725		0.296		-		0.296	Continuing	Continuing	Continuing
		Subtotal	8.077	0.325		0.725		0.296		-		0.296	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Mill	ions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	020 CO	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
Testing Costs	MIPR	Various : Various	26.049	0.865		0.805		0.845		-		0.845	Continuing	Continuing	Continuing
		Subtotal	26.049	0.865		0.805		0.845		-		0.845	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	Date:	Date: March 2019										
Appropriation/Budget Activity 2040 / 4	R-1 Pro PE 0603 Develop	<b>gram El</b> 3827A / S oment	<b>ement (Number/N</b> a Soldier Systems - A	Project ( S53 / Clo	t <b>(Number/Name)</b> Nothing And Equipment							
	Prior Years FY 2018		FY 2	019	FY 2020 Base	FY 2020 FY 2 Base O(		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals	99.066	2.532		1.823		2.466	-		2.466	Continuing	Continuing	N/A

**Remarks** 

xhibit R-4, RDT&E Schedule Profile: PB 2020 Army       Date: March 202         Date: March 202       Date: March 202												201	9																	
Appropriation/Budget Activity 2040 / 4							F F L	R-1 Program Element (Number/Name)Project (NPE 0603827A / Soldier Systems - AdvancedS53 / ClotDevelopmentS53 / Clot											Num	lumber/Name) hing And Equipment										
Event Name	FY 2018 FY 2					201	2019 FY 2020					FY 2021 F				F	FY 2022			FY 2023					FY 2024					
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	2	3	4	1	2	3	4	4	1	2	3	4
UNIFORM CLOTHING																														
IHWCU-F																														
Flame Resistant Clothing Upgrades																														
Improve Signature Mgmt (IR) Eval & Camo in Clothing & Equi																														
CW/ECW Clothing Improvements																														
CW/ECW Handwear																														
CW/ECW Footwear																														
INDIVIDUAL EQUIPMENT																														

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: N	larch 2019			
ppropriation/Budget Activity 040 / 4	<b>R-1 Program Element (Numb</b> PE 0603827A <i>I Soldier System</i> <i>Development</i>	Project (Number/ S53 / Clothing And	Jumber/Name) hing And Equipment				
S	chedule Details						
	S	tart		End			
Events	Quarter	Year	Quarter	Year			
UNIFORM CLOTHING	1	2010	4	2023			
IHWCU-F	1	2020	4	2020			
Flame Resistant Clothing Upgrades	1	2011	4	2023			
Improve Signature Mgmt (IR) Eval & Camo in Clothing & Equipment	2	2012	4	2024			
CW/ECW Clothing Improvements	1	2020	4	2022			
CW/ECW Handwear	1	2020	4	2020			
CW/ECW Footwear	1	2020	4	2020			
INDIVIDUAL EQUIPMENT	4	2015	4	2018			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019			
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060382 Developme	am Elemen 27A / Soldie ent	<b>t (Number/</b> r Systems -	Name) Advanced	Project (N S54 / Smai	oject (Number/Name) 4 I Small Arms Improvement				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost		
S54: Small Arms Improvement	-	27.832	7.677	14.555	-	14.555	16.097	19.232	17.439	10.487	0.000	113.319		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

#### Note

This program supports the Cross Functional Team (CFT).

FY 2020 New starts include the following programs: Individual Non-Lethal System (funded in FY 2017), Non-Standard Weapons Assessments (funded in FY 2017), Solid State Active Denial System, Current and Legacy Weapon Improvements, and Next Generation Optics.

Name change: Next Generation Squad Automatic Rifle is renamed Next Generation Squad Weapon-Automatic Rifle (NGSW-AR) and Small Arms Fire Control (SAFC)-Squad combined with SAFC-Crew are now referred to as Next Generation Fire Control.

Previously funded efforts in this Project: Recoil Reduction Mechanisms, Lightweight Rifle/Machine Gun Barrel Evaluations, and Rifle/Machine Gun Suppressor Evaluations, Protective Weapons Coatings, and Weapon Upgrades and Accessories are now funded under Current and Legacy Weapon Improvements. Armaments for Robots is now funded under Externally Powered Weapon. Optics Upgrades is now covered under Next Generation Optics. Sniper Missed Distance Corrective Offset, Small Arms Fire Control Crew Enhancements, Small Arms Fire Control Precision Enhancements, and Fire Control Upgrades are now funded under Next Generation Fire Control.

#### A. Mission Description and Budget Item Justification

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020		
Title: New Weapon Systems	21.200	0.800	2.505		
Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: N	larch 2019			
--	---	-------------------------	----------------------	----------------------------	---------
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A <i>I Soldier Systems - Advanced</i> <i>Development</i>	Project (N S54 / Sma	umber/I // Arms /	<b>Name)</b> mprovement	
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2018	FY 2019	FY 2020
Description: Development of new small arms weapon systems					
<b>FY 2019 Plans:</b> Next Generation Squad Automatic Rifle (NGSAR): Transition of technologies to Program Element 0604601A, Project EW4. Coordinating and developing the Acquisition Strategy, Capability Production Document (CPD), and provide data stakeholders. Beginning EMD phase for the Next Generation Squad Automatic	from Program Element 0603827A, Project S54 e Capability Development Document (CDD), a from various technologies to better inform c Rifle.				
Externally Powered Mounted Machine Gun renamed to Externally Powered W development of the Capability Development Document (CDD) with Maneuver of Excellence. Intent is to leverage information gathered from prototype testing inform the CDD and the various platforms that may include the EPW as their A	eapon (EPW). Continuing to support the Center of Excellence and Maneuver Support C and develop a demonstrator to better evaluate Armament System.	enter e and			
New Weapons Evaluations and Assessments: Continuing to perform initial ev	aluation and assessment of new weapons.				
<i>FY 2020 Plans:</i> Externally Powered Weapon (EPW): Will continue to support the development with Maneuver Center of Excellence and Maneuver Support Center of Excellence prototype testing and develop a demonstrator to better evaluate and inform the the EPW as their Armament System. Will initiate the intelligence/networking and loop, small caliber defensive armaments system on an unmanned ground vehicle.	t of the Capability Development Document (CD nce. Intend to leverage information gathered fro e CDD and the various platforms that may inclu nd weapons design and functions for a man-in- icle including the Warfighter/Robot interface.	D) om de the-			
New Weapon Systems Evaluations and Assessments: Will continue to perform systems.	m initial evaluation and assessment of new wea	apon			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 Increase in funds required to reduce technology risk and to determine complete the Next Generation Squad Weapons technology development phase	e the appropriate set of technologies required to e.	D			
Title: Small Arms Weapon Systems Enhancements			-	0.100	7.650
Description: Enhancements and developments of small arms weapon system	IS.				
<b>FY 2019 Plans:</b> Recoil Reduction Mechanisms: Continuing to assess and evaluate selected R fabricated and tested for both individual and crew served weapons.	Recoil Reduction Mechanisms prototypes to be				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date:	/larch 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)PPE 0603827A / Soldier Systems - AdvancedSDevelopmentS	oject (Number/ 54 / Small Arms	<b>Name)</b> Improvement	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Armaments for Robots: Continuing to initiate the intelligence/networking and w small caliber defensive armaments system on an unmanned ground vehicle inc	reapons design and functions for a man-in-the-lo cluding the Warfighter/Robot interface.	op,		
Increased Barrel Life/Replace Chrome: Continuing test and evaluation of proto and liner designs that can withstand higher pressures per the Small Arms Amn investigate and mature additive manufacturing and cold spray methodology for	otype barrels delivered in FY 2017 to pursue barr nunition Configuration Study outputs. Further barrels.	el		
Non-Standard Weapons Assessments: Continuing to conduct baseline testing capability analysis of unique weapon characteristics. Continuing to utilize test of Non-Developmental Item solutions for pending requirements as well as esta of Regionally Aligned Forces and establish a sustainment strategy for long term Regionally Aligned Forces training mission. Continuing to conduct market rese	of commercial weapon systems and perform information to conduct trade off assessments blish safety parameters for the training mission n support of weapons procured to support the earch of commercially available weapon systems			
Small Business Innovative Research Enhancements: Continuing to focus on in acquisition and tracking, fire control, training effectiveness and reliability of wea	nprovements designed to enhance lethality, targ apons.	et		
Protective Weapons Coatings: (includes Adaptive Lubricious Coatings): Cont support production of super hydrophobic and other coatings in support of Smal manufacturing process studies and assessments to adapt the coating technolo manufacturing processes.	inuing to develop manufacturing technology to I Arms Weapons. Assessing and evaluating curr gy into weapon Original Equipment Manufacture	ent -		
Weapon Upgrades and Accessories: Continuing to test, evaluate and analyze weapons.	ongoing and new activities to enhance small arr	IS		
<b>FY 2020 Plans:</b> FY2020 New Start: Current and Legacy Weapon Improvements: Will assess a improvements for all current and legacy weapon systems.	nd evaluate selected capabilities and			
FY2020 New Start: Solid State Active Denial System: Will work to complete m Capability Development Document and provide input into programmatic docum	aturation of design, continue to monitor status of ients as necessary.			
FY2020 New Start: Individual Non-Lethal System: Will work to complete matur Government facility in support of Milestone B. Previously funded in FY 2017.	ation of design and get it ready for prove out tes	at		

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	arch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A / Soldier Systems - Advanced Development	Project (N S54 / Sma	umber/N II Arms Ir	<b>lame)</b> mprovement	
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2018	FY 2019	FY 2020
FY2020 New Start: Non-Standard Weapons Assessments: Will continue to consystems and perform capability analysis of unique weapon characteristics. Constraining mission of Non-Developmental Item solutions for pending requirement training mission of Regionally Aligned Forces and establish a sustainment strate support the Regionally Aligned Forces training mission. Continues to conduct systems. Previously funded in FY 2017.	onduct baseline testing of commercial weapon ntinue to utilize test information to conduct trad- ts as well as establish safety parameters for the tegy for long term support of weapons procure market research of commercially available wea	e e d to pon			
Small Business Innovative Research Enhancements: Will continue future effo enhance lethality, target acquisition and tracking, fire control, training effective	rts continues to focus on improvements design ness and reliability of weapons.	ed to			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 Increase in funds required to reduce technology risk and to determine complete the Next Generation Squad Weapons technology development phase	e the appropriate set of technologies required to e.	)			
Title: Ammunition			-	0.100	0.100
Description: Small arms ammunition improvement.					
<b>FY 2019 Plans:</b> Ammunition Upgrades: Continuing to evaluate the effect of new ammunition of	on small arms weapons.				
FY 2020 Plans: Ammunition Upgrades: Will continue to evaluate the effect of new ammunition	n on small arms weapon systems.				
Title: Combat Optics			0.508	0.100	0.100
Description: Improvement of small arms combat optics.					
<b>FY 2019 Plans:</b> Optics Upgrades: Continuing to evaluate state of the art advances in optical c products, including Mounted Machinegun Optic Capability Production Docume and its associated annexes.	omponent technologies for inclusion in future ent, Fire Control Capability Development Docun	nent,			
<b>FY 2020 Plans:</b> FY2020 New Start: Next Generation Optics: Will integrate current and emergi variable magnification spotting scope and into binoculars.	ng target acquisition component technologies in	nto a			
Title: Fire Control			6.124	6.095	4.000

PE 0603827A: Soldier Systems - Advanced Development Army

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603827A <i>I Soldier Systems - Advanced</i> <i>Development</i>	Project (N S54 / Sma	umber/I II Arms I	<b>Name)</b> mprovement	
B. Accomplishments/Planned Programs (\$ in Millions)		F١	2018	FY 2019	FY 2020
Description: Small arms fire control.					
<ul> <li>FY 2019 Plans:</li> <li>FY 2019 New start: Next Generation Fire Control (Crew Served and Squad) Tr and oversight for exploring future fire control applications for Next Generation S Business innovation Research, and digital enhancements. Future applications tracking and handoff, automatic target detection/identification/recognition, integ secure wireless transmission, environmental sensing, and optical enhancement</li> <li>Next Generation Spotting Scope: Continuing to consolidate readily available at technologies into a variable magnification spotting scope.</li> <li>Next Generation Binocular: Continuing to assess and evaluate incorporating et technologies into binoculars.</li> <li>Sniper Missed Distance Corrective Offset: Continuing to assess and evaluate sniper's bullet trace to target to derive a missed distance correct offset for a foll</li> <li>Next Generation Fire Control: Continuing to conduct prototyping activities to an rifle weapon platforms. Will address Size, Weight, and Power trade space chal squad weapons. Transitioning to Program Element 0604601A Project FF2 Sm</li> <li>Small Arms Fire Control-Precision/Enhancements: Continuing to support and o which includes: target detection to improve battlefield reconnaissance and intel acquisitions at extended ranges in all battlefield conditions, improve anti-reflect counter optical augmentation that can disclose soldiers? location, target trackin tracking, weapon bore sensor, automated muzzle velocity tracker to improve fin networking, and augmented reality. To provide support to Small Business Inno feasibility, scientific merit, research and development, and commercialization o</li> </ul>	echnology Enhancements: Continuing suppor Squad Weapons objective requirements, Smal specifically address aim augmentation, target grated day/night capability, integrated wind sen its. and mature fire-control/target acquisition compo- existing target acquisition/fire control componer from a sniper team (shooter's) location, tracks low-on shot. dvance fire control technologies on carbine an- lenges associated with fire control on the indiv nall Arms Fire Control. explore future precision fire control enhanceme lligence gathering capabilities, improve target tion (AR) coating to minimize scope glints, and ng, down range wind sensing technology, bulle re control accuracy, far-target location, battlefie vative Research efforts that will explore the of future Precision fire control system.	t sor, onent ht d idual ents t t eld			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name)FPE 0603827A / Soldier Systems - AdvancedSDevelopmentS	roject (Number/l 554 / Small Arms I		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
Fire Control Upgrades: Continuing to test advanced fire control syn in support of the Capability Development Document consisting of in and high velocity 40mm.	stems for small arms platforms to define the acquisition strat ndividual weapons, sniper/precision, crew served weapons,	egy ow		
<b>FY 2020 Plans:</b> Next Generation Fire Control Technology Enhancements: Will con Squad Weapons, and specifically address decrease soldier aim en Prototype demonstrations will have application in individual and cre	tinue to support technology integration with Next Generation for, decrease engagement time and increase probability of h w served weapons to enhance and upgrade Fire Control.	ı it.		
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 Increase in funds required to reduce technology risk and to complete the Next Generation Squad Weapons technology develo	to determine the appropriate set of technologies required to pment phase.			
Title: Research and Analysis		-	0.200	0.200
Description: Research and analysis of small arms.				
<b>FY 2019 Plans:</b> Continuing to initiate Market Research and Benefit Analysis of 360 kinetic weapons, low flying drone engagement, and other small arr	degree situational awareness, active stabilization, advance	Ŀ		
<b>FY 2020 Plans:</b> Will continue to initiate Market Research and Benefit Analysis of 36 kinetic weapons, low flying drone engagement, and other small arr	60 degree situational awareness, active stabilization, advanc ns research.	ed		
Title: FY2019 SBIR / STTR Transfer		-	0.282	-
<b>FY 2019 Plans:</b> FY2019 SIBR/STTR Transfer				
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 SIBR/STTR				
	Accomplishments/Planned Programs Subto	tals 27.832	7.677	14.555

on: PB :	2020 Army							Date: Ma	rch 2019	
			<b>R-1 P</b> PE 06 <i>Deve</i>	rogram Elen 03827A / So opment	n <b>ent (Numb</b> Idier System	e <b>r/Name)</b> s - Advanced	Project (N S54 / Sma	lumber/Na all Arms Imp	<b>me)</b> provement	
in Millie	ons <u>)</u>									
		FY 2020	<u>FY 2020</u>	<u>FY 2020</u>					<u>Cost To</u>	
2018	<u>FY 2019</u>	Base	000	Total	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<u>Complete</u>	<b>Total Cost</b>
2.999	11.102	2.589	-	2.589	15.767	14.789	13.927	9.029	0.000	80.202
7.914	10.188	21.463	-	21.463	10.163	11.254	8.000	10.000	0.000	88.982
8.280	-	1.384	-	1.384	-	-	-	-	0.000	9.664
-	-	33.080	-	33.080	36.880	13.780	15.470	16.060	0.000	115.270
9.664	5.749	7.076	-	7.076	15.377	7.918	6.284	0.974	0.000	53.042
-	-	22.880	-	22.880	30.630	28.750	25.000	11.750	0.000	119.010
5.628	5.879	0.000	-	0.000	-	-	-	-	0.000	11.507
	in Milli 2018 2.999 7.914 8.280 - 9.664 - 5.628	PB 2020 Army         in Millions)         2018       FY 2019         2.999       11.102         7.914       10.188         8.280       -         -       -         9.664       5.749         -       -         5.628       5.879	In Millions)         FY 2020           2018         FY 2019         Base           2.999         11.102         2.589           7.914         10.188         21.463           8.280         -         1.384           -         -         33.080           9.664         5.749         7.076           -         -         22.880           5.628         5.879         0.000	FY 2020 Army         R-1 P PE 06 Devel           in Millions)         FY 2020 Base 2.999         FY 2020 11.102         FY 2020 2.589         FY 2020 -           7.914         10.188         21.463         -           8.280         -         1.384         -           -         33.080         -         9.664         5.749         7.076           -         -         22.880         -         -         -           5.628         5.879         0.000         -	FY 2020 Army         R-1 Program Elem PE 0603827A / So Development           in Millions)         FY 2020         FY 2020         FY 2020         FY 2020         FY 2020         Total 2.589         -         1.384         -         1.384         -         1.384         -         1.384         -         3.080         9.664         5.749         7.076         -         7.076         -         7.076         -         2.589         -         22.880         -         1.384         -         1.384         -         1.384         -         1.384         -         3.080         -         33.080         -         33.080         -         22.880	FY 2020 Army         R-1 Program Element (Number PE 0603827A / Soldier System Development           in Millions)         FY 2020         FY 2020         FY 2020         FY 2020           2018         FY 2019         Base         OCO         Total         FY 2021           2.999         11.102         2.589         -         2.589         15.767           7.914         10.188         21.463         -         21.463         10.163           8.280         -         1.384         -         1.384         -           -         33.080         -         33.080         36.880           9.664         5.749         7.076         -         7.076         15.377           -         -         22.880         -         22.880         30.630           5.628         5.879         0.000         -         0.000         -	PE 2020 Army         R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development         in Millions)         FY 2019       FY 2020       FY 2020         2018       FY 2019       Base 2.589       FY 2020       FY 2020         Total 2.589       FY 2021       FY 2022 15.767       FY 2022 14.789         7.914       10.188       21.463       -       21.463       10.163       11.254         8.280       -       1.384       -       1.384       -       -         -       -       33.080       -       33.080       36.880       13.780         9.664       5.749       7.076       -       7.076       15.377       7.918         -       -       22.880       -       22.880       30.630       28.750         5.628       5.879       0.000       -       0.000       -       -	FY 2020 Army         R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development         Project (N S54 / Smatrix           2018         FY 2019         FY 2020         FY 2021         FY 2022         FY 2023         FY 2023         FY 2023         13.927           2018         FY 2019         Base         OCO         Total         FY 2021         FY 2022         FY 2023         13.927           7.914         10.188         21.463         -         21.463         10.163         11.254         8.000           8.280         -         1.384         -         1.384         -         -         -         -           -         33.080         -         33.080         36.880         13.780         15.470           9.664         5.749         7.076         -         7.076         15.377         7.918         6.284           -         -         22.880         -         22.880         30.630         28.750         25.000           5.628         5.879         0.000         -         0.000         -         -         -	FY 2020 Army         R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development         Project (Number/Na S54 / Small Arms Imp Development           2018         FY 2019 2.999         FY 2020 11.102         FY 2020 2.589         FY 2020 -         FY 2020 2.589         FY 2020 -         FY 2021 2.589         FY 2021 15.767         FY 2022 14.789         FY 2023 13.927         FY 2024 9.029           7.914         10.188         21.463         -         21.463         10.163         11.254         8.000         10.000           8.280         -         1.384         -         -         -         -         -           -         -         33.080         -         33.080         36.880         13.780         15.470         16.060           9.664         5.749         7.076         -         7.076         15.377         7.918         6.284         0.974           -         -         22.880         -         22.880         30.630         28.750         25.000         11.750           5.628         5.879         0.000         -         -         -         -         -         -	FY 2020 Army         R-1 Program Element (Number/Name) PE 0603827A / Soldier Systems - Advanced Development         Project (Number/Name) S54 / Small Arms Improvement           in Millions)         FY 2019         Base 2.589         FY 2020         FY 2020         FY 2020         FY 2021         FY 2022         FY 2023         FY 2024         Cost To Complete           2018         FY 2019         Base 2.589         OCO         Total 2.589         FY 2021         FY 2022         FY 2023         FY 2024         Cost To Complete           7.914         10.188         21.463         -         21.463         10.163         11.254         8.000         10.000         0.000           8.280         -         1.384         -         -         -         -         0.000         0.000           9.664         5.749         7.076         -         7.076         15.377         7.918         6.284         0.974         0.000           -         -         22.880         30.630         28.750         25.000         11.750         0.000           -         -         22.880         -         22.880         25.000         11.750         0.000

#### <u>Remarks</u>

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

#### D. Acquisition Strategy

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

#### E. Performance Metrics

N/A

ons)		FY 2	2018	R-1 Pro PE 060 Develop	ogram Ele 3827A / S oment	ement (N Soldier Sy FY 2	umber/Na /stems - A 2020	ame) dvanced	Project S54 / S	(Number mall Arms	/ <b>Name)</b> Improvei	ment	
ons)		FY 2	2018	EV		FY 2	2020	FY 2	2020	EV 2020			
	1	nt Services (\$ in Millions) FY 2018 FY 2019 FY 2020 FY 2020 FY 2020 Total Total FY 2019 FY 2020 FY 202								Total			
Performing tivity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
l Soldier eapons, : Picatinny senal	4.838	2.066	Mar 2018	0.570	Mar 2019	0.590	Mar 2020	-		0.590	Continuing	Continuing	Continuing
ny Budget ïce : Pentagon, ashington DC	-	-		0.282	Nov 2018	-		-		-	Continuing	Continuing	Continuing
Subtotal	4.838	2.066		0.852		0.590		-		0.590	Continuing	Continuing	N/A
ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total			
Performing ctivity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
ny Research velopment gineering nters, : Multiple	11.375	22.348	Mar 2018	3.680	Mar 2019	9.755	Mar 2020	-		9.755	Continuing	Continuing	Continuing
Subtotal	11.375	22.348		3.680		9.755		-		9.755	Continuing	Continuing	N/A
		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total			
Performing tivity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
ny Research velopment gineering nters, : Multiple	24.780	2.271	Mar 2018	1.450	Mar 2019	2.240	Mar 2020	-		2.240	Continuing	Continuing	Continuing
Subtotal	24.780	2.271		1.450		2.240		-		2.240	Continuing	Continuing	N/A
	Soldier apons, : Picatinny enal ny Budget ice : Pentagon, shington DC Subtotal ns) Performing tivity & Location ny Research velopment gineering nters, : Multiple Subtotal Performing tivity & Location ny Research velopment gineering nters, : Multiple Subtotal	Soldier apons, : Picatinny enal4.838my Budget ice : Pentagon, shington DC-Subtotal4.838ns)Performing tivity & Location gineering nters, : MultiplePrior YearsPerforming gineering nters, : Multiple11.375Performing tivity & Location11.375Performing tivity & Location24.780Performing gineering ny Research velopment gineering subtotal24.780	Soldier apons, : Picatinny enal4.8382.066ny Budget ice : Pentagon, shington DCSubtotal4.8382.066ns)FY 2Performing tivity & Location gineering hters, : MultiplePrior YearsCostSubtotal11.37522.348Performing tivity & LocationPrior YearsCostNy Research velopment gineering hters, : Multiple11.37522.348Performing tivity & LocationPrior YearsCostSubtotal11.37522.348Subtotal11.37522.348Location gineering hters, : MultiplePrior YearsCostNy Research velopment gineering hters, : Multiple24.7802.271Subtotal24.7802.271	Soldier apons, : Picatinny enal4.8382.066Mar 2018my Budget ice : Pentagon, shington DCSubtotal4.8382.066-Subtotal4.8382.066-ns)Fry 2018-Performing tivity & Location gineering nters, : MultiplePrior YearsAward DateSubtotal11.37522.348Mar 2018Performing tivity & LocationPrior YearsAward DatePerforming gineering nters, : MultiplePrior YearsAward DatePerforming tivity & LocationPrior YearsAward DatePerforming tivity & LocationPrior YearsAward CostPerforming tivity & LocationPrior YearsAward CostMar 2018Prior yelopment gineering ny Research velopment gineering ters, : Multiple24.7802.271Subtotal24.7802.271Mar 2018	Soldier apons, : Picatinny enal4.8382.066Mar 20180.570my Budget ice : Pentagon, shington DC0.282Subtotal4.8382.0660.852ns)FY 2018FY 2Performing tivity & Location gineering hters, : MultiplePrior YearsAward CostSubtotal11.37522.348Mar 20183.680FY 2018FY 2Performing tivity & LocationPrior YearsAward CostCostPerforming gineering nters, : MultiplePrior YearsAward CostCostPerforming tivity & LocationPrior YearsAward CostCostPerforming tivity & LocationPrior YearsAward CostCostPerforming tivity & LocationPrior YearsAward CostCostSubtotal24.780 2.2712.271Mar 20181.450Subtotal24.780 2.2712.271Int.50	Soldier apons, : Picatinny enal4.8382.066Mar 20180.570Mar 2019my Budget ice : Pentagon, shington DC0.282Nov 2018Subtotal4.8382.0660.852Ns)FY 2018FY 2019Award DateAward DateAward DatePerforming tivity & Location gineering nters, : MultiplePrior Years22.348Mar 20183.680Mar 2019Performing tivity & LocationPrior YearsAward CostAward DateAward DateSubtotal11.37522.348Mar 20183.680Mar 2019Performing tivity & Location11.37522.348Mar 2018Award DatePerforming tivity & LocationPrior YearsAward CostAward DateAward DatePerforming tivity & LocationPrior Years22.348Mar 20181.450Mar 2019Performing tivity & LocationYearsCostMar 2019Mar 2019Performing tivity & LocationYears2.271Mar 20181.450Mar 2019Mar 201924.7802.271Mar 20181.450Mar 2019	Soldier apons, : Picatinny enal         4.838         2.066         Mar 2018         0.570         Mar 2019         0.590           ny Budget ice : Pentagon, shington DC         -         -         0.282         Nov 2018         -           Subtotal         4.838         2.066         Mar 2018         0.570         Mar 2019         0.590           ns)         FY 2018         FY 2019         FY 2019	Soldier apons, : Picatinny enal         4.838         2.066         Mar 2018         0.570         Mar 2019         0.590         Mar 2020           ny Budget ice : Pentagon, shington DC         -         -         0.282         Nov 2018         -         -           Subtotal         4.838         2.066         0.852         0.590         Mar 2020           ns)         FY 2018         FY 2019         FY 2020 Base           Performing tivity & Location ny Research velopment gineering thers; : Multiple         Prior 11.375         Award 22.348         Award Date         Award Cost         Award Date         Award Cost         Award Date           FY 2018         FY 2019         FY 2020 Base         Mar 2020         -	Soldier apons, Picatinny enal         4.838         2.066         Mar 2018         0.570         Mar 2019         0.590         Mar 2020         -           ny Budget (cc): Pentagon, shington DC         -         -         0.282         Nov 2018         -	Soldier apons, Picatinny enal         4.838         2.066         Mar 2018         0.570         Mar 2019         0.590         Mar 2020         -           ny Budget ice : Pentagon, shington DC         -         -         0.282         Nov 2018         -         -         -           Subtotal         4.838         2.066         0.852         0.590         Mar 2020         -         -           ns)         Fy 2018         Fy 2019         Fy 2020 Base         Fy 2020 OCO         Award Date         Award Cost         Award Date         Award Cost <td>Soldier apons, : Picatinny enal         4.838         2.066         Mar 2018         0.570         Mar 2019         0.590         Mar 2020         -         0.590           ny Budget (ce : Pentagon, shington DC         -         -         0.282         Nov 2018         -         -         0.590           Subtotal         4.838         2.066         0.852         0.590         -         -         0.590           ns)         Fy 2018         Fy 2019         Fy 2020 Base         Fy 2020 OCO         Fy 2020 Total           Performing tivity &amp; Location         Prior Years         Cost         Award Date         Cost         Fy 2020 FY 2020         <t< td=""><td>Soldier apons, Picatinny enal4.8382.066Mar 20180.570Mar 20190.590Mar 2020-00.590Continuingny Budget ice : Pentagon, shington DC0.282Nov 2018000<td< td=""><td>Soldier apons,: Picatinny apons,: Picatinny enal4.8382.066Mar 20180.570Mar 20190.590Mar 2020-00.590Continuing continuingNy Budget ce: Pentagon, shington DC0.282Nov 20180.590-0.590Continuing continuingSubtotal4.8382.06600.8520.5900.5900.590Continuing continuingSubtotal4.8382.06600.8520.590FY 2020FY 2020 BaseFY 2020 TotalFY 2020 TotalPerforming relegoment gineering nters,: MultiplePrior TotalAward DateCostAward DateAward CostAward DateCostTotal CostPerforming relegoment gineering nters,: MultiplePrior TotalAward CostAward DateAward CostAward DateCostTotal CostPerforming relegoment gineering nters,: MultiplePrior TotalAward CostAward DateCostAward CostCostTotal CostPerforming tivity &amp; LocationPrior TotalAward CostAward DateCostAward CostAward CostCost Total CostPerforming ters,: MultiplePrior CostAward DateCostAward CostAward DateCostCost Total CostPerforming ters,: MultiplePrior CostAward DateCostAward Cost<t< td=""></t<></td></td<></td></t<></td>	Soldier apons, : Picatinny enal         4.838         2.066         Mar 2018         0.570         Mar 2019         0.590         Mar 2020         -         0.590           ny Budget (ce : Pentagon, shington DC         -         -         0.282         Nov 2018         -         -         0.590           Subtotal         4.838         2.066         0.852         0.590         -         -         0.590           ns)         Fy 2018         Fy 2019         Fy 2020 Base         Fy 2020 OCO         Fy 2020 Total           Performing tivity & Location         Prior Years         Cost         Award Date         Cost         Fy 2020 FY 2020         FY 2020 FY 2020 <t< td=""><td>Soldier apons, Picatinny enal4.8382.066Mar 20180.570Mar 20190.590Mar 2020-00.590Continuingny Budget ice : Pentagon, shington DC0.282Nov 2018000<td< td=""><td>Soldier apons,: Picatinny apons,: Picatinny enal4.8382.066Mar 20180.570Mar 20190.590Mar 2020-00.590Continuing continuingNy Budget ce: Pentagon, shington DC0.282Nov 20180.590-0.590Continuing continuingSubtotal4.8382.06600.8520.5900.5900.590Continuing continuingSubtotal4.8382.06600.8520.590FY 2020FY 2020 BaseFY 2020 TotalFY 2020 TotalPerforming relegoment gineering nters,: MultiplePrior TotalAward DateCostAward DateAward CostAward DateCostTotal CostPerforming relegoment gineering nters,: MultiplePrior TotalAward CostAward DateAward CostAward DateCostTotal CostPerforming relegoment gineering nters,: MultiplePrior TotalAward CostAward DateCostAward CostCostTotal CostPerforming tivity &amp; LocationPrior TotalAward CostAward DateCostAward CostAward CostCost Total CostPerforming ters,: MultiplePrior CostAward DateCostAward CostAward DateCostCost Total CostPerforming ters,: MultiplePrior CostAward DateCostAward Cost<t< td=""></t<></td></td<></td></t<>	Soldier apons, Picatinny enal4.8382.066Mar 20180.570Mar 20190.590Mar 2020-00.590Continuingny Budget ice : Pentagon, shington DC0.282Nov 2018000 <td< td=""><td>Soldier apons,: Picatinny apons,: Picatinny enal4.8382.066Mar 20180.570Mar 20190.590Mar 2020-00.590Continuing continuingNy Budget ce: Pentagon, shington DC0.282Nov 20180.590-0.590Continuing continuingSubtotal4.8382.06600.8520.5900.5900.590Continuing continuingSubtotal4.8382.06600.8520.590FY 2020FY 2020 BaseFY 2020 TotalFY 2020 TotalPerforming relegoment gineering nters,: MultiplePrior TotalAward DateCostAward DateAward CostAward DateCostTotal CostPerforming relegoment gineering nters,: MultiplePrior TotalAward CostAward DateAward CostAward DateCostTotal CostPerforming relegoment gineering nters,: MultiplePrior TotalAward CostAward DateCostAward CostCostTotal CostPerforming tivity &amp; LocationPrior TotalAward CostAward DateCostAward CostAward CostCost Total CostPerforming ters,: MultiplePrior CostAward DateCostAward CostAward DateCostCost Total CostPerforming ters,: MultiplePrior CostAward DateCostAward Cost<t< td=""></t<></td></td<>	Soldier apons,: Picatinny apons,: Picatinny enal4.8382.066Mar 20180.570Mar 20190.590Mar 2020-00.590Continuing continuingNy Budget ce: Pentagon, shington DC0.282Nov 20180.590-0.590Continuing continuingSubtotal4.8382.06600.8520.5900.5900.590Continuing continuingSubtotal4.8382.06600.8520.590FY 2020FY 2020 BaseFY 2020 TotalFY 2020 TotalPerforming relegoment gineering nters,: MultiplePrior TotalAward DateCostAward DateAward CostAward DateCostTotal CostPerforming relegoment gineering nters,: MultiplePrior TotalAward CostAward DateAward CostAward DateCostTotal CostPerforming relegoment gineering nters,: MultiplePrior TotalAward CostAward DateCostAward CostCostTotal CostPerforming tivity & LocationPrior TotalAward CostAward DateCostAward CostAward CostCost Total CostPerforming ters,: MultiplePrior CostAward DateCostAward CostAward DateCostCost Total CostPerforming ters,: MultiplePrior CostAward DateCostAward Cost <t< td=""></t<>

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	y								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 060 Develop	ogram Ele 3827A / S oment	e <b>ment (N</b> coldier Sy	umber/Na stems - A	ame) Idvanced	Project S54 / Sr	(Number mall Arms	r/ <b>Name)</b> s Improve	ment	
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	FY 2020 FY 2020 Base 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
Developmental Testing	MIPR	Army Test and Evaluation Centers, : Multiple	13.861	1.147	Mar 2018	1.695	Mar 2019	1.970	Mar 2020	-		1.970	Continuing	Continuing	Continuing
		Subtotal	13.861	1.147		1.695		1.970		-		1.970	Continuing	Continuing	N/A
		Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	54.854	27.832		7.677		14.555		-		14.555	Continuing	Continuing	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army								Date	e: March 201	19	
Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06 <i>Devel</i>	rogra 60382 lopme	i <b>m Eleme</b> r 7A / Soldie ent	n <b>t (Number/Name</b> er Systems - Adva	) nced	Project (N S54 / Sma	lumb all Arn	e <b>r/Name)</b> ns Improven	nent	
Event Name	FY 2018	FY 20	019 FY 2020 FY 2021				F	FY 2022	2 FY 2023			Y 2024
Eventivanie	1 2 3 4	1 2 3	4	1	2 3 4	1 2 3 4	1	2 3 4	1	2 3 4	1 2	3 4
NEW WEAPON SYSTEMS												
Next Generation Squad Weapon-Automatic Rifle												
Next Generation Squad Weapon-Rifle												
Externally Powered Weapon (EPW)												
New Weapon Systems Evaluations and Assessments												
SMALL ARMS WEAPON SYSTEMS ENHANCEMENTS												
Solid State Active Denial System												
Current and Legacy Weapon Improvements												
Individual Non-Lethal System												
Non-Standard Weapon Assessments												
Small Business Innovative Research												
Protective Weapons Coatings (includes Adaptive Lubricious (												
Weapons Upgrades and Accessories												

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army										Date	: March	201	9		
Appropriation/Budget Activity 2040 / 4			R-1 Program Element (Number/Name)Project (Number/Name)PE 0603827A / Soldier Systems - AdvancedS54 / Small Arms ImprovementDevelopmentDevelopment											ent		
Event Name	FY 2018	FY 20	19		FY 2	020	FY 2021			FY 2022		Y 2023		F	Y 20	24
AMMUNITION	1 Z 3 4	1   Z   3	4	1	2	3 4	1	2 3	4 1	2 3 4	1	2 3	4	1   2	3	4
Ammunition Upgrades																
COMBAT OPTICS																
Next Generation Optics																
Optics Upgrades																l
FIRE CONTROL																l
Next Generation Fire Control Technology Enhancements																
Next Generation Fire Control																l
Small Arms Fire Control Precision/Enhancements																
Small Arms Fire Control Upgrades																
RESEARCH AND ANALYSIS																
Research and Analysis of Small Arms																

hibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	ch 2019		
propriation/Budget Activity 40 / 4	R-1 Program PE 0603827A Development	Element (Number I Soldier Systems	e <b>r/Name)</b> s - Advanced	Project (Number/Name)         d         S54 I Small Arms Improvement			
So	chedule Detail	S					
		Si	tart	E	nd		
Events		Quarter	Year	Quarter	Year		
NEW WEAPON SYSTEMS		1	2008	4	2024		
Next Generation Squad Weapon-Automatic Rifle		1	2014	4	2019		
Next Generation Squad Weapon-Rifle		2	2019	4	2020		
Externally Powered Weapon (EPW)		1	2015	4	2021		
New Weapon Systems Evaluations and Assessments		1	2017	4	2024		
SMALL ARMS WEAPON SYSTEMS ENHANCEMENTS		1	2008	4	2024		
Solid State Active Denial System		1	2020	4	2024		
Current and Legacy Weapon Improvements		1	2020	4	2024		
Individual Non-Lethal System		1	2020	4	2020		
Non-Standard Weapon Assessments		1	2020	4	2024		
Small Business Innovative Research		1	2015	4	2024		
Protective Weapons Coatings (includes Adaptive Lubricious Coatings)		1	2016	4	2019		
Weapons Upgrades and Accessories		1	2010	4	2019		
AMMUNITION		1	2008	4	2023		
Ammunition Upgrades		1	2016	4	2024		
COMBAT OPTICS		1	2008	4	2024		
Next Generation Optics		1	2020	4	2024		
Optics Upgrades		1	2016	4	2019		
FIRE CONTROL		1	2008	4	2024		
Next Generation Fire Control Technology Enhancements		1	2019	4	2024		
Next Generation Fire Control		1	2017	3	2019		
Small Arms Fire Control Precision/Enhancements		1	2017	4	2019		

Exh	ibit R-4A, RDT&E Schedule Details: PB 2020 Army					Date: Marc	ch 2019
<b>Apr</b> 204	oropriation/Budget Activity 0 / 4	<b>R-1 Program</b> PE 0603827A <i>Development</i>	Element (Numbe I Soldier Systems	lumber/Nan II Arms Imp	<b>ne)</b> rovement		
		·	St	art		E	nd
	Events		Quarter	Year	(	Quarter	Year
	Small Arms Fire Control Upgrades		1	2008		4	2019
	RESEARCH AND ANALYSIS		1	2012		4	2024
	Research and Analysis of Small Arms		1	2015		4	2024

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	vrmy							Date: Mar	ch 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060382 Developme	<b>am Elemen</b> 27A / Soldie ent	<b>t (Number</b> / r Systems -	Name) Advanced	Project (N VS4 / Sold	roject (Number/Name) S4 / Soldier Protective Equipment			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
VS4: Soldier Protective Equipment	-	29.934	21.126	2.836	-	2.836	4.444	4.909	6.488	8.150	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			
This program supports the Cross <u>A. Mission Description and Bud</u> This Project supports efforts to ev technology transition from the lab	Functional get Item Ju valuate inte oratory to c	Team (CFT ustification grated tech operational u	). nologies and use.	d represent	ative or pro	totype syste	ems that hel	p expedite	Personal Pr	otective Eq	uipment (Pl	PE)	
B. Accomplishments/Planned P	rograms (S	in Millions	s <u>)</u>						FY	2018 F	Y 2019	FY 2020	
Title: Soldier Protective Equipmer	nt (SPE)									29.934	20.828	2.836	
<b>Description:</b> Effort to increase W cycle aspects of Personal Protection	arfighter lei ve Equipm	thality and n ent (PPE).	nobility by o	ptimizing S	oldier prote	ction while e	effectively n	nanaging al	life				
FY 2019 Plans: Will continue Technology/Maturati System (SPS) requirements for lig improvements. If ready, initiate pro and instrumented field exercises, to characterize and increase dural subsystem/component level. Cont requirements.	on and Ris hter-weigh oof-of-princ evaluate up bility, shelf inue the de	k Reductior t ballistic ma tiple demon ogrades and life, and fun evelopment	n efforts acro aterials with strations on l inform stal ctional serv of improved	oss the PPI improved p promising keholders o rice life of e I measurem	E portfolio to performance new and ad of new opera xisting pers nent process	o support th e and manu vanced mat ational capa onal protect ses for exist	e Soldier Pr facturing/te terials, and bilities. Con ive systems ing systems	rotection sting proces in simulated tinue efforts s at the s and emerg	ss I S ging				
<b>FY 2020 Plans:</b> Project, at a reduced level of effor portfolio: Torso and Extremity Pro Transition Combat Eye Protection performance and manufacturing/ t will evaluate upgrades and inform appropriate. Continue efforts to ch	t from FY1 tection (TE (TCEP) to esting proc stakeholde naracterize	9, will contir P); Vital Tor support SP cess improve ers of new o and increas	nue Technol rso Protectio S requiremo ements. If n perational o re durability	logy/Matura on (VTP); Ir ents for ligh ew materia capabilities , shelf life, a	ation and Ri ntegrated H nter-weight k ils are ready and then ind and function	sk Reductio ead Protectionallistic mate to allistic mate to the Productor corporate the al service li	n efforts ac ion System erials with ir ct Managen em into SP fe of existin	ross the PP (IHPS); and nproved nent Office S designs a g personal	E I s				

Exhibit R-2A, RDT&E Project Justif	ication: PB	2020 Army							Date: M	arch 2019		
Appropriation/Budget Activity       R-1 Program Element (Number/Name)       Project (Number/Name)         2040 / 4       PE 0603827A / Soldier Systems - Advanced       VS4 / Soldier         Development       Development       Development										(Number/Name) oldier Protective Equipment		
B. Accomplishments/Planned Prog	rams (\$ in I	<u>/lillions)</u>						Γ	FY 2018	FY 2019	FY 2020	
protective systems at the subsystem/ existing systems and emerging requi	component l rements.	evel. Contin	ue the devel	opment of im	proved mea	isurement pr	ocesses for					
FY 2019 to FY 2020 Increase/Decree Funding change in Soldier Protective in a reduced level of effort.	<b>ase Statem</b> Equipment	e <i>nt:</i> portfolio is de	ue to anticip	ated requirer	nent change	s in FY19 ar	id FY20 that	result				
Title: FY 2019 SBIR/STTR TRANSF	ER								-	0.298	-	
Description: FY 2019 SBIR/STTR T	RANSFER											
<b>FY 2019 Plans:</b> FY 2019 SBIR/STTR TRANSFER												
FY 2019 to FY 2020 Increase/Decre FY 2019 SBIR/STTR TRANSFER	ase Statem	ent:										
				Accom	nplishments	/Planned P	ograms Sub	ototals	29.934	21.126	2.836	
C. Other Program Funding Summa	ry (\$ in Milli	<u>ons)</u>										
• VS5: Soldier Protective Equipment	<b>FY 2018</b> 1.725	<u>FY 2019</u> 6.050	FY 2020 Base 6.627	<u>FY 2020</u> <u>OCO</u> -	<u>FY 2020</u> <u>Total</u> 6.627	<u>FY 2021</u> 8.327	<u>FY 2022</u> 9.666	<b>FY 202</b> 9.49	<b><u>FY 202</u></b> 0 8.50	Cost To           4         Complete           7         0.000	<u>Total Cost</u> 50.392	

#### D. Acquisition Strategy

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

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Army	y								Date:	March 20	019	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Develop	ogram El 3827A / S oment	<b>ement (N</b> Soldier Sy	umber/N stems - A	<b>ame)</b> Idvanced	Project VS4 / S	(Number oldier Pro	r/ <b>Name)</b> itective Ed	quipment	
Management Service	es (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	020 se	FY 2 OC	:020 :O	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	Allot	PM SPIE Various : Various	1.350	0.862		0.934		0.400		-		0.400	Continuing	Continuing	Continuing
		Subtotal	1.350	0.862		0.934		0.400		-		0.400	Continuing	Continuing	N/A
Product Developme	nt (\$ in M	illions)	ſ	FY 2	2018	FY 2	2019	FY 2 Ba	020 se	FY 2 OC	020 CO	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
Dev/Sys Engineering Spt	MIPR	Various : Various	8.059	0.443		0.400		0.750		-		0.750	Continuing	Continuing	Continuing
Dev/Integ Contracts	TBD	Various : Various	33.363	26.805		18.219		1.000		-		1.000	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.298		-		-		-	0.000	0.298	-
		Subtotal	41.422	27.248		18.917		1.750		-		1.750	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	020 se	FY 2 OC	:020 :O	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
Misc Support Costs	MIPR	Various : Various	3.925	0.832		0.662		0.200		-		0.200	Continuing	Continuing	Continuing
		Subtotal	3.925	0.832		0.662		0.200		-		0.200	Continuing	Continuing	N/A
Test and Evaluation	(\$ in Milli	ons)	ſ	FY 2	2018	FY 2	2019	FY 2 Ba	020 se	FY 2 OC	020 CO	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
Ballistic/Blast/Nonballistic Testing	MIPR	Various : Various	16.790	0.992		0.613		0.486		-		0.486	Continuing	Continuing	Continuing
		Subtotal	16.790	0.992		0.613		0.486		-		0.486	Continuing	Continuing	N/A
DE 0602927A: Soldior	Sustama	Advanced Dovala	nmont												

Exhibit R-3, RDT&E Project Cost Analysis: PB 2		Date: March 2019									
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program I</b> PE 0603827A <i>Development</i>	Element (N I Soldier Sy	ed VS4/S	<b>Project (Number/Name)</b> VS4 / Soldier Protective Equipment							
Prior Years FY 2018			018	FY 2019	FY 2 Ba	2020 I se	Y 2020 OCO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals 63.487 29.934				21.126	2.836		-	2.836	Continuing	Continuing	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A									Date	: Ma	rch 20	19				
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)ProjectPE 0603827A / Soldier Systems - AdvancedVS4 / SoldierDevelopmentVS4 / Soldier									(Number/Name) oldier Protective Equipment					
Event Name	FY 2018	FY 20	19	F	Y 2020	F	Y 2021	F	Y 202	2	F	TY 20	023		FY 20	024
	1 2 3 4	1 2 3	4	1 2	3 4	1 3	2 3 4	1	2 3	4	1	2 :	3 4	1	2 3	3 4
SPS Technology Upgrade Insertion																
TCEP Authorized Protective Eyewear (APEL) Update		3														
VTP LRIP Production																
VTP RFP Submission	<b></b>															
VTP FRP Decision		4														
VTP Technology Upgrade Insertion																
TEP Technology Upgrade Insertion																
Helmet Technology Upgrade Insertion																
VTP SSEB																
Next Gen IHPS Contract Award		2														
Next Gen IHPS Deliveries																

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element</b> PE 0603827A / Soldier Development	t <b>(Number/N</b> <sup>-</sup> Systems - A	<b>Project (Number/Name)</b> VS4 / Soldier Protective Equipment			
	Schedule Details					
		Start	:	E	nd	
Events	Qua	arter	Year	Quarter	Year	
SPS Technology Upgrade Insertion		1	2017	4	2023	
TCEP Authorized Protective Eyewear (APEL) Update		2	2019	2	2019	
VTP LRIP Production		1	2017	1	2020	
VTP RFP Submission		2	2018	2	2018	
VTP FRP Decision		2	2019	2	2019	
VTP Technology Upgrade Insertion		1	2020	4	2023	
TEP Technology Upgrade Insertion		1	2020	4	2023	
Helmet Technology Upgrade Insertion		1	2020	4	2023	
VTP SSEB		3	2015	2	2019	
Next Gen IHPS Contract Award		2	2019	2	2019	
Next Gen IHPS Deliveries		2	2021	4	2023	

xhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: Marc	ch 2019		
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	Appropriation/Budget Activity         040: Research, Development, Test & Evaluation, Army I BA 4: Advanced         Component Development & Prototypes (ACD&P)         Prior       FY 2020				R-1 Program Element (Number/Name) PE 0604017A / Robotics Development								
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
Total Program Element	-	38.051	74.368	115.222	-	115.222	105.332	132.978	83.910	65.971	0.000	615.832	
CF4: Robotic Combat Vehicle (RCV) NGCV-CFT	-	0.000	0.000	109.400	-	109.400	99.008	126.676	77.594	57.382	0.000	470.060	
FD2: Soldier Robotics Systems	-	1.477	2.105	2.771	-	2.771	3.261	3.290	3.352	3.423	0.000	19.679	
FD3: Battery Modernization & Interface Standardization	-	0.813	0.848	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.661	
FD9: Robotics Systems	-	35.761	71.415	3.051	-	3.051	3.063	3.012	2.964	5.166	0.000	124.432	

#### <u>Note</u>

In FY 2020 funding within this Program Element will transition/realign as follows:

- Project FD9 Robotics Systems: Robotic Combat Vehicle - Experimental Unit Prototypes (TARDEC) effort will remain in this PE but realign to Project CF4 Robotic Combat Vehicle (RCV) NGCV-CFT.

- Project FD9 Robotics Systems: Leader Follower efforts will transition to PE 0604622A Family of Heavy Tactical Vehicles Project EZ8, Leader Follower.

#### A. Mission Description and Budget Item Justification

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

FY 2020 funding in the amount of \$1.258 million will support program management activities to include salaries and travel, conduct Analysis of Alternatives (AoA) on Enhanced Robotic Payload (ERP) programs, Chemical, Biological, Radiological, and Nuclear (CBRN), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), and payload technology maturation efforts.

The Battery Modernization & Interface Standardization (BMIS) program was established to help bring greater power efficiency and effectiveness to the dismounted Soldier and reduce the proliferation of proprietary batteries across the Army. BMIS will develop the Army Standard Family of Batteries (SFoB), a central acquisition management authority, and reduce 38 Communications-Electronics (C-E) battery types, currently in use, to just 3. Battery standardization and policy enforcement will

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

support Operational Readiness at a reduced cost to the Army while maintaining configuration management, life cycle support, safety standards, and technological upgrades.

Robotics Systems for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing/transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives/Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation/transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits. RDTE funds enable support to capability development of Tactical Wheeled Vehicle - Leader Follower (TWV-LF), Automated Convoy Operations (ACO), Dismounted Engineer Mobility System (DEMS), modular mission payloads, Route Clearance & Interrogation System (RCIS) Type II. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision). RDTE Product Manager Applique and Large Unmanned Ground Systems funding supports Leader Follower and Robotic Combat Vehicle program transitions from Technology Demonstrations to Program of Record through Modeling and Simulation (M&S) development and initial validated simulations.

Robotic Combat Vehicle (RCV) Prototyping effort will produce unmanned combat vehicle prototypes with the purpose of providing vehicles that Soldiers will use to develop new Concepts of Operations (CONOPS) and new requirements for unmanned combat vehicles to support Army Modernization priorities. Within RCV there are two major lines of effort executed in 3 phases: RCV Surrogate Experimental Unit Prototyping (Phase 1 & 2) and RCV Purpose Built Experimental Unit Prototyping (Phase 3). These efforts provide the basis for the Army to make the decision to move forward with a Robotic Combat Vehicle program transitioning from Technology Demonstrations to Program of Record through Modeling and Simulation (M&S) development and initial prototype testing and iterative Soldier evaluations. This will stress the autonomy systems developed within the Science and Technology (S&T) base and ultimately reduce Program of Record testing requirements, technical risks, and costs through studies and validated simulations in addition to helping the Next Generation Combat Vehicle Cross Functional Team (NGCV CFT) refine their RCV requirements and develop the CONOPS and Tactics, Techniques and Procedures (TTPs) for Manned / Unmanned Teaming (MUMT) in combat relevant missions.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Arr	ny			Date:	March 2019
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	: Advanced	<b>R-1 Program El</b> PE 0604017A / <i>I</i>	ement (Number/Name) Robotics Development		
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	39.608	95.660	15.677	-	15.677
Current President's Budget	38.051	74.368	115.222	-	115.222
Total Adjustments	-1.557	-21.292	99.545	-	99.545
<ul> <li>Congressional General Reductions</li> </ul>	-0.031	-0.092			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-21.200			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
Congressional Adds	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-1.526	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	99.545	-	99.545

#### Change Summary Explanation

The FY 2020 increase of \$73.845 million supports the Army's modernization priorities in support of the National Defense Strategy, to include experimental prototyping.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060401	Image: Program Element (Number/Name)         Project (Number/Name)           PE 0604017A / Robotics Development         CF4 / Robotic Combat Velopment           NGCV-CFT         NGCV-CFT						V)
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
CF4: Robotic Combat Vehicle (RCV) NGCV-CFT	-	0.000	0.000	109.400	-	109.400	99.008	126.676	77.594	57.382	0.000	470.060
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

In FY 2020, funding realigns from PE 0604017A Project FD9 Robotics Systems to PE 0604017A Project CF4 Robotic Combat Vehicle (RCV) NGCV-CFT. This is not a new start Project. This Project supports the Cross Functional Team (CFT).

#### A. Mission Description and Budget Item Justification

Robotic Combat Vehicle (RCV) Prototyping effort will produce unmanned combat vehicle prototypes with the purpose of providing vehicles that Soldiers will use to develop new Concepts of Operations (CONOPS) and new requirements for unmanned combat vehicles to support Army Modernization priorities. Within RCV there are two major lines of effort executed in 3 phases: RCV Surrogate Experimental Unit Prototyping (Phase 1 & 2) and RCV Purpose Built Experimental Unit Prototyping (Phase 3). These efforts provide the basis for the Army to make the decision to move forward with a Robotic Combat Vehicle program transitioning from Technology Demonstrations to Program of Record through Modeling and Simulation (M&S) development and initial prototype testing and iterative Soldier evaluations. This will stress the autonomy systems developed within the Science and Technology (S&T) base and ultimately reduce Program of Record testing requirements, technical risks, and costs through studies and validated simulations in addition to helping the Next Generation Combat Vehicle Cross Functional Team (NGCV CFT) refine their RCV requirements and develop the CONOPS and Tactics, Techniques and Procedures (TTPs) for Manned / Unmanned Teaming (MUMT) in combat relevant missions.

In order to accelerate user involvement with RCV platform capabilities, the RCV Surrogate Experimental Unit Prototyping effort will be executed through a two (2) phase activity. The RCV surrogate platform build (Phase 1) was initiated in FY19 under 0604017A Robotics Development, Project FD9 Robotics Systems and will conclude in this project with test and demonstration. This project will finalize Phase 1's rapid prototype build of surrogate RCV platforms using existing robotized vehicles and conduct Soldier evaluations at the platoon level (4 RCVs) through MUMT evaluations. Lessons learned from the platoon experiment will inform development of the purpose built RCV platforms (Phase 3) as well as inform S&T investment to help close gaps identified in unmanned vehicle performance. In order to conduct larger scale MUMT maneuvers and to continue to advance the autonomous performance of the robotic platforms, two additional platoons of surrogate RCVs will be built leveraging existing contractor unmanned platforms for a total of a company set (12) RCV. The surrogate company of RCVs (Phase 2) will be used for a second round of Soldier experimentation building off of the platoon exercises and providing additional refinement of CONOPs/TTPs with a representative operational formation and will provide a test bed for the latest autonomous capabilities developed in S&T.

The RCV Purpose Built Experimental Unit Prototyping line of effort (Phase 3) will develop and produce innovative, unmanned platforms that take advantage of being designed specifically for unmanned combat operations such as reduced platform size and improved mobility. The intent is to award a minimum of two contracts to design and build up to a company of twelve (12) RCV platforms for user evaluation and experimentation starting at the end of FY 2022. The RCV platforms will incorporate mature technology capabilities transitioned from S&T as they become available to include the latest autonomous mobility capability, improved user control interfaces and advanced sensing and aided target recognition. The Purpose Built RCV platform requirements will be informed by the initial surrogate platoon experimentation (Phase

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019							
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A <i>I Robotics Development</i>	Project (Number/Name) CF4 / Robotic Combat Vehicle (RCV) NGCV-CFT					
1) and Soldier feedback. The surrogate company experimentation (Phase as reducing risk on critical software enabled capabilities such as the latest a and Soldier control stations for RCV. Ultimately the purpose of this line of e capability needs more development before it is operationally effective.	2) will inform how the purpose built RCVs will be autonomous behaviors, mission command of mu effort is to determine if RCV is ready to enter a range	used in a representa Iltiple RCVs in an effe apid acquisition progr	ative formatio ective MUMT am of record	n as well formation or if the			
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020			
Title: Robotic Combat Vehicle ? Prototype Platforms		-	-	89.180			
<b>Description:</b> Robotic Combat Vehicle (RCV) ? Prototype Platforms effort w with the purpose of creating an experimental unit that Soldiers will use to create new requirements for unmanned combat vehicles to support Army Moderniz be created, starting first with surrogate platforms which adapt existing platfor in several different weight classes. Based off of lessons learned from the su RCVs will be built which maximize the capability advantages that unmanned and weight. The platforms will be built with the purpose of going through AT through iterative User experimentation.	vill produce unmanned combat vehicle prototype eate new Concepts of Operations (CONOPS) and zation priorities. Several variants of prototypes w forms into surrogate RCVs for early experimentat urrogate vehicle builds, platforms optimized to b d platforms can offer such as reduced platform s EC safety release and ultimately for Soldier eva	s nd /ill ion e .ize luation					
<i>FY 2020 Plans:</i> In FY 2020, contracts for surrogate RCVs (Phase 2) using existing platforms off of requirements generated from a platform evaluation funded under PE (Enhancement Program (REP). Surrogate RCV platforms will focus on record Direct fire, missile systems and advanced sensors will be integrated on to the mobility functions will be improved and autonomy sensor suite will be integrated safety assessment in FY 2021. These platforms will be combined with M11 Development, Project FD9 Robotics Systems in FY 2019 for company level 2021. In addition, based on the results of Phase 1 experimentation (see RC contract will be awarded to up to two (2) industry partners to initiate designs.	s will be awarded to up to two (2) contractors ba 0605053A Ground Robotics, Project FB7 Roboti nnaissance and decisive lethality mission roles. ne platforms designed for remote operation. Re ated to ensure safety critical operation for ATEC 3 surrogates built under PE 0604017A Robotics RCV Surrogate Experimentation scheduled in F CV Test and Evaluation bullet below), a competit s of a purpose built RCV for award in 4QFY2020	sed cs mote ; · · · ·					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> In FY 2020, funding for Robotic Combat Vehicle realigns from PE 06040174 Systems to PE 0604017A Robotics Development, Project CF4 Robotic Con Project.	A Robotics Development, Project FD9 Robotics nbat Vehicle (RCV) NGCV-CFT. This is not a ne	w start					
Title: Robotic Combat Vehicle ? Modeling and Simulation		-	-	7.270			
<b>Description:</b> Robotic Combat Vehicle (RCV) Modeling and Simulation effor environment to conduct data collection and results that will form the physical set to inform the operational experimentation in the RCV Campaign of Learn	rt will produce the ability to experiment in a virtua al testing desires. This will provide the initial data ning as well as feed initial data to the Requireme	al I ents					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A <i>I Robotics Development</i>	Project (N CF4 / Rok NGCV-CF	lumber/N ootic Com T	<b>Name)</b> Ibat Vehicle (I	RCV)
B. Accomplishments/Planned Programs (\$ in Millions)		F	<b>í 2018</b>	FY 2019	FY 2020
Community as they build new manned-unmanned teaming (MUMT) CONOPs simulations for unmanned operation of combat platforms will be refined in a virtuest cycles in a virtual developmental space.	and TTPs. As test data is collected, high fide tual test environment to enable virtual test ? fix	lity c?			
<i>FY 2020 Plans:</i> This effort will conduct a series of virtual experiments of multiple RCV concepts the mobility, lethality, and aided target recognition systems (AiTR) capabilities a operational environment and tested with trained soldiers to provide a RCV undwill be based upon input from industry science advisory groups to inform near-to implement that will be assessed to help inform the purpose built prototype ar force simulation experimentation.	s in different weight-class designs that factor in using accurate technology models simulated in erstanding for future BCT formations. The mo- term art-of-the-possible. Soldier feedback on h nd evaluate capability sets in platoon level for	i an dels iow :e-on-			
FY 2019 to FY 2020 Increase/Decrease Statement: In FY 2020, funding for Robotic Combat Vehicle realigns from PE 0604017A R Systems to PE 0604017A Robotics Development, Project CF4 Robotic Comba Project.	obotics Development, Project FD9 Robotics t Vehicle (RCV) NGCV-CFT. This is not a new	r start			
Title: Robotic Combat Vehicle ? Testing and Evaluation			-	-	7.170
<b>Description:</b> Robotic Combat Vehicle (RCV) Testing effort will perform system the RCV surrogate platforms and purpose-built platforms. This will expose unexare safe for Soldier operation prior to conducting Field Experimentation.	n verification testing and system safety testing xpected issues and ensure that the RCV syste	on ms			
<b>FY 2020 Plans:</b> RCV Risk Reduction effort will complete safety testing on the integrated Phase testing, the surrogate platforms begin the Soldier MUM-T Experimentation to go vehicles and to begin CONOP and TTP development based on actual system p controlled by manned fighting control vehicles developed under PE 0603645A EV7 Combat Vehicle Prototyping during the Soldier MUM-T Experimentation.	e 1 surrogate M113 platforms. Following safety et User assessment on the performance of the performance. Surrogate RCV platforms will be / Armored Systems Modernization Adv Dev, F	roject			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> In FY 2020, funding for Robotic Combat Vehicle realigns from PE 0604017A R Systems to PE 0604017A Robotics Development, Project CF4 Robotic Comba Project.	obotics Development, Project FD9 Robotics t Vehicle (RCV) NGCV-CFT. This is not a new	' start			
Title: Robotic Combat Vehicle ? Program Management			-	-	5.780

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date:	/larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A <i>I Robotics Development</i>	<b>Project (Number/</b> CF4 / Robotic Con NGCV-CFT	<b>Name)</b> nbat Vehicle (	(RCV)
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
<ul> <li>Description: Robotic Combat Vehicle (RCV) Program Management effort will detailed design, system integration and build, testing, and all Manned Unmanner FY 2020 Plans:</li> <li>This effort will manage all activity under the RCV line of effort to include but not supplies, equipment and facilities. Manage RCV concept development, analyze Manage detailed design, build integration, and evaluation of the RCV platform testing and operational experimentation.</li> </ul>	enable RCV concepting, modeling and simulationed Teaming Field Experimentation. Teaming Field Experimentation. In the second simulation of RCV concessolutions. Manage the execution of the Phase	on, avel, ots. 1		
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> In FY 2020, funding for Robotic Combat Vehicle realigns from PE 0604017A F Systems to PE 0604017A Robotics Development, Project CF4 Robotic Comba Project.	Robotics Development, Project FD9 Robotics at Vehicle (RCV) NGCV-CFT. This is not a new	start		
	Accomplishments/Planned Programs Subt	otals -	-	109.400
C. Other Program Funding Summary (\$ in Millions)		· · · ·	·	

N/A

<u>Remarks</u>

#### D. Acquisition Strategy

Robotic Combat Vehicle (RCV) Experimental Unit Prototyping will provide unmanned combat vehicles to enable users to assess the capability of the platforms and create new CONOPS and doctrine for manned/unmanned teaming based operations. Efforts will inform new ways to fight, identify system limitations and benefits and provide an achievable, analytically backed basis for future RCV requirements documents to drive future acquisition programs. Opportunity to take advantage of rapid acquisition processes if experimental prototypes meet soldier expectations which would get unmanned ground combat vehicles quicker into the field. Decision point in FY23 on decisive lethality path forward for the Army which determines if RCV is ready to enter rapid acquisition or needs additional development.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	ıy								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				<b>R-1 Pr</b> PE 060	<b>ogram El</b> 04017A / /	ement (N Robotics	lumber/N Developm	<b>ame)</b> ent	Project CF4 / R NGCV-	( <b>Numbe</b> Pobotic Co CFT	r <b>/Name)</b> ombat Veh	icle (RC\	/)
Management Service	es (\$ in M	lillions)		FY	2018	FY	2019	FY	2020 ase	FY 2	2020 CO	FY 2020 Total	]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Robotic Combat Vehicle - Program Management	MIPR	Various : Various	-	-		-		5.780	Oct 2019	-		5.780	15.550	21.330	-
		Subtotal	-	-		-		5.780		-		5.780	15.550	21.330	N/A
Product Developme	nt (\$ in M	illions)		FY	2018	FY	2019	FY	2020 ase	FY 2 O(	2020 CO	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
RCV Surrogate Platform Built (Company Set)	C/CPFF	TBD : TBD	-	-		-		75.900	Oct 2019	-		75.900	25.300	101.200	-
RCV Purpose Built Platform (Company Set)	C/CPFF	TBD : TDB	-	-		-		13.280	Aug 2020	-		13.280	222.850	236.130	-
		Subtotal	-	-		-		89.180		-		89.180	248.150	337.330	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2018	FY	2019	FY	2020 ase	FY 2	2020 CO	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
RCV Modeling and Simulation	MIPR	TBD : TBD	-	-		-		7.270	Oct 2019	-		7.270	10.820	18.090	-
RCV Test and Evaluation	MIPR	TBD : TBD	-	-		-		7.170	Oct 2019	-		7.170	28.780	35.950	-
		Subtotal	-	-		-		14.440		-		14.440	39.600	54.040	N/A
			Prior Years	FY	2018	FY	2019	FY	2020 ase	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		<b>Project Cost Totals</b>	-	-		0.000		109.400		-		109.400	303.300	412.700	N/A
Remarks_															

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army											Dat	te: M	arch 20	019			
Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06	<b>Progra</b> 60401	<b>am Ele</b> 17A / F	emen Roboti	<b>t (Nur</b> ics De	nber/Nam velopmen	<b>e)</b> t	Proje CF4 NGC	ect (N / Rob V-CF	lumb otic ( T	oer/N Com	lame) bat Veł	nicle	(RC	V)	
Event Neme	FY 2018	FY 20	19	F	FY 202	20	F	Y 2021		FY 202	22		FY	2023		FY	202	24
	1 2 3 4	1 2 3	6 4	1	2 3	4	1	2 3 4	1	2 3	4	1	2	3 4	1	2	3	4
Robotic Combat Vehicle (RCV)																		
Phase I Vehicle Saftey Testing and Safety Release																		
RCV Phase I - Soldier Operational Exercise																		
RCV Phase II – Vehicle Design						•												
RCV Phase II – Vehicle Integration / Build																		
RCV Phase II – Vehicle Shakedown Testing																		
RCV Phase II – Vehicle Safety Testing and Safety Release																		
RCV Phase II – Soldier Operational Exercise																		
RCV Phase III - Contracting																		
RCV Phase III – Vehicle Design																		
RCV Phase III – Vehicle Integration / Build																		
RCV Phase III – Vehicle Shakedown Testing																		
RCV Phase III – Vehicle Safety Testing and Safety Release																		

Exhibit R-4, RDT&E Schedule Profile: PB 2020 /	Army						Date: March 20	)19
Appropriation/Budget Activity 2040 / 4			<b>R-1 F</b> PE 06	Program Elemen 604017A / Robot	nt (Number/Name tics Development	e) Project (N CF4 / Rob NGCV-CF	<b>lumber/Name)</b> ootic Combat Veh T	iicle (RCV)
	EV 2018	EX 20	19	EX 2020	EV 2021	EV 2022	EV 2023	EV 2024
Event Name	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
RCV Phase III – Soldier Operational Exercise								

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program</b> PE 0604017A	Element (Number I Robotics Devel	e <b>r/Name)</b> opment	Project (Number/Nat CF4 / Robotic Comba NGCV-CFT	<b>ne)</b> t Vehicle (RCV)
	Schedule Detail	S			
		S	tart	E	ind
Events		Quarter	Year	Quarter	Year
Robotic Combat Vehicle (RCV)		1	2020	2	2020
Phase I Vehicle Saftey Testing and Safety Release		1	2020	2	2020
RCV Phase I - Soldier Operational Exercise		2	2020	2	2020
RCV Phase II ? Vehicle Design		1	2020	3	2020
RCV Phase II ? Vehicle Integration / Build		2	2020	4	2020
RCV Phase II ? Vehicle Shakedown Testing		4	2020	1	2021
RCV Phase II ? Vehicle Safety Testing and Safety Release		2	2021	3	2021
RCV Phase II ? Soldier Operational Exercise		4	2021	4	2021
RCV Phase III - Contracting		3	2020	4	2020
RCV Phase III ? Vehicle Design		4	2020	3	2021
RCV Phase III ? Vehicle Integration / Build		2	2021	2	2022
RCV Phase III ? Vehicle Shakedown Testing		2	2022	3	2022
RCV Phase III ? Vehicle Safety Testing and Safety Release		4	2022	1	2023
RCV Phase III ? Soldier Operational Exercise		2	2023	2	2023

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Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060401	am Elemen 7A I Roboti	<b>t (Number</b> / ics Develop	Name) ment	Project (N FD2 / Soldi	umber/Nan er Robotics	ne) s 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
FD2: Soldier Robotics Systems	-	1.477	2.105	2.771	-	2.771	3.261	3.290	3.352	3.423	0.000	19.679
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

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

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

FY 2020 funding in the amount of \$1.258 million will support program management activities to include salaries and travel, conduct Analysis of Alternatives (AoA) on Enhanced Robotic Payload (ERP) programs, Chemical, Biological, Radiological, and Nuclear (CBRN), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), and payload technology maturation efforts.

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

Soldier Exoskeleton amplifies the strength, endurance, and mobility of its operator, the Soldier. The Soldier Exoskeleton capabilities provide the Army with a deployable, personal tactical performance enhancer. Soldier Exoskeleton variants will be capable of operating in a wide range of environments enhancing combat operations.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Soldier Borne Sensor (SBS) / Exoskeleton	0.330	1.483	1.513
<b>Description:</b> The SBS provides the small unit a "quick look" capability with improved Situational Awareness of routes, buildings, tunnels, obstacles blocking line of sight, and similar concealed threat locations. The budget activity enables payload improvements including camera enhancements, target identification algorithms, display/controller improvements and user			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A <i>I Robotics Development</i>	Project FD2 / S	t (Number/N Soldier Robo	<b>lame)</b> tics Systems	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
notifications for specific items of interest. Soldier Exoskeleton variants, ranging capable of operating in a wide range of environments enhancing combat operations.	g from Commercial-Off-The-Shelf solutions, wations.	ill be			
<b>FY 2019 Plans:</b> Provide for the capability of transitioning and continuing development of Indust warfighter strengths and human performance to reduce Soldier load. Provide f exoskeleton solutions and completion of initial technical and programmatic data subsequent materiel development decision.	try and DoD Exoskeleton efforts to augment the integration and evaluation of potential a to inform capability requirement generation	ie and			
<b>FY 2020 Plans:</b> Will continue to provide for the capability of transitioning and continuing develot to augment the warfighter strengths and human performance to reduce Soldier and evaluation of potential exoskeleton solutions and completion of initial technic requirement generation and subsequent materiel development decision.	opment of Industry and DoD Exoskeleton effor r load. Continue to provide for the integration nical and programmatic data to inform capabil	ts ity			
FY 2019 to FY 2020 Increase/Decrease Statement: Funding change due to economic adjustment.					
Title: UGV Soldier Robotics Development			1.147	0.573	1.258
<b>Description:</b> Soldier Robotics Development is designed to facilitate the transit into Programs of Record. It informs the acquisition process beforehand allowin Center of Excellence, Maneuver Support Center of Excellence, and the Cyber decisions and affordability trades while writing requirements. UGV Robotics De (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intellig Outfits (RS-SKO), Enhanced Robotics Payload (ERP), payload technology ma and Nuclear (CBRN); small, pocket sized, airborne sensors, etc.	tion of robotics and autonomous systems tech og the Maneuver Center of Excellence, Sustain Center of Excellence the ability to make integ evelopment will fund Common Robotics Syste S(LR)), Common Robotic System (Communic gence) (CRS(MS/AI)), Render Safe - Sets, Kit turation efforts, Chemical, Biological, Radiological	nology nment ration m cation s and gical,			
<i>FY 2019 Plans:</i> Develop initial program cost estimates, conduct market surveys, perform/updat sufficiency, perform risk reduction activities and maturation technology efforts, Request for Proposal (RFP).	te Analysis of Alternatives (AoA) or letter of initiate milestone documentation and prepare				
FY 2020 Plans:					

Exhibit R-2A, RDT&E Project Justif	ication: PB	2020 Army							Date: Ma	arch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> I PE 06	r <b>ogram Eler</b> 04017A / Ro	nent (Numb botics Deve	<b>er/Name)</b> lopment	Projec FD2 /	<b>:t (Number/N</b> Soldier Robot	ame) ics Systems	
B. Accomplishments/Planned Prog	rams (\$ in N	<u>/lillions)</u>						Γ	FY 2018	FY 2019	FY 2020
Funding is provided for program man (AoA) on Enhanced Robotic Payload System (Light Reconnaissance) Robo	agement ma (ERP) progr ot (LRR) (CF	trix support ams, Chemi S(LR)), and	to include sa cal, Biologic payload teo	alaries and tr al, Radiolog chnology mat	avel, conductical, and Nuction effort	ct Analysis o clear (CBRN ts.	f Alternatives ), Common F	s Robotic			
FY 2019 to FY 2020 Increase/Decree FY 2020 funding increase due to add	ease Statem itional roboti	e <i>nt:</i> cs developm	nent requirer	nents.							
Title: FY 2019 SBIR / STTR Transfer	-								-	0.049	-
Description: SBIR / STTR											
<b>FY 2019 Plans:</b> SBIR / STTR											
FY 2019 to FY 2020 Increase/Decree Adjusted for FY 2019 SBIR / STTR tr	ase Statem ansfer.	ent:									
				Accor	nplishment	s/Planned P	rograms Su	btotals	1.477	2.105	2.771
C. Other Program Funding Summa	ry (\$ in Milli	ons)									
	<b>.</b> .		FY 2020	FY 2020	<u>FY 2020</u>					Cost To	
Line Item	FY 2018	FY 2019	<u>Base</u>	000	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 202</u>	<u>FY 2024</u>	Complete	Total Cost
• FB8: Soldier Borne Sensor (SBS)     • W63798: Soldier     Borne Sensor (SBS)	2.197 24.000	3.465 21.680	0.000 23.362	-	0.000 23.362	- 25.927	- 11.160	19.10	 1 25.293	Continuing	Continuing
Remarks											
Pre-acquisition program activities fur	nded by this l	ine transitio	n to a separa	ate Program	Element and	d Project prio	or to their firs	t progran	n acquisition M	/lilestone (B	or C).
<b>D. Acquisition Strategy</b> Soldier Robotics Systems will utilize Readiness Assessments with PdM U	a Robotics D IGV S&T par	evelopment tners, techn	funding for ology matura	internal syst ation efforts,	ems enginee and studies	ering, require and analysis	ments and a sin support c	rchitectu of progra	re analysis, A n initiation wit	oAs and Tec h industry.	hnology
Initial Exoskeleton efforts will focus of feedback that will inform capability re (COTS) solutions to developmental e	n prototyping equirement d efforts.	g emerging l efinition and	ndustry and subsequent	DoD Exoske t materiel de	eleton initiati velop decisio	ves, assessi on. These ir	ng their perfo itiatives may	ormance range fr	through demo om Commerci	onstrations an al-Off-The S	nd Soldier helf
E. Performance Metrics N/A											

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 060	<b>ogram Ele</b> 4017A <i>I F</i>	ement (N Robotics I	l <b>umber/N</b> a Developm	a <b>me)</b> ent	Project FD2 / S	(Number	r/ <b>Name)</b> botics Sys	tems	
Management Servic	es (\$ in M	lillions)		FY	FY 2018 FY 2019		2019	FY 2020 Base		FY 2	2020 FY 2020 CO Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
UGV Program Management Support	MIPR	Multiple : Multiple	-	0.418	Mar 2018	0.390	Feb 2019	0.400	Oct 2019	-		0.400	0.000	1.208	Continuing
SBS and Exoskeleton Program Management Support	Various	Various : Multiple	-	0.330	Jul 2018	1.483	Mar 2019	1.513	Mar 2020	-		1.513	0.000	3.326	Continuing
	U	Subtotal	-	0.748		1.873		1.913		-		1.913	0.000	4.534	N/A
Product Developme	nt (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
AoA CRS(H)	MIPR	Multiple : Various	-	0.258	Jun 2018	-		-		-		-	0.000	0.258	-
AoA ERP	MIPR	Multiple : Various	-	0.421	Apr 2018	0.098	Feb 2019	-		-		-	0.000	0.519	-
AoA CRS(LR)	MIPR	Multiple : Various	-	-		0.085	Feb 2019	-		-		-	0.000	0.085	-
Payload maturation and integration	Various	Various : Multiple	-	-		-		0.429	Dec 2019	-		0.429	0.000	0.429	-
Capability Development Studies	Various	Various : Multiple	-	-		-		0.429	Dec 2019	-		0.429	0.000	0.429	-
JCAUS IOP V4	MIPR	ARDEC : Picatinny, NJ	-	0.050	Sep 2018	-		-		-		-	0.000	0.050	-
FY 2019 SBIR /STTR Transfer	TBD	TBD : TBD	-	-		0.049	Oct 2018	-		-		-	0.000	0.049	-
		Subtotal	-	0.729		0.232		0.858		-		0.858	0.000	1.819	N/A
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	1.477		2.105		2.771		-		2.771	0.000	6.353	N/A

**Remarks** 

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army							Date: March	201	9			
ppropriation/Budget Activity 040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0604017A / Robotics DevelopmentFD2 / Soldier Robotics Syst											
Event Name	FY 2018	FY 201	9	FY 2020	FY 2021		FY 2022	FY 2023	•	FY 202			
	1 2 3 4	1 2 3	4 1	2 3 4	1 2 3 4	1	2 3 4	1 2 3	4	1 2 3			
UGV Robotics Development (ERP, CBRN, CRS-LR, etc.)	UGV												
SBS MDD													
SBS Analysis of Alternatives / Letter of Sufficiency	AoA/LoS												
SBS Market Survey	Market Survey												
SBS Request for Proposal (Development/Staffing)	REP (Development	t(Staffing)											
SBS RFP Release Decision		RFP Release I	Decision										
SBS SSEB		SSE	3										
SBS MS B/C													
SBS Studies/Analysis	Study/Analysis												
	,,-												

			Date: Mar	ch 2019		
<b>R-1 Program E</b> PE 0604017A /	Element (Numbe Robotics Develo	<b>r/Name)</b> opment	Project (Number/Name) FD2 / Soldier Robotics Systems			
Schedule Details	i					
Г	St	art	E	nd		
	Quarter	Year	Quarter	Year		
	1	2018	4	2024		
	1	2018	1	2018		
	1	2018	4	2023		
	1	2018	4	2023		
	1	2018	2	2024		
	2	2019	2	2019		
	3	2019	1	2020		
	4	2019	4	2019		
	1	2018	4	2023		
	R-1 Program E PE 0604017A / Schedule Details	R-1 Program Element (Number PE 0604017A / Robotics Develot         Schedule Details         Schedule Details         Quarter         1         1         1         1         1         1         1         1         1         1         1         1         1         1         2         3         4         1	R-1 Program Element (Number/Name) PE 0604017A / Robotics Development           Schedule Details           Schedule Details           Quarter         Year           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2018           1         2019           3         2019           1         2018	R-1 Program Element (Number/Name) PE 0604017A / Robotics Development         Project (Number/Name) FD2 / Soldier Robotics           Schedule Details         Start         E           Quarter         Year         Quarter           1         2018         4           1         2018         1           1         2018         4           1         2018         4           1         2018         4           1         2018         4           1         2018         1           2         2019         2           3         2019         1           4         2019         4           1         2018         4		

Exhibit R-2A, RDT&E Project Ju						Date: Marc	h 2019					
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060401	am Elemen 7A / Roboti	t (Number/ ics Develop	Name) ment	<b>Project (Number/Name)</b> FD3 <i>I Battery Modernization &amp; Interface</i> <i>Standardization</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
FD3: Battery Modernization & Interface Standardization	-	0.813	0.848	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	1.661
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Systems.

#### A. Mission Description and Budget Item Justification

Note: Project Battery Modernization & Interface Standardization complete in FY19.

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

Funding supports modernization of the current battery types. 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				
Title: Acquisition Strategy	0.212	0.210	-				
Description: Complete advanced development pre-milestone B assessments and analysis.							
<b>FY 2019 Plans:</b> Finalize advanced development technology assessments and analysis. Conduct C-E battery analysis of market research/ Requests for Information (RFI). Develop Acquisition Strategy for the BMIS program.							
FY 2019 to FY 2020 Increase/Decrease Statement:							
Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	arch 2019			
--	---	--	--------------------------	-----------------------------	---------------------	--	--
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A <i>I Robotics Development</i>	<b>Project (Number/Name)</b> FD3 I Battery Modernization & Interface Standardization					
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2018	FY 2019	FY 2020		
Army efforts complete in FY19 and thereafter funding reallocated to support the National Defense Strategy.	e Army's modernization priorities in support of	the					
Title: BMIS Standard Family of Batteries (SFoB) Design			0.601	0.638	-		
<b>Description:</b> Finalize research and complete assessment of technology and p maintenance and updates will be made as technology advances.	ortfolios. Once the SFoB has been establishe	d,					
<b>FY 2019 Plans:</b> Finalize the C-E Battery technology assessment. Determine a solid and integra batteries for generators and hybrids, robotics, vehicles, and low density/usage	Ide						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Army efforts complete in FY19 and thereafter funding reallocated to support the National Defense Strategy.	e Army's modernization priorities in support of	the					
	Accomplishments/Planned Programs Sub	ototals	0.813	0.848	-		
<ul> <li>C. Other Program Funding Summary (\$ in Millions) N/A</li> <li>Remarks</li> <li>D. Acquisition Strategy BMIS will expand the Army Standard Family of Batteries to include C-E, batter will continue to investigate technology advancements of batteries for these syst</li> <li>E. Performance Metrics N/A</li> </ul>	ies for generators and hybrids, robotics, vehic stems and provide information and recommen	eles, and low dations to a	w density/ applicable	usage system Program Mar	ns. BMIS nagers.		

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19					
Appropriation/Budg 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 0604	<b>gram El</b> 4017A <i>I F</i>	ement (N Robotics I	<b>lumber/N</b> Developm	<b>ame)</b> eent	Project FD3 / B Standa	(Numbe attery Mo rdization	ber/Name) Modernization & Interface on						
Management Servic	es (\$ in M	illions)		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				
BMIS Design	Various	Various : Fort Belvoir	-	0.269		0.272		-		-		-	0.000	0.541	-				
		Subtotal	-	0.269		0.272		-		-		-	0.000	0.541	N/A				
Product Development (\$ in Millions)			FY 2018		FY 2	019	FY 2 Ba	2020 ase	FY 2	2020 CO	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				
BMIS SFoB Prototype Development	Various	Various : Fort Belvoir, VA	-	0.332		0.371		-		-		-	0.000	0.703	-				
		Subtotal	-	0.332		0.371		-		-		-	0.000	0.703	N/A				
Support (\$ in Millior	is)			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				
BMIS Program Support	Various	Various : Fort Belvoir	-	0.212		0.205		-		-		-	0.000	0.417	-				
		Subtotal	-	0.212		0.205		-		-		-	0.000	0.417	N/A				
		_	Prior Years	FY 2	2018	FY 2	019	FY 2 Ba	2020 ase	FY : O	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract				
		Project Cost Totals	-	0.813		0.848		-		-		-	0.000	1.661	N/A				
<u>Remarks</u>																			

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army		Date: March 2019								
Appropriation/Budget Activity 2040 / 4		F	R-1 Program Elemen PE 0604017A / Robo	nt (Number/Name tics Development	) Project ( FD3 / Bat Standard	<b>Project (Number/Name)</b> FD3 <i>I Battery Modernization &amp; Interface</i> <i>Standardization</i>					
[	EV 2049	EX 204	о БУ 2020	EX 2024	EX 2022	EV 2022	EX 2024				
Event Name	1 2 3 4 1 2		4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4				
Battery & Interface Technical Assessment & Prototype Develop											
Battery Portfolio Assessment/Design											
C-E Battery Tech Assessment/Adv Prototype											
C-E Battery Requirements Analysis											
Vehicle-Generator Battery Tech Assessment/Adv Prototype											
Army Standard Family of Batteries (SFoB) Updates											

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date	: March 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Nu PE 0604017A / Robotics D	umber/Name) evelopment	Project (Numbe FD3 / Battery Mo Standardization	er/Name) odernization & Interface	
S	chedule Details				
		Start	End		
Events	Quarte	r Year	Quarte	er Year	
Battery & Interface Technical Assessment & Prototype Development	1	2018	6 4	2019	
Battery Portfolio Assessment/Design	1	2018	6 4	2019	
C-E Battery Tech Assessment/Adv Prototype	1	2018	6 4	2018	

C-E Battery Tech Assessment/Adv Prototype	1	2018	4	2018
C-E Battery Requirements Analysis	1	2018	1	2019
Vehicle-Generator Battery Tech Assessment/Adv Prototype	4	2018	4	2019
Army Standard Family of Batteries (SFoB) Updates	1	2018	4	2019

Exhibit R-2A, RDT&E Project Ju	Date: March 2019												
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (NumPE 0604017A / Robotics DevelopmentFD9 / Robotic					imber/Name) tics 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	
FD9: Robotics Systems	-	35.761	71.415	3.051	-	3.051	3.063	3.012	2.964	5.166	0.000	124.432	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

### <u>Note</u>

In FY20 funding within this Project will transition/realign as follows:

- Robotic Combat Vehicle - Experimental Unit Prototypes (TARDEC) will remain in this PE 0604017A, but realign to Project CF4 Robotic Combat Vehicle (RCV) NGCV-CFT.

- Leader Follower efforts will transition to PE 0604622A Family of Heavy Tactical Vehicles Project EZ8, Leader Follower.

#### A. Mission Description and Budget Item Justification

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

Funding will expand Modeling and Simulation (M&S) including CASTLE capability to test and evaluate Manned Unmanned teaming, combat scenarios or other emerging Robotics program needs. RD funding will utilize the M&S environment to mature and evaluate S&T for inclusion to program requirements, Engineering Change Proposals (ECPs) and/or technical insertions, utilize gaming technology in conjunction with Autonomy Software to develop Training, Tactics and Procedures (TTPs), requirements and CONOPS.

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

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<i>Title:</i> Tactical Wheeled Vehicle - Leader Follower (TWV-LF) - RD for PdM Applique & Large Unmanned Ground Systems (ALUGS)	6.959	6.650	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019					
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A <i>I Robotics Development</i>	Project (N FD9 / Rob	ject (Number/Name) 97 Robotics Systems				
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2018	FY 2019	FY 2020		
<b>Description:</b> Tactical Wheeled Vehicle (TWV) Leader Follower (LF) Program in Systems (ALUGS) builds upon the Tank Automotive Research Development & Follower (ELF) Operational Technology Demonstration (OTD) to provide a limit System (PLS) A1. Current PdM efforts will lay the groundwork for future Program TARDEC efforts to include up to seven (7) unmanned Follower vehicles. Fundi risk reduction efforts to include Capabilities Document input, close monitoring of capture technical and test data, provide test support, develop Modeling and Sim Integration Lab (SIL).	ader Id ce tware						
<b>FY 2019 Plans:</b> FY19 funding supported the capability development of incremental technology is technology transitions, testing, and milestone document preparation. Modeling a prototype testing will refine the system performance to meet required Tactical W system capabilities. Development of a TWV-LF Software Integration Lab (SIL), systems and ultimately reduce Program of Record testing requirements, technic Supports capability development of RCIS Type II, Dismounted Engineer Mobility	l V-LF ons. ams.						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Beginning in FY 2020, Leader Follower (LF) transitions to funding line 0604622. Leader Follower. The initiation of the new Project EZ8 for LF causes the decreated 2020.	Z8 Y						
<i>Title:</i> Tactical Wheeled Vehicle - Leader Follower - Tank Automotive Research Tech Demo	Development & Engineering Center (TARDE	C)	28.802	42.330	-		
<b>Description:</b> Tactical Wheeled Vehicle - Leader Follower (TWV-LF) provides a kit to 10 ALUGS test Palletized Load System (PLS) A1s. For the TARDEC Tech manned Leader vehicle which leads a line of 3 optionally manned Follower vehic directional and speed guidance to the Follower vehicles to follow the Leader vehicle army purposes for Leader Follower is to improve Force Protection and increas Army to demonstrate and operationally assess an unmanned vehicle capability technology. The Army will build, and test prototype systems for safety release, S	olique d ne n.						
<b>FY 2019 Plans:</b> FY 2019 funding continued the fabrication and testing of up to 140 Leader Follo assessment in FORSCOM identified units. Systems will go through an Army Te	ower PLS A1 vehicles for user operational est and Evaluation Command (ATEC) safety						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019					
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A / Robotics Development	<b>Proje</b> FD9 /	oject (Number/Name) 09 / Robotics Systems				
B. Accomplishments/Planned Programs (\$ in Millions)		ſ	FY 2018	FY 2019	FY 2020		
assessment and plan for Urgent Materiel Release based on the signed Leader Leader Follower systems will go through a 12 month Operational Technology user feedback and assessment on the truck performance to inform a future mi program of record. Funding supports Robotic Combat Vehicle - Robotic Wingr Demonstration (JCTD).	r Follower Directed Requirement. The issued Demonstration on CONUS installations to pro lestone decision for a follow on Leader Follow nan (RCV-RW) Joint Capabilities Technology	vide ver					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> This effort ends in FY19 and transitions to PE 0604622A Family of Heavy Tac	tical Vehicles Project EZ8 Leader Follower in	FY20.					
Title: Emerging Robotics Systems			-	2.298	3.051		
<b>Description:</b> Validation and verification of incremental system software capab M&S Software-in-the-loop (SIL) and Hardware-in-the-loop (HIL) allowing for tra-	ility upgrades for emerging robotic systems th ansition into Program of Record.	nrough					
<b>FY 2019 Plans:</b> Funding supports Systems Engineering, Requirements, Cost Analysis and Tec Lab (SIL), and Robotic Combat Vehicle - Robotic Wingman (RCV-RW) Joint C transition to Program of Record. This will include cost, schedule and performa development). Funding also supports Squad Multipurpose Equipment Transport Automation Concept Development.	chnology Transition Plans, Software Integratio capabilities Technology Demonstration (JCTD nce risk reduction efforts (e.g. M&S environm ort (SMET) Modular Mission Payloads (MMP)	on ) ent and					
<i>FY 2020 Plans:</i> FY2020 funding will expand Modeling and Simulation including CASTLE capa Teaming, combat scenarios or other emerging program needs. RD funding wil evaluate S&T for inclusion to program requirements, Engineering Change Pro various mission payload development, utilize gaming technology in conjunction Tactics and Procedures (TTPs), requirements and CONOPS and continue val capability. Funding will support Rapid prototyping to inform emerging program	bilities to test and evaluate Manned Unmanne I utilize the M&S environment to mature and posals (ECPs) and/or technical insertions and n with Autonomy Software to develop Training idating simulation scenarios to expand test s with a Buy, Try, Decide strategy.	ed I J,					
FY 2019 to FY 2020 Increase/Decrease Statement: Funding increase supports all emerging Robotic programs and increased Value	dation and Verification.						
<i>Title:</i> Robotic Combat Vehicle ? Experimental Unit Prototypes - Tank Automot (TARDEC)	tive Research Development & Engineering Ce	enter	-	16.840	-		
<b>Description:</b> Robotic Combat Vehicle (RCV) Experimental Unit Prototyping et prototypes with the purpose of creating an experimental unit that Soldiers will (CONOPS), and new requirements for unmanned combat vehicles to support a three phase approach to promote multiple industry partners to provide innov	fort will produce unmanned combat vehicle use to create new Concepts of Operations Army Modernization priorities. Effort will lever ative, armed unmanned platforms for soldier	age					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019					
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604017A <i>I Robotics Development</i>	Project (N FD9 / Rob	ject (Number/Name) ) I Robotics Systems				
B. Accomplishments/Planned Programs (\$ in Millions)		F۱	2018	FY 2019	FY 2020		
experimentation with the intent of defining requirements for future RCV program surrogate RCV platforms to get armed unmanned systems into Soldier?s hands 1 delivers a platoon set of modified M113s with remote weapons stations in ord combat capability and to help refine requirements based on user feedback for a in Phase 3. Phase 2 adds an additional two platoons of surrogate RCVs to enate to better understand how RCVs will be used in the future fight and to refine soft RCVs Lessons learned from the phase 1 soldier experimentation will directly sull track which will competitively deliver up to a company set of RCVs the Soldier evaluation. CONOPs and TTPS developed under Phase 2 will inform e ultimately form the basis for a decision point to move forward with a procureme	n Phase ht I start uvers ose nded nd						
<b>FY 2019 Plans:</b> RCV Phase 1 Surrogate Experimentation effort will install by-wire kits onto four to be operated remotely. Remote Weapon Stations (both small and medium cal unmanned platforms to enable computer aided target recognition and remoted completed by the end of FY19 for integration with autonomy package and follow <b>EX 2019 to EX 2020 Increase/Decrease Statement:</b>	them d onto will be						
In FY20, funding realigns to PE 0604017A / Project CF4 Robotic Combat Vehic	e (RCV) NGCV-CFT.						
<i>Title:</i> FY 2019 SBIR/STTR Transfer			-	3.297	-		
FY 2019 Plans: SBIR/STTR							
FY 2019 to FY 2020 Increase/Decrease Statement: Adjusted for FY 2019 SBIR/STTR Transfer							
	Accomplishments/Planned Programs Sul	ototals	35.761	71.415	3.051		
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> Pre-acquisition program activities funded by this line transition to a separate Pr	ogram Element and Project prior to their first	program ac	quisition I	Milestone (B	or C).		

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army							
R-1 Program Element (Number/Name) PE 0604017A / Robotics Development	Project (N FD9 / Robo	umber/Name) otics Systems					
R	R-1 Program Element (Number/Name) PE 0604017A / Robotics Development	R-1 Program Element (Number/Name) Project (N PE 0604017A / Robotics Development FD9 / Robotics					

#### D. Acquisition Strategy

Robotics Development (RD) is designed to facilitate the transition of robotics and autonomous systems technology from Science and Technology (S&T) projects into emerging programs of record. It informs the acquisition process early in the development cycle allowing key stakeholders the ability to make integration decisions and affordability trades while writing requirements.

Product Manager Applique and Large Unmanned Ground Systems (PdM ALUGS) builds upon the TARDEC Expedient Leader Follower (ELF) Operational Technology Demonstration (OTD) to provide a limited autonomous vehicle capability to Tactical Wheeled Vehicles including the Palletized Load System (PLS) A1. Efforts include Capabilities Document input, close monitoring of OTD activities that feed cost estimates, capture technical and test data, provide test support, develop Modeling and Simulation (M&S) capabilities, and develop a Software Integration Lab (SIL). Efforts may support Rapid prototyping to inform emerging programs. A "buy/lease, try and inform" methodology may be used to evaluate Commercial Off the Shelf (COTS), Government Off the Shelf (GOTS) and Non-Developmental Item (NDI) robotics products that have the potential to enhance Soldier combat effectiveness. Actual operational user feedback and evaluation results obtained will inform emerging capabilities and requirements documents in support of a return on investment to support future Army decision making.

Robotic Combat Vehicle (RCV) funding supports Systems Engineering, Requirements, Cost Analysis, Joint Capabilities Technology Demonstration (JCTD) support, and technology transition plans.

Tank Automotive Armaments Research Development & Engineering Center (TARDEC) funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology. The Army will build, and test prototype systems for safety release, Soldier use, and further technology maturation.

Robotic Combat Vehicle (RCV) Experimental Unit Prototyping will provide unmanned combat vehicles to enable users to assess the capability of the platforms and created new CONOPS and doctrine for manned/unmanned teaming based operations. Efforts will inform new CONOPS, identified system limitations and benefits and provide an achievable, analytically backed basis for future RCV requirements documents to drive future acquisition programs.

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (NumberPE 0604017A / Robotics DevelopmentFD9 / Robotics S							r/ <b>Name)</b> ystems		
Management Service	es (\$ in M	illions)		FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	020 FY 2020 O Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PM FP PdM ALUGS	Allot	PM FP : Warren, MI	-	2.350		1.025	Nov 2018	0.500	Oct 2019	-		0.500	0.000	3.875	-
RCIS Type II ALUGS	MIPR	PdM ALUGS : Warren, MI	-	0.500		0.725	Oct 2018	-		-		-	0.000	1.225	-
		Subtotal	-	2.850		1.750		0.500		-		0.500	0.000	5.100	N/A
Product Development (\$ in Millions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	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
RCV/ACO M&S SIL ALUGS	MIPR	TARDEC : Warren, MI	-	-		1.100	Dec 2018	-		-		-	0.000	1.100	-
SMET Modular Mission Payloads ALUGS	TBD	TBD : TBD	-	-		1.000	Dec 2018	-		-		-	0.000	1.000	-
Leader Follower (TARDEC) Tech Demo A Kit	C/CPFF	Robotic Research : Baltimore, MD	-	10.400		11.000	Oct 2018	-		-		-	0.000	21.400	-
Leader Follower (TARDEC) Tech Demo B Kit	C/CPFF	Oshkosh : Oshkosh, WI	-	9.402		12.500	Dec 2018	-		-		-	0.000	21.902	-
Leader Follower (TARDEC) Integrated System Integrator	C/CPFF	Lockheed Martin : Dallas, TX	-	4.500		4.500	Oct 2018	-		-		-	0.000	9.000	-
Leader Follower (TARDEC) Warfighter Machine Interface	C/CPFF	DCS Corp : Boston, MA	-	2.500		3.000	Nov 2018	-		-		-	0.000	5.500	-
RCV Risk Reduction Platform Development	C/CPFF	To Be Determined : To Be Determined	-	-		16.840	Nov 2018	-		-		-	0.000	16.840	-
RD M&S SIL ALUGS	MIPR	TARDEC and various : Warren, MI	-	-		-		1.540	Oct 2019	-		1.540	0.000	1.540	-
FY2019 SBIR/STTR Transfer	TBD	Various : Various	-	-		3.297		-		-		-	0.000	3.297	-
		Subtotal	-	26.802		53.237		1.540		-		1.540	0.000	81.579	N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060	o <b>gram Ele</b> 4017A <i>I F</i>	ement (N Robotics I	l <b>umber/N</b> a Developm	a <b>me)</b> ent	Project FD9 / R	(Number Robotics S	r/ <b>Name)</b> Systems		
Support (\$ in Millions	s)			FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
PdM ALUGS Support	MIPR	Various : Multiple locations	-	4.109		4.398	Oct 2018	1.011	Oct 2019	-		1.011	0.000	9.518	-
SMET Modular Mission Payloads ALUGS	MIPR	PdM ALUGS : Warren, MI	-	-		0.550	Oct 2018	-		-		-	0.000	0.550	-
Technology Demo support (TARDEC)	MIPR	TARDEC : Warren, MI	-	1.000		2.100	Oct 2018	-		-		-	0.000	3.100	-
		Subtotal	-	5.109		7.048		1.011		-		1.011	0.000	13.168	N/A
est and Evaluation (\$ in Millions)				FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
Leader Follower (TARDEC) Tech Demo Testing	MIPR	ATEC : Aberdeen, MD	-	0.500		0.200	Oct 2018	-		-		-	0.000	0.700	-
Leader Follower (TARDEC) Tech Demo Data Logger	MIPR	ATEC : Aberdeen, MD	-	0.500		0.200	Oct 2018	-		-		-	0.000	0.700	-
Leader Follower (TARDEC) Testing	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD	-	-		7.830	Dec 2018	-		-		-	0.000	7.830	-
Leader Follower (TARDEC) Data Logger	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD	-	-		1.000	Dec 2018	-		-		-	0.000	1.000	-
PdM ALUGS RD ATEC support	MIPR	ATEC : Aberdeen, MD	-	-		0.150	Nov 2018	-		-		-	0.000	0.150	-
	Subtotal -					9.380		-		-		-	0.000	10.380	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	bit R-3, RDT&E Project Cost Analysis: PB 2020 Army												
Appropriation/Budget Activity 2040 / 4					<b>gram El</b> 4017A / F	<b>ement (N</b> Robotics L	u <b>mber/Na</b> Developme	a <b>me)</b> ent	Project FD9 / Ro	(Number	/ <b>Name)</b> ystems		
Prior Years FY 2018				FY 2	019	FY 2 Ba	020 se	FY 2 OC	020 O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	35.761		71.415		3.051		-		3.051	0.000	110.227	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A																Dat	<b>e:</b> №	larc	h 20	19							
Appropriation/Budget Activity 2040 / 4			<b>R-1</b> PE (	<b>Prog</b> 0604	gram 017A	Eler A / Ro	nent boti	t (Ni cs D	umb )eve	er/N lopm	ame) ient	)	Pi Fi	r <b>oje</b> D9 /	<b>ct (N</b> Rob	lumt otics	oer/l Sys	Nam sterr	ie) is								
Event Name		FY	2018		F	Y 20	19		FY	2020	)		FY	202 <sup>-</sup>	1		FY	202	2		FY	202	3		FY	202	24
LEADER FOLLOWER ALUGS	1	2	3	4 1	2	2 3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
LF ALUGS MODELING & SIMULATION (M&S)	LF M8	us.																									
LF M&S Initial Capability Development		&S Initi	ial Develo	pment																							
LF Improve M&S Functionality & increase utility			LF Imp	rove Mi	&S fun	octional	ity																				
LF M&S continued testing		LFI	M&S cont	. testing	3																						
LF M&S Use Case Development		F M&S	Use Case	e Dev																							
LF M&S Validation, Verification Accreditation				LEVe	er/Val/A	Accredi	itation																				
LF Milestone C Documentation						LFI	MS C Do	ocumen	nt Prepa	aration																	
ALUGS Emerging Systems Upgrades																											
RD Emerging Systems Capability Upgrade Validation and Ve	rificat	tion		RD	Emerg	ging sys	stems V/	nr.																			
TARDEC LEADER FOLLOWER Operational Technology Dem	onstr	ation	(OTD)																								
TARDEC LF Applique Prototype Build (10) for test			Applique	Prototy	/pe Bui	ild & In	ntegratio	r (10)																			
TARDEC LF Order Items for 140 Applique Systems			Long	Lesd	ltem O	order (1	40)																				
								-			I																

xhibit R-4, RDT&E Schedule Profile: PB 2020 Army												Da	ate:	: Ma	arch	201	19												
Appropriation/Budget Activity 2040 / 4							F	<b>R-1 F</b> PE 0	<b>Prog</b> 604(	<b>jram</b> 017A	Elem	<b>ent</b> botic	<b>(Νι</b> s D	imb eve	er/N lopr	<b>Nam</b> ment	e)		<b>Pro</b> j FD9	j <b>ect (</b> ) / Ro	Num botic	i <b>be</b> s S	r/Na Syst	ame) ems	)				
Event Name	1	FY	2018	3	1	FY	201	9	1	FY	2020	4	1	FY 2	202	21	1	F	Y 20	)22 3 4	1	F	Y 2	023 3	_	1	FY:	202	4
TARDEC LF Contractor Engineering Test		2		ontrac	cior Tes	st	3			2	3	-		2	5					<u>, , ,</u>	<u> </u>		<u> </u>	3	-	•	2	3	
ATEC LF Urgent Material Release (UMR) & Safety Test (TAR	DEC)					ATEC	test																						
TARDEC LF Applique Build (140) for Tech Demo						Build B	Excursi	ion Ap	plique	Syster	ns (140)																		
TARDEC LF Urgent Material Release (UMR)								4																					
TARDEC LF First Unit of Issue									2 FUI																				
TARDEC LF Tech Demo Assessment									Eva	iluate L	.F system	ns in F	ORSO	COM u	nits														
Robotic Combat Vehicle (RCV) Risk Reduction																													
RCV Experimental Unit Prototyping - Contract Award					RCV I	Experin	mental	Unit P	ototyp	ing - C	ontract A	ward																	
RCV Risk Reduction - M113 By-Wire Integration					RCV F	RR - MI	113 By	y-Wire I	ntegra	ation																			
RCV Risk Reduction - Unmanned M113 Shake Out Testing								RCV F	R - Ur	nmanne	ed M113	Shake	e Out	Testir	g														
RCV Risk Reduction - ATEC Safety Testing										RCV F	R - ATE	C Safe	ty Te	sting															
RCV Risk Reduction - Advanced Technology Demonstration											R		- Adv	vance	d Tec	hnolog	y Dem	nonstr	ration										
Robotic Combat Vehicle (RCV) Experimental Unit Prototyping																													
									-								-												

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army					Date: March 20	19	
Appropriation/Budget Activity 2040 / 4			<b>R-1 Pro</b> PE 0604	<b>ogram Elemen</b> 4017A <i>I Robot</i>	t (Number/Name ics Development	e) Project (N FD9 / Rob	<b>lumber/Name)</b> ootics Systems	
						1	1	
Event Name	FY 2018	FY 20	)19	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
RCV Experimental Unit Prototyping - Industry Mobility Platfor	1 2 3 4	1 2 3 RCV EUP - Indu	3 4 1	2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
RCV Experimental Unit Prototyping - Industry Lethality System	ns Prototypes	RCV EUP - Indu	istry Lethality	Systems Prototypes				
RCV Experimental Unit Prototyping - Industry AiTR System P	rototypes	RCV EUP - Indu	istry AiTR Sys	tem Prototypes				
RCV Experimental Unit Prototyping - Prototype Evaluation an	nd Runoff			RCV E	UP - Prototype Evaluation	and Runoff		

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army	-4A, RDT&E Schedule Details: PB 2020 Army								
ppropriation/Budget Activity 040 / 4	<b>R-1 Program Element (Number</b> PE 0604017A <i>I Robotics Develo</i>	r/ <b>Name)</b> pment	Project (Number/Nam FD9 / Robotics System	<b>1e)</b> 15					
S	chedule Details								
	Sta	art	E	nd					
Events	Quarter	Year	Quarter	Year					
LEADER FOLLOWER ALUGS	1	2017	4	2022					
LF ALUGS MODELING & SIMULATION (M&S)	1	2017	4	2020					
LF M&S Data Source Matrix Development	1	2017	4	2017					
LF M&S Initial Capability Development	4	2017	2	2018					
LF Improve M&S Functionality & increase utility	3	2018	4	2020					
LF M&S continued testing	2	2018	4	2022					
LF M&S Use Case Development	1	2018	1	2019					
LF M&S Validation, Verification Accreditation	4	2018	4	2019					
LF Milestone C Documentation	3	2019	4	2020					
ALUGS Emerging Systems Upgrades	1	2017	4	2022					
RD Emerging Systems Capability Upgrade Validation and Verification	1	2019	4	2020					
TARDEC LEADER FOLLOWER Operational Technology Demonstration	(OTD) 3	2018	3	2022					
TARDEC LF Applique Prototype Build (10) for test	3	2018	4	2018					
TARDEC LF Order Items for 140 Applique Systems	3	2018	4	2018					
TARDEC LF Contractor Engineering Test	3	2018	2	2019					
ATEC LF Urgent Material Release (UMR) & Safety Test (TARDEC)	2	2019	3	2020					
TARDEC LF Applique Build (140) for Tech Demo	2	2019	4	2019					
TARDEC LF Urgent Material Release (UMR)	1	2020	1	2020					
TARDEC LF First Unit of Issue	1	2020	1	2020					
TARDEC LF Tech Demo Assessment	1	2020	2	2021					
Robotic Combat Vehicle (RCV) Risk Reduction	4	2019	4	2021					
RCV Experimental Unit Prototyping - Contract Award	1	2019	1	2019					
RCV Risk Reduction - M113 By-Wire Integration	1	2019	4	2019					

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army					Date: Mar	ch 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program</b> PE 0604017A	Element (Numbe / Robotics Develo	e <b>r/Name)</b> Spment	<b>Project (N</b> FD9 / <i>Rob</i>	umber/Nai	<b>me)</b> ms
		St	art		E	Ind
Events		Quarter	Year	0	Quarter	Year
RCV Risk Reduction - Unmanned M113 Shake Out Testing		4	2019		2	2020
RCV Risk Reduction - ATEC Safety Testing		2	2020		4	2020
RCV Risk Reduction - Advanced Technology Demonstration		4	2020		4	2021
Robotic Combat Vehicle (RCV) Experimental Unit Prototyping		1	2019		4	2023
RCV Experimental Unit Prototyping - Industry Mobility Platform Prototype	es	1	2019		4	2020
RCV Experimental Unit Prototyping - Industry Lethality Systems Prototyp	es	1	2019		4	2020
RCV Experimental Unit Prototyping - Industry AiTR System Prototypes		1	2019		4	2020
RCV Experimental Unit Prototyping - Prototype Evaluation and Runoff		4	2020		1	2021

Exhibit R-2, RDT&E Budget Item	n Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	h 2019	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)						am Elemen 20A / Cross	<b>t (Number</b> /l Functional	Name) Team (CFT)	Advanced	Developme	ent & Prototy	yping
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	9.488	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
CF1: CFT Advanced Development & Prototyping	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing			

#### Note

This program was a FY 2019 new start. FY 2020 and out funding supporting CFT Network efforts has been realigned to 0604541A Unified Network Transport.

#### A. Mission Description and Budget Item Justification

This Program Element (PE) funds experimental prototyping and technical demonstrations of selected technologies conducted by Cross-Functional Teams (CFT) in order to inform and refine the development of initial capability documents in support of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE). Funding facilitates the experimentation and demonstration of priority technologies to ensure that planned capabilities are technologically feasible, affordable, and available to Soldiers. Benefits include the narrowing of capability gaps by developing capability documents and rapidly transitioning leader-approved capability requirements to the Army Acquisition System. In project CF1, CFT will conduct pre-Materiel Solution Analysis Phase experimentation and technical demonstrations to enable capability document development and improve the decision making for potential programs of record.

This investment supports the Chief of Staff of the Army (CSA) six modernization priorities.

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	38.000	174.699	-	174.699
Current President's Budget	0.000	9.488	0.000	-	0.000
Total Adjustments	0.000	-28.512	-174.699	-	-174.699
Congressional General Reductions	-	-0.012			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-28.500			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
Congressional Adds	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-174.699	-	-174.699

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604020A / Cross Functional Team (CFT) Advanced	Development & Prototyping
Change Summary Explanation The decrease between the previous President's Budget and the Curre	ent President's Budget reflects a restructure of CFT funding	

Exhibit R-2A, RDT&E Project Ju	Date: Marc	ch 2019										
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060402 Team (CFT Prototyping	am Elemen 20A / Cross T) Advanceo G	<b>t (Number/</b> Functional d Developm	Name) ent &	Project (N CF1 / CFT Prototyping	umber/Nan Advanced ?	<b>1e)</b> Developmel	nt &			
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
CF1: CFT Advanced Development & Prototyping	-	0.000	9.488	0.000	-	0.000	0.000	0.000	0.000	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-					

#### Note

Project is a new start in FY19.

#### A. Mission Description and Budget Item Justification

This project funds pre-Materiel Solution Analysis Phase experimentation and technical demonstrations conducted by the eight Cross-Functional Teams (CFT) to inform and refine the development of Initial Capability Documents (ICD) to support Materiel Development Decision (MDD) in the areas of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE). CFT advanced development and prototyping efforts will narrow an existing capability gap by informing capability document development and rapidly transition leader-approved capability requirements to the Army Acquisition System. This will allow for faster development of capabilities and ensure planned capabilities are technologically feasible, affordable, and available to the Soldier.

This investment support the Chief of Staff of the Army (CSA) six modernization priorities

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: CFT Experimental prototyping and technology Demonstration	-	8.225	-
<b>Description:</b> Cross-Functional Teams (CFT) conduct experimental prototyping and technical demonstrations ) in order to inform and refine the development of initial capability documents in support of Long Range Precision Fires (LRPF), Next Generation Combat Vehicle (NGCV), Future Vertical Lift (FVL), Network Command, Control Communication, and Intelligence (NC3I), Assured Positioning, Navigation, and Timing (APNT), Air and Missile Defense (AMD), Soldier Lethality, and Synthetic Training Environment (STE).			
FY 2019 Plans: Will conduct experimental prototyping and technical demonstrations to enable the development of Initial Capability Document (ICD) development in support of Enhanced Night Vision Goggles, Enhanced Defense Advanced Global Positioning System			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	Aarch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604020A <i>I Cross Functional</i> <i>Team (CFT) Advanced Development &amp;</i> <i>Prototyping</i>	Project (N CF1 / CF7 Prototypin	<b>lumber/</b> F Advanc g	Name) ed Developm	ent &
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2018	FY 2019	FY 2020
Receiver (DAGR) Distribution Device, and network and user asses capabilities.	ssments of Command Post (CP) Mobility and Survivability				
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to realignment of funding to 0604541A Unified Ne	etwork Transport.				
Title: FY19 SBIR STTR			-	1.263	-
<b>FY 2019 Plans:</b> n/a- tax					
FY 2019 to FY 2020 Increase/Decrease Statement: SBIR STTR Tax now accounted for					
	Accomplishments/Planned Programs Sub	ototals	-	9.488	-
C. Other Program Funding Summary (\$ in Millions) N/A Remarks Transition of technologies are aligned with multiple RDT&E or Prod OPA: Signal Modernization B00010; Net Warrior R80501; Tactical RDT&E: Command Post Computing Environment 654818323 D. Acquisition Strategy Activities will be conducted both in-house and through multiple cor	curement lines, to include but not limited to: I Network Radio System Handheld B95006; Manpack B95 mpetitively-awarded contracts using best value source sel	007; COTS ection proce	Tactical edures.	Radio B9810	5.
<u>E. Performance Metrics</u> N/A					

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 0604 Team (C Prototyp	<b>gram Ele</b> 4020A / C CFT) Adv bing	ement (N Cross Fur anced De	lumber/N nctional evelopmer	ame) nt &	Project CF1 / C Prototyµ	<b>(Number</b> FT Advar bing	r/ <b>Name)</b> aced Deve	lopment	&
Product Developmen	it (\$ in Mi	llions)		FY	2018	FY 2	019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
CFT Experimental Prototyping and technology demonstrations	TBD	Various : various	-	-		8.225		-		-		-	0.000	8.225	-
SBIR SITTR	TBD	SBIR STTR : n/a	-	-		1.263		-		-		-	0.000	1.263	-
		Subtotal	-	-		9.488		-		-		-	0.000	9.488	N/A
		Project Cost Totals	Prior Years	FY	2018	FY 2	019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

#### **Remarks**

Contracting will be conducted through Other Transactional Agreements or through FAR Part 12 Commercial Acquisition.

Exhibit R-4, RDT&E Schedule Profile: PB 2	2020 Army					Date: March 20	19
Appropriation/Budget Activity 2040 / 4		R P Te P	-1 Program Elemer E 0604020A / Cross eam (CFT) Advance rototyping	nt (Number/Name S Functional d Development &	e) Project (N CF1 / CF1 Prototypin	<b>lumber/Name)</b> T Advanced Deve Ig	lopment &
	EX 2018	EV 2019	EX 2020	EV 2021	EV 2022	EV 2023	EX 2024
Event Name	1 2 3 4	1 2 3	4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Cross Functional Teams							
Analysis of Technical Solutions							
L						1	1]

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Ma	rch 2019
ppropriation/Budget Activity 040 / 4	<b>R-1 Program</b> PE 0604020A <i>Team (CFT) A</i> <i>Prototyping</i>	Element (Numbe I Cross Functiona dvanced Develop	r/Name) I al ( ment & I	Project (Number/Na CF1 / CFT Advanced Prototyping	m <b>e)</b> I Development &
	Schedule Detail	S			
		St	art		End
Events		Quarter	Year	Quarter	Year
Cross Functional Teams		3	2019	1	2021
Analysis of Technical Solutions		3	2019	4	2019

Exhibit R-2, RDT&E Budget Item	I Justificat	ion: PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	st & Evalua types (ACD	ation, Army I 0&P)	BA 4: Adv	anced	<b>R-1 Progra</b> PE 060402	am Elemen 21A / Electro	t (Number/l onic Warfare	Name) e Technolog	y Maturatio	n (MIP)		
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	18.043	-	18.043	18.800	0.000	0.000	0.000	0.000	36.843
AW7: Electronic Warfare Technology Maturation (MIP)	-	0.000	0.000	18.043	-	18.043	18.800	0.000	0.000	0.000	0.000	36.843

#### Note

This program is a new start in FY 2020.

#### A. Mission Description and Budget Item Justification

Terrestrial Layer System (TLS) is a new start effort in FY 2020 to provide Army maneuver forces integrated Signals Intelligence (SIGINT), Electronic Warfare (EW), and offensive Cyber-enabling integrated solution to support Multi Domain operation capability gaps and provide Force Protection, Situational Development, and Information Superiority to the maneuver forces. TLS is a dedicated, all weather, 24/7, ground-based tactical system providing Signals Intelligence (SIGINT), Electronic Warfare Support (ES), Electronic Attack (EA) and Cyber enabling capabilities to support the Brigade Combat Team (BCT) and Expeditionary-Military Intelligence Brigade (E-MIB) commanders. TLS provides Indications and Warnings, Force Protection and Situational Awareness to influence the commander's decision cycle, improve targeting timeliness and accuracy, and provide the maneuver commander with electronic attack and offensive cyber warfare options to deny, degrade, disrupt, or otherwise manipulate the targeted force. TLS employs technologically advanced systems with a modular open-system approach for dismounted, vehicle mounted, and extended range operations that can be efficiently sustained and effectively upgraded to provide capabilities against changing near peer and emerging threats.

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	18.043	-	18.043
Total Adjustments	0.000	0.000	18.043	-	18.043
<ul> <li>Congressional General Reductions</li> </ul>	-	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
<ul> <li>Reprogrammings</li> </ul>	-	-			
<ul> <li>SBIR/STTR Transfer</li> </ul>	-	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	18.043	-	18.043
Change Summary Explanation					
This program is a new start in FY 2020.					

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Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060402 Technology	am Element 21A / Electro y Maturation	t <b>(Number/</b> onic Warfare (MIP)	Name) e	<b>Project (N</b> AW7 <i>I Elec</i> <i>Maturation</i>	umber/Nan tronic Warf (MIP)	ne) are Technolo	gу
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
AW7: Electronic Warfare Technology Maturation (MIP)	-	0.000	0.000	18.043	-	18.043	18.800	0.000	0.000	0.000	0.000	36.843
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
<u>Note</u> PE 0604021A and Project AW7 fc	or Terrestria	al Layer Sys	item (TLS) i	s a new sta	rt in FY 202	20.						

#### A. Mission Description and Budget Item Justification

This is a new start in FY 2020. Terrestrial Layer System (TLS) is the overarching effort to provide Army maneuver forces integrated Intelligence, Electronic Warfare, and Cyber Warfare-enabling Capabilities. TLS is a dedicated, all weather, 24/7, ground-based tactical system providing Signals Intelligence (SIGINT), Electronic Warfare Support (ES), Electronic Attack (EA) and Cyber enabling capabilities to support the Brigade Combat Team (BCT) and Expeditionary-Military Intelligence Brigade (E-MIB) commanders. TLS provides, but is not limited to; Indications and Warnings, Force Protection and Situational Awareness to influence the commander's decision cycle, improves targeting timeliness and accuracy, and provides the maneuver commander with electronic attack and offensive cyber warfare options to deny, degrade, disrupt, or otherwise manipulate the targeted force. TLS employs technologically advanced systems with a modular open-system approach for dismounted, vehicle mounted, and extended range operations that can be efficiently sustained and effectively upgraded over its lifecycle to incorporate emerging technologies in order to pace near peer and emerging threats.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Technical / Program Management	-	-	2.282
Description: Funds will provide for technical engineering and program management.			
<i>FY 2020 Plans:</i> FY 2020 technical engineering and program management support for TLS.			
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 is the first year funding is programmed to support the TLS effort.			
Title: Systems Engineering and Component Prototyping	-	-	15.761
<b>Description:</b> Funds will provide for, but are not limited to evaluation, development and engineering of component level technologies to include antennas, radios, software architecture and other Signals Intelligence (SIGINT), Electronic Warfare Support (ES), Electronic Attack (EA) and Cyber enabling components to mature technical feasibility and reduce Critical Technology Element (CTE) risks. Funds will support, but are not limited to the development of system level design and integration to reduce Size, Weight and Power (SWaP) in order to mature components into an emerging Program of Record (PoR) level			

Appropriation/Budget Activity       R-1 Program Element (Number/Name)       Project (Number/Name)       Project (Number/Name)         2040 / 4       PE 0604021A / Electronic Warfare       AW7 / Electronic Warfare       AW7 / Electronic Warfare         7echnology maturation level. Additionally, funding will support continuing component and system improvements through the establishment of a developmental test environment.       FY 2018       FY 2019       FY 2020         FY 2020 Plans:       Conduct analysis of SIGINT, ES, EA and cyber enabling components and system alternatives. Award contract agreements to mature critical technologies, develop sub-systems, components and reduce component integration risks in a System solution that can be evaluated for affordability, faasibility, and technical maturity; all of which will reduce program technical and cost risks.       -       -       18.043         C. Other Program Funding Summary (\$ in Millions)       FY 2020       FY 2020       FY 2020       FY 2020       FY 2023       FY 2023       FY 2024       Complete       Total Cost         · FJS: Terrestrial       -       -       0.000       -       0.000       37.000       51.300       21.000       12.100       0.000       121.400         Layer System (MIP)       Remarks       -       -       0.000       12.100       0.000       121.400	Exhibit R-2A, RDT&E Project Jus	stification: PB	2020 Army							Date: N	larch 2019	
B. Accomplishments/Planned Programs (\$ in Millions)       FY 2018       FY 2019       FY 2019       FY 2020         technology maturation level. Additionally, funding will support continuing component and system improvements through the establishment of a developmental test environment.       FY 2019       FY 2019       FY 2019       FY 2019       FY 2019       FY 2020         FY 2020 Plans:       Conduct analysis of SIGINT, ES, EA and cyber enabling components and system alternatives. Award contract agreements to mature critical technologies, develop sub-systems, components and reduce component integration risks in a System solution that can be evaluated for affordability, feasibility, and technical maturity; all of which will reduce program technical and cost risks.       FY 2019 to FY 2020 Increase/Decrease Statement:       Image: Content of the content of	Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> I PE 06 <i>Techn</i>	rogram Eler 04021A / Ele ology Matura	nent (Numb ectronic War ation (MIP)	er/Name) fare	<b>Proje</b> AW7 / <i>Matura</i>	ct (Number/I Electronic M ation (MIP)	Name) /arfare Techno	blogy
technology maturation level. Additionally, funding will support continuing component and system improvements through the establishment of a developmental test environment. FY 2020 Plans: Conduct analysis of SIGINT, ES, EA and cyber enabling components and system alternatives. Award contract agreements to mature critical technologies, develop sub-systems, components and reduce component integration risks in a System solution that can be evaluated for affordability, feasibility, and technical maturity; all of which will reduce program technical and cost risks. FY 2020 Increase/Decrease Statement: FY 2020 is the first year funding is programmed to support the TLS effort. FY 2020 is the first year funding is programmed to support the TLS effort. FY 2020 FY 2020 FY 2020 Cother Program Funding Summary (\$ in Millions) C. Other Program Funding Summary (\$ in Millions) FY 2018 FY 2018 FY 2019 Base OCO Total FY 2021 FY 2022 FY 2023 FY 2023 FY 2024 Complete Total Cost 12.100 0.000 121.000 121.000 121.000 121.000 121.000 121.000 121.000 121.000 121.400 Layer System (MIP) Remarks	B. Accomplishments/Planned Pr	<u>ograms (\$ in N</u>	<u>/lillions)</u>						[	FY 2018	FY 2019	FY 2020
FY 2020 is the first year funding is programmed to support the TLS effort.         Accomplishments/Planned Programs Subtotals       -       -       18.043         C. Other Program Funding Summary (\$ in Millions)         EY 2020       FY 2021       FY 2022       FY 2023       FY 2024       Cost To         Line Item       FY 2018       FY 2019       Base       OCO       Total       FY 2021       FY 2023       FY 2023       FY 2024       Complete       Total Cost         • FJ5: Terrestrial       -       -       0.000       -       0.000       37.000       51.300       21.00       12.100       0.000       121.400         Layer System (MIP)       Remarks       -       -       0.000       -       0.000       37.000       51.300       21.000       12.100       0.000       121.400       1	technology maturation level. Additi establishment of a developmental <i>FY 2020 Plans:</i> Conduct analysis of SIGINT, ES, E mature critical technologies, develo can be evaluated for affordability, f <i>FY 2019 to FY 2020 Increase/Dec</i>	onally, funding test environme A and cyber er op sub-systems feasibility, and t	will support nt. habling com s, componer echnical ma ent:	continuing c ponents and its and reduc iturity; all of v	system alte ce componer which will red	nd system in rnatives. Aw nt integratior duce prograr	nprovements ard contract risks in a S n technical a	s through the agreements ystem solutic and cost risks	to on that 			
Accomplishments/Planned Programs Subtotals       -       -       18.043         C. Other Program Funding Summary (\$ in Millions)         EY 2020       FY 2020       FY 2020       FY 2020       FY 2020       FY 2020       Cost To         Line Item       FY 2018       FY 2019       Base       OCO       Total       FY 2021       FY 2022       FY 2023       FY 2024       Complete       Total Cost         • FJ5: Terrestrial       -       -       0.000       -       0.000       37.000       51.300       21.000       12.100       0.000       121.400         Layer System (MIP)       Remarks       Remarks       -       -       -       -       -       -       -       -       -       -       -       -       121.400       -       -       121.400       -	FY 2020 is the first year funding is	programmed to	o support the	e TLS effort.								
C. Other Program Funding Summary (\$ in Millions)         FY 2020       FY 2021       FY 2022       FY 2023       FY 2024       Complete       Total Cost         • FJ5: Terrestrial       -       -       0.000       -       0.000       37.000       51.300       21.000       12.100       0.000       121.400         Layer System (MIP)       -       -       0.000       -       0.000       37.000       51.300       21.000       12.100       0.000       121.400         Remarks       -       -       -       -       0.000       -       0.000       37.000       51.300       21.000       12.100       0.000       121.400					Accor	nplishments	s/Planned P	rograms Su	btotals	-	-	18.043
Line Item         FY 2018         FY 2019         Base         OCO         Total         FY 2021         FY 2022         FY 2023         FY 2024         Complete         Total Cost           • FJ5: Terrestrial         -         -         0.000         -         0.000         37.000         51.300         21.000         12.100         0.000         121.400           Layer System (MIP)         Remarks         Remarks         Filler         Filler <th< td=""><td>C. Other Program Funding Sumr</td><td><u>nary (\$ in Milli</u></td><td><u>ons)</u></td><td>FY 2020</td><td>FY 2020</td><td>FY 2020</td><td></td><td></td><td></td><td></td><td>Cost To</td><td></td></th<>	C. Other Program Funding Sumr	<u>nary (\$ in Milli</u>	<u>ons)</u>	FY 2020	FY 2020	FY 2020					Cost To	
	<u>Line Item</u> • FJ5: <i>Terrestrial</i> <i>Layer System (MIP)</i> <u>Remarks</u>	<u>FY 2018</u> -	<u>FY 2019</u> -	<u>Base</u> 0.000	<u>000</u>	<u>Total</u> 0.000	<u>FY 2021</u> 37.000	<u>FY 2022</u> 51.300	<u>FY 202</u> 21.00	23 FY 202 00 12.10	<u>4</u> <u>Complete</u> 0 0.000	<u>Total Cost</u> 121.400

A competitive acquisition approach for component development and prototyping is planned for TLS using a tailored acquisition strategy to rapidly deliver an initial integrated ground intelligence, electronic warfare and cyber capability to the Army. These efforts will be used, but are not limited to identify, develop, prototype, evaluate, analyze, and demonstrate potential enhanced capabilities and extended range alternative solutions. These efforts will quantify the respective maturity and effectiveness to mitigate capability gaps against changing near peer representative enemy target sets and operational scenarios. Enhanced capability, extended range and other technologies to provide overmatch capabilities will be evaluated for merit and will provide increased performance for production of TLS systems in FY2022. The TLS program will leverage all authorities to accelerate delivery.

#### **E. Performance Metrics**

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 0604 Technol	<b>gram Ele</b> 4021A <i>I E</i> logy Matu	ement (N Electronic Iration (M	umber/Na Warfare IIP)	ame)	<b>Project</b> AW7 / E Maturat	(Number Electronic ion (MIP)	r/ <b>Name)</b> Warfare T	ēchnolog	עז
Product Developmer	nt (\$ in M	illions)		FY	2018	FY 2	:019	FY 2 Ba	2020 Ise	FY 2 O(	2020 CO	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
Systems Engineering and Prototyping	C/Various	TBD : TBD	-	-		-		15.761	Feb 2020	-		15.761	0.000	15.761	-
		Subtotal	-	-		-		15.761		-		15.761	0.000	15.761	N/A
Support (\$ in Million	s)			FY	2018	FY 2	:019	FY 2 Ba	2020 Ise	FY 2 O	2020 CO	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
Technical / Program Management	C/CPFF	AASKI Technology : Tinton Falls, NJ	-	-		-		1.141	Nov 2019	-		1.141	0.000	1.141	-
Technical / Program Management	MIPR	Various Matrix Support Organizations : Abderdeen Proving Grounds, MD	-	-		-		1.141	Nov 2019	-		1.141	0.000	1.141	-
		Subtotal	-	-		-		2.282		-		2.282	0.000	2.282	N/A
			Prior Years	FY2	2018	FY 2	019	FY 2 Ba	2020 ise	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	_	Project Cost Totals	-	-		0.000		18.043		-		18.043	0.000	18.043	N/A
<u>Remarks</u>															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	۲my	<i>,</i>																					Dat	<b>e:</b> N	/larc	h 20	)19				
Appropriation/Budget Activity 2040 / 4			<b>R-1</b> PE 0 <i>Tech</i>	Prog 6040 nolo	<b>gram</b> 021/ ogy N	n Ele A / E ∕latu	e <b>mer</b> Electr iratio	n <b>t (N</b> ronic n (N	Num c W //IP)	nbe /arfa )	er/N are	ame	<del>)</del> )	F / /	Proj \W] Mati	e <b>ct</b> 7 I E urati	(Ni lect on	umb tron (MII	ic V P)	Nan Varf	<b>ie)</b> are 7	Tech	nolo	рду							
		EV	/ 20	19		EV	20	10		EV	201	20		_	va	2024	1		E	/ 20	122			EV	202	3		E	1 20	124	
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1		2	3	4	1	2		3 4	4	1	2	3	4	1	2		3	4
TLS Competitive Component Prototying Award(s)										4													·								
TLS System Engineering and Prototyping																															
TLS Integration/Production Contract Award																															
TLS Integration																															
TLS Rapid Production/Fielding																															
													1																		

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019
ppropriation/Budget Activity )40 / 4	R-1 Program PE 0604021A <i>Technology M</i>	Element (Numbe I Electronic Warfa aturation (MIP)	r/Name) are	Project (Number/Nai AW7 / Electronic War Maturation (MIP)	<b>ne)</b> fare Technology
	Schedule Detail	5			
		St	art	E	nd
Events		Quarter	Year	Quarter	Year
TLS Competitive Component Prototying Award(s)		2	2020	2	2020
TLS System Engineering and Prototyping		2	2020	2	2021
TLS Integration/Production Contract Award		2	2021	2	2021
TLS Integration		2	2021	2	2022
TLS Rapid Production/Fielding		2	2022	2	2027

Exhibit R-2, RDT&E Budget Item	n Justificat	ion: PB 202	20 Army							Date: Marc	h 2019	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACD	ation, Army I &P)	/ BA 4: Adva	anced	<b>R-1 Progr</b> a PE 060410	<b>am Elemen</b> )0A I Analys	t (Number/ sis Of Altern	Name) atives				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	7.307	9.753	10.023	-	10.023	10.092	10.225	10.427	10.765	0.000	68.592
EC7: Analysis Of Alternatives	-	7.307	9.753	10.023	-	10.023	10.092	10.225	10.427	10.765	0.000	68.592

### A. Mission Description and Budget Item Justification

This Program Element (PE) provides funding for analytical support of Analysis of Alternatives. Analyses of Alternatives are statutory requirements for Major Defense Acquisition Programs and regulatory for all other programs. Based on Department of Defense Instruction (DoDI) 5000.02, Analyses of Alternatives are required to be completed for a new start program prior to its first Milestone Decision. The Program Element (PE) provides analytical capability for Pre-Milestone A programs that emerge outside the normal budget or POM cycles. Normally these programs are without program managers and require analysis to support Congressional, Defense and Army Senior Leader's requirement and acquisition needs and priorities. The Analyses of Alternatives support the preparation of the Capability Development Document, Key Performance Parameters and Thresholds values and tradeoff analysis. The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy and Plans. Work in this Program Element (PE) is performed by analytical agencies such as U.S. Army TRADOC Analysis Center and U.S. Army Materiel Systems Analysis Activity. The Army is projecting to start work on multiple Analyses of Alternatives beginning in FY 2020, and will assess and fund the highest Congressional, Defense and Army Senior Leader's priorities during the year of execution.

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	9.921	9.765	10.023	-	10.023
Current President's Budget	7.307	9.753	10.023	-	10.023
Total Adjustments	-2.614	-0.012	0.000	-	0.000
<ul> <li>Congressional General Reductions</li> </ul>	-0.006	-0.012			
<ul> <li>Congressional Directed Reductions</li> </ul>	-2.310	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
<ul> <li>Reprogrammings</li> </ul>	-	-			
SBIR/STTR Transfer	-0.298	-			

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0604100A / Analysis Of AlternativesProject (Number/Name) EC7 / Analysis Of Alternatives								
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
EC7: Analysis Of Alternatives	-	7.307	9.753	10.023	-	10.023	10.092	10.225	10.427	10.765	0.000	68.592
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### A. Mission Description and Budget Item Justification

This Project provides funding for analytical support of Analysis of Alternatives. Analyses of Alternatives are statutory requirements for Major Defense Acquisition Programs and regulatory for all other programs. Based on Department of Defense Instruction (DoDI) 5000.02, Analyses of Alternatives are required to be completed for a new start program prior to its first Milestone Decision. The Project provides analytical capability for Pre-Milestone A programs that emerge outside the normal budget or POM cycles. Normally these programs are without program managers and require analysis to support Congressional, Defense and Army Senior Leader's requirement and acquisition needs and priorities. The Analyses of Alternatives support the preparation of the Capability Development Document, Key Performance Parameters and Thresholds values and tradeoff analysis. The cited work is consistent with the Assistant Secretary of Defense, Research and Engineering Science and Technology priority focus areas and the Army Modernization Strategy and Plans. Work in this Program Element is performed by analytical agencies such as U.S. Army TRADOC Analysis Center and U.S. Army Materiel Systems Analysis Activity. The Army is projecting to start work on multiple Analyses of Alternatives beginning in FY 2020 and will assess and fund the highest Congressional, Defense and Army Senior Leader's priorities during the year of execution.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Analysis of Alternatives	7.307	9.396	10.023
Description: This Project provides funding for analytical support for the following efforts:			
<b>FY 2019 Plans:</b> FY 2019 funding supports Analysis of Alternatives for new start programs that do not yet have a Program Manager assigned and to augment PM funds where requirement decisions drive changes in scope or increased fidelity to achieve Congressional intent and interest. Analysis of Alternatives initiation, scope, and fidelity are determined through the AROC process prior to the materiel development decision. Current projections indicate multiple new start programs will need to start their Analysis of Alternatives in FY 2019, including Unified Network Operations, Common Operating Environment, Cyberspace Situational Understanding, Offensive Cyberspace Operations, Mobile Armored Combat Earthmover, and Synthetic Training Environment. In addition, several Analyses of Alternatives started in FY 2018 will continue to require analysis funding into FY 2019, to include Vehicle Protection Suite, Terrestrial Layer Intelligence Support for Multi-Domain Battle/Joint Combined Army Maneuver, Future Tactical Unmanned Aircraft System, and Advanced Threat Detection System. In the Spring of 2018 (on or about 1 May) we will provide the Committee an updated listing of projected FY 2019 new start program Analyses of Alternatives.			
<b>FY 2020 Plans:</b> FY 2020 funding supports analysis for new start programs that do not yet have a program manager assigned and to augment program manager funds where requirement decisions drive changes in scope or increased fidelity to achieve Congressional, Defense and Army Senior Leader?s priority intent and interest. The analysis initiation, scope, and fidelity are determined			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604100A / Analysis Of Alternatives	<b>Project (N</b> EC7 / Anal	u <b>mber/N</b> ysis Of A	<b>lame)</b> Alternatives	
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2018	FY 2019	FY 2020
in accordance with the Joint and Army Requirement Oversight Councils (JROC Development Decision.	C and AROC) processes prior to the Materiel				
FY 2019 to FY 2020 Increase/Decrease Statement: Minor economic adjustments.					
Title: FY 2019 SBIR / STTR Transfer			-	0.357	-
Description: FY 2019 SBIR / STTR Transfer					
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
	Accomplishments/Planned Programs Subt	otals	7.307	9.753	10.023
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 0604	<b>gram El</b> 4100A / A	e <mark>ment (N</mark> Analysis C	umber/N Of Alterna	<b>ame)</b> tives	Project EC7 / A	<b>(Numbe</b> nalysis O	r/ <b>Name)</b> f Alternati	ves	
Product Developme	nt (\$ in M	illions)		FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	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	-	-		0.357		-		-		-	0.000	0.357	-
		Subtotal	-	-		0.357		-		-		-	0.000	0.357	N/A
Support (\$ in Million	s)			FY 2	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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 (Analysis of Alternative)	MIPR	TRADOC Analysis Center : Fort Leavenworth, KS	-	3.803		5.580		-		-		-	0.000	9.383	-
System Engineering (Analysis of Alternative)	MIPR	Army Materiel Systems Analysis Activity : Aberdeen Proving Ground, MD	-	3.504		3.816		-		-		-	0.000	7.320	-
Analytical Support for Analyses of Alternatives	MIPR	TBD : TBD	23.572	-		-		10.023		-		10.023	0.000	33.595	-
		Subtotal	23.572	7.307		9.396		10.023		-		10.023	0.000	50.298	N/A
			Prior Years	FY	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	23.572	7.307		9.753		10.023		-		10.023	0.000	50.655	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020	Army																Dat	<b>:e:</b> M	arch	201	9			
Appropriation/Budget Activity 2040 / 4						<b>R-1</b> PE 0	<b>Prog</b> 0604	<b>jram</b> 100A	Elem I Ana	ent lysis	(Nun s Of /	<b>nber/</b> Altern	Name atives	e) s	Pro EC7	<b>ject (N</b> 7 I Ana	<b>lum</b> t Ilysis	oer/N Of A	l <b>ame</b> ) Iterna	) ative	es			
Event Name		FY 20	018		FY 2	019		FY	2020	_	F	Y 20	21		FY 20	022		FY :	2023	_		FY 2	024	_
Identify Candidates for FY18 AoA funding	1	<b>Z</b>	<u> </u>	1	2	3 4		2	3	4	1 1	2 3	4	1	2	5 4		2	3	4	1	2	3 4	-
Issue FY18 AoA Funding																								
Identify Candidates for FY19 AoA funding																								
Issue FY19 AoA Funding																								
Identify Candidates for FY20 AoA funding																								
Issue FY 20 AoA Funding																								
Identify Candidates for FY21 AoA funding																								
Issue FY 21 AoA Funding																								
										_														

hibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019										
propriation/Budget Activity 40 / 4	R-1 Program Element (Num PE 0604100A / Analysis Of A	<b>Project (Number/Name)</b> EC7 <i>I Analysis Of Alternatives</i>										
	Schedule Details											
		Start		End								
Events	Quarter	Year	Quarter	Year								
Identify Candidates for FY18 AoA funding	4	2017	3	2018								
Issue FY18 AoA Funding	1	2018	4	2018								
Identify Candidates for FY19 AoA funding	4	2018	3	2019								
Issue FY19 AoA Funding	1	2020	4	2020								
Identify Candidates for FY20 AoA funding	4	2019	3	2020								
Issue FY 20 AoA Funding	1	2020	4	2020								
Identify Candidates for FY21 AoA funding	4	2020	3	2021								
Issue FY 21 AoA Funding	1	2021	4	2021								
Exhibit R-2, RDT&E Budget Item	n Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	ch 2019	
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Appropriation/Budget Activity         2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced         Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0604113A / Future Tactical Unmanned Aircraft System (FTUAS)							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2024	Cost To Complete	Total Cost		
Total Program Element	-	0.000	12.393	40.745	-	40.745	20.122	25.281	25.960	28.299	Continuing	Continuing
EX8: Future Tactical Unmanned - 0.000 12.393 40.74 Aircraft System (FTUAS)						40.745	20.122	25.281	25.960	28.299	Continuing	Continuing

### A. Mission Description and Budget Item Justification

The Future Unmanned Aircraft System (FUAS) is a critical system in the Multi-Domain Operations (MDO)battle concept that will employ MDO capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders. The Joint Requirements Oversight Council (JROC) approved the FUAS Initial Capabilities Document (ICD) on 12 OCT 2018. The ICD includes requirements for Scalable Control Interface (SCI), Air Launched Effects (ALE), and Purpose-Driven UAS (to include Future Tactical UAS and Advanced UAS).

The Future Unmanned Aircraft System (FUAS) will be comprised of multiple components including the Future Tactical UAS (FTUAS) for the Brigade Combat Team (BCT), the Advanced UAS (AUAS) for the Combat Aviation Brigades (CAB), and Air Launched Effects (ALE). The FTUAS seeks to replace the RQ-7 assets within the Brigade Combat Teams. Key attributes of the FTUAS focus on Rapid Deployability, Expeditionary Maneuver, and Mobility for adaptive and agile operations. FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including power generation, transportation, or command and control equipment; aircraft software; and required engineering, logistics, and programmatic support. FUAS will penetrate defense-in-depth environments by employing Air Launched Effects (ALE) with teaming and swarming effects to detect, decoy, jam RADAR and communications, conduct cyber-attack, spoof and jam GPS, and kinetic engagement.

Justification: FY 2020 FTUAS RDTE Base funding of \$40.745 million (M) will be utilized for the following: 1) \$18.079M to support the USARPAC Multi-Domain Task Force (MDTF) Demonstration, 2) \$20.000M to support ALE Early Systems Analysis, 3) \$2.666M provides Systems Engineering and Program Management (SEPM) to support of FTUAS and ALE development and preparation of pre-milestone decision documentation.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Arr	ny			Date:	March 2019				
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	: Advanced	<b>R-1 Program Element (Number/Name)</b> PE 0604113A <i>I Future Tactical Unmanned Aircraft System (FTUAS)</i>							
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total				
Previous President's Budget	0.000	12.393	5.645	-	5.645				
Current President's Budget	0.000	12.393	40.745	-	40.745				
Total Adjustments	0.000	0.000	35.100	-	35.100				
<ul> <li>Congressional General Reductions</li> </ul>	-	-							
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-							
<ul> <li>Congressional Rescissions</li> </ul>	-	-							
<ul> <li>Congressional Adds</li> </ul>	-	-							
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-							
Reprogrammings	-	-							
SBIR/STTR Transfer	-	-							
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	35.100	-	35.100				

### Change Summary Explanation

Increase of \$35.100 million in FY2020 will provide required support for the Multi-Domain Task Force (MDTF) demonstration and ALE Early Systems Analysis.

Exhibit R-2A, RDT&E Project Ju		Date: March 2019											
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)ProjecPE 0604113A / Future Tactical UnmannedEX8 / IAircraft System (FTUAS)System					(Number/Name) uture Tactical Unmanned Aircraft (FTUAS)		
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	
EX8: Future Tactical Unmanned Aircraft System (FTUAS)	-	0.000	12.393	40.745	-	40.745	20.122	25.281	25.960	28.299	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### A. Mission Description and Budget Item Justification

The Future Unmanned Aircraft System (FUAS) is a critical system in the Multi-Domain Operations (MDO) battle concept that will employ MDO capabilities at all echelons and allow ground based forces to project power from land into other domains to defeat highly capable enemies, secure terrain, and consolidate gains. FUAS encompasses an array of capabilities from platoon soldiers to Division Commanders. The FUAS Initial Capabilities Document (ICD) was approved by the Joint Requirements Oversight Council (JROC) on 12 OCT 2018. The ICD includes requirements for Scalable Control Interface (SCI), Air Launched Effects (ALE), and Purpose-Driven UAS (to include Future Tactical UAS and Advanced UAS).

The Future Unmanned Aircraft System (FUAS) will be comprised of multiple components including the Future Tactical UAS (FTUAS) for the Brigade Combat Team (BCT), the Advanced UAS (AUAS) for the Combat Aviation Brigades (CAB), and Air Launched Effects (ALE). The FTUAS seeks to replace the RQ-7 assets within the Brigade Combat Teams. Key attributes of the FTUAS focus on Rapid Deployability, Expeditionary Maneuver, and Mobility for adaptive and agile operations. FTUAS will consist of an aircraft subsystem that will include the airframe, propulsion, avionics, communications, navigation, and software systems; aircraft-specific ground support equipment including power generation, transportation, or command and control equipment; aircraft software; and required engineering, logistics, and programmatic support. FUAS will penetrate defense-in-depth environments by employing Air Launched Effects (ALE) with teaming and swarming effects to detect, decoy, jam RADAR and communications, conduct cyber-attack, spoof and jam GPS, and kinetic engagement.

Justification: FY 2020 FTUAS Base funding of \$40.745 million (M) will be utilized for the following: 1) \$18.079M to support the USARPAC Multi-Domain Task Force (MDTF) Demonstration, 2) \$20.000M to support ALE Early Systems Analysis, 3) \$2.666M provides Systems Engineering and Program Management (SEPM) to support of FTUAS and ALE development and preparation of pre-milestone decision documentation.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Multi Domain Task Force (MDTF) Demonstration	-	10.800	18.079
<b>Description:</b> Funding for USARPAC Multi-Domain Task Force (MDTF) Demonstration supports UAS aircraft, payload and Multi-Function Electronic Warfare (MFEW) demonstration which will inform FTUAS requirements and Analysis of Alternatives (AoA).			
<b>FY 2019 Plans:</b> Funding for USARPAC Multi-Domain Task Force (MDTF) Experimentation supports UAS aircraft, payload and Multi-Function Electronic Warfare (MFEW) experimentation which will inform FTUAS requirements and Analysis of Alternatives (AoA).			
FY 2020 Plans:			

PE 0604113A: *Future Tactical Unmanned Aircraft System...* Army

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604113A <i>I Future Tactical Unmanned</i> <i>Aircraft System (FTUAS)</i>	<b>Project (Number/Name)</b> EX8 <i>I Future Tactical Unmanned Aircraft</i> <i>System (FTUAS)</i>					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020			
Funding for USARPAC Multi-Domain Task Force (MDTF) Demonst Electronic Warfare (MFEW) demonstration which will inform FTUAS	ration supports UAS aircraft, payload and Multi-Function S requirements and Analysis of Alternatives (AoA).						
FY 2019 to FY 2020 Increase/Decrease Statement: Increase of \$15.100 million in FY2020 will provide required support	for the MDTF demonstration.						
Title: Air Launched Effects (ALE) Early Systems Analysis		-	-	20.000			
<b>Description:</b> ALE Early Systems Analysis in preparation for a Mate and an Analysis of Alternatives (AoA). The PM will conduct market an assessment of how the proposed candidate materiel solution ap effectively address capability gaps, desired operational attributes, a	eriel Development Decision (MDD), and to inform requireme research, early systems engineering analyses and conduct proaches are technically feasible and have the potential to nd associated external dependencies.	ents					
<i>FY 2020 Plans:</i> Funds ALE market research, early systems engineering analyses a approaches.	nd assessment of proposed candidate materiel solution						
FY 2019 to FY 2020 Increase/Decrease Statement: Increase of \$20M in FY2020 funds ALE market research, early sys candidate materiel solution approaches.	ems engineering analyses and assessment of proposed						
Title: System Engineering/Program Management		-	1.593	2.666			
Description: System Engineering and Program Management (SEF	?M)						
<b>FY 2019 Plans:</b> Funding for System Engineering/Program Management (SEPM) to as: MDTF Experimentation, market research, Validated On-line The independent cost estimates and other required milestone document	support FTUAS pre-milestone decision requirements such eat (VOLT) Assessment, Analysis of Alternatives (AoA), ts.						
<b>FY 2020 Plans:</b> Funding for SEPM to support FTUAS pre-milestone decision requir cost estimates and other required milestone documents	ements such as: Analysis of Alternatives (AoA), independe	nt					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Program increasing funds due to upcoming MDD in FY2021.							
	Accomplishments/Planned Programs Subt	otals -	12.393	40.745			

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army					Date: March 2019				
Appropriation/Budget Activity	R-1 P	rogram Eler	nent (Numb	Project (N	lumber/Name)						
2040 / 4	PE 06	04113A I Fu	ture Tactical	EX8 I Fut	ure Tactical Unmanned Aircraft						
	Aircra	ft System (F	TUAS)	TUAS)							
C. Other Program Funding Summa	ary (\$ in Milli	ons <u>)</u>									
			<u>FY 2020</u>	<u>FY 2020</u>	FY 2020					<u>Cost To</u>	
Line Item	<u>FY 2018</u>	FY 2019	Base	000	<u>Total</u>	<u>FY 2021</u>	FY 2022	FY 2023	FY 2024	<u>Complete</u>	Total Cost
<ul> <li>A01310: Tactical Unmanned</li> </ul>	-	-	12.100	-	12.100	1.101	25.345	38.100	55.400	0.000	132.046
Aircraft System (TUAS)											

#### <u>Remarks</u>

FY 2020 base procurement dollars in the amount of \$12.1 million supports the FVL CFT FTUAS demonstration: Specifically, the procurement of 12 attrition air vehicles, New Equipment Training (NET) and PM support.

#### D. Acquisition Strategy

TRADOC Capabilities Manager (TCM) - Future Vertical Lift (FVL) has prepared an Initial Capabilities Document (ICD) that is in JROC staffing. PM TUAS will follow that approval with an MDD in FY 2021 and a subsequent Analysis of Alternatives phase.

The Future Vertical Lift (FVL) Cross Functional Team (CFT) is overseeing a demonstration effort in FY 2019 and FY 2020 that will inform the Future Tactical Unmanned Aircraft System (FTUAS) requirement to develop capability that will ultimately replace the RQ-7B (Shadow Tactical Unmanned Aircraft System) within the Brigade Combat Team (BCT) formation. Demonstration effort will focus on conducting analysis and obtaining field data that will be used to write the Capabilities Development Document that will serve as the formal requirement to replace the RQ-7B within the BCTs. As part of the program development, a Materiel Development Decision will be conducted in FY2021 followed by an Analysis of Alternatives and ultimately a decision that will identify the appropriate entry into the Milestone Decision process.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	019	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Program Element (Number/Name)Project (Number/Name)PE 0604113A / Future Tactical UnmannedEX8 / Future Tactical UnmanAircraft System (FTUAS)System (FTUAS)								anned Air	craft
Management Service	es (\$ in M	illions)		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
Systems Engineering and Program Management (SEPM)	C/TBD	PM TUAS : Redstone Arsenal	-	-		1.593		2.666		-		2.666	Continuing	Continuing	-
Subtotal -				-		1.593		2.666		-		2.666	Continuing	Continuing	N/A
Product Development (\$ in Millions)			FY	2018	FY 2	FY 2019		2020 se	FY 2	2020 CO	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
Air Launched Effects (ALE) Early Systems Analysis	TBD	PM TUAS : Redstone Arsenal	-	-		-		20.000		-		20.000	0.000	20.000	-
		Subtotal	-	-		-		20.000		-		20.000	0.000	20.000	N/A
Support (\$ in Millions	5)			FY	2018	FY 2	019	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
Multi Domain Task Force (MDTF) UAS Demonstration	SS/ Various	Various : Various	-	-		10.800		18.079		-		18.079	12.821	41.700	-
		Subtotal	-	-		10.800		18.079		-		18.079	12.821	41.700	N/A
Prior Years		Prior Years	FY	2018	FY 2	019	FY 2020 Base		FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals -			-		12.393		40.745		-		40.745	Continuing	Continuing	N/A	
<u>Remarks</u>															

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Numl</b> PE 0604113A <i>I Future Tactica</i> Aircraft System (FTUAS)	p <b>er/Name)</b> I Unmanned	<b>Project (Number/Name)</b> EX8 <i>I Future Tactical Unmanned Aircrat</i> <i>System (FTUAS)</i>		
Sch	edule Details				
		Start	E	nd	
Events	Quarter	Year	Quarter	Year	
Multi Domain Task Force Demonstration (MDTF)	1	2019	4	2021	
System Engineering/Program Management (SEPM)	1	2019	4	2024	
FTUAS Demonstration (APA Funded)	2	2020	1	2021	
Analysis of Alternatives (AoA)	4	2020	1	2021	
Materiel Development Decision (MDD)	1	2021	1	2021	
Milestone C	1	2022	1	2022	
LRIP (APA Funded)	2	2022	4	2023	
IOTE	1	2023	2	2023	
FRP Decision	4	2023	4	2023	
FRP (APA Funded)	1	2024	4	2024	

Exhibit R-2, RDT&E Budget Item	n Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					<b>R-1 Program Element (Number/Name)</b> PE 0604114A <i>I Lower Tier Air Missile Defense (LTAMD) Sensor</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2024	Cost To Complete	Total Cost		
Total Program Element	-	57.437	89.248	427.772	-	427.772	376.738	332.322	241.461	87.500	Continuing	Continuing
EX2: Lower Tier Air Missile Defense (LTAMD) Capability	427.772	-	427.772	376.738	332.322	241.461	87.500	Continuing	Continuing			

### Note

LTAMDS is currently scheduled to begin receiving procurement funds in FY 2022.

#### A. Mission Description and Budget Item Justification

Lower Tier Air Missile Defense Sensor (LTAMDS) program will provide the required sensing capabilities, surveillance and fire control in the lower tier portion of the Army Integrated Air and Missile Defense (IAMD) of the ballistic missile defense battlespace. The acquisition program will competitively select the sensor/radar set (RS) to replace the baseline PATRIOT RS (AN/MPQ-65A) due to threat changes and the growing obsolescence and high Operational & Support (O&S) cost of the existing RS. The LTAMDS capability will address critical capability gaps, modernize technology, reduce O&S costs, mitigate obsolescence, and increase reliability and maintainability. The LTAMDS capability will increase sensor/radar performance to maximize the inherent PAC-3 Missile Segment Enhanced (MSE) Interceptor capabilities to engage threats.

FY 2020 base dollars in the amount of \$427.772 million supports acceleration of the Lower Tier Air Missile Defense (LTAMDS) Sensor program. FY 2020 tasks include purchase of prototypes, purchase of test equipment, and supports programmatic and engineering activities needed to select the best technical approach that meets accelerated fielding timelines and facilitates incremental capability enhancements.

<u>FY 2018</u>	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
76.728	120.374	125.772	-	125.772
57.437	89.248	427.772	-	427.772
-19.291	-31.126	302.000	-	302.000
-0.049	-0.111			
-16.900	-31.015			
-	-			
-	-			
-	-			
-	-			
-2.342	-			
-	-	302.000	-	302.000
	FY 2018 76.728 57.437 -19.291 -0.049 -16.900 - - - - - - -2.342 -	FY 2018         FY 2019           76.728         120.374           57.437         89.248           -19.291         -31.126           -0.049         -0.111           -16.900         -31.015           -         -	FY 2018         FY 2019         FY 2020 Base           76.728         120.374         125.772           57.437         89.248         427.772           -19.291         -31.126         302.000           -0.049         -0.111         -           -16.900         -31.015         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         -           -         -         302.000	FY 2018         FY 2019         FY 2020 Base         FY 2020 OCO           76.728         120.374         125.772         -           57.437         89.248         427.772         -           -19.291         -31.126         302.000         -           -0.049         -0.111         -         -           -16.900         -31.015         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         -         -           -         -         302.000         -

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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 I BA 4: Advanced	PE 0604114A I Lower Tier Air Missile Defense (LTAMD) Sensor
Component Development & Prototypes (ACD&P)	

#### **Change Summary Explanation**

FY 2020 funding increase of \$302.000 million to accelerate program's IOC to select the best technical approach that meets accelerated fielding timelines and facilitates incremental capability enhancements in accordance with FY 2018 NDAA requirement to accelerate LTAMDS Initial Operational Capability to not later than December 2023.

FY 2019 funding reduction of \$31.126 million.

FY 2018 funding reduction of \$16.900 million for contract award delay, Congressional rescission \$0.049 million, and \$2.342 million for SBIR/STTR transfer.

Exhibit R-2A, RDT&E Project Ju		Date: March 2019										
Appropriation/Budget Activity 2040 / 4						am Element 4A / Lower .TAMD) Sen	<b>Project (Number/Name)</b> EX2 I Lower Tier Air Missile Defense (LTAMD) Capability					
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
EX2: Lower Tier Air Missile Defense (LTAMD) Capability	-	57.437	89.248	427.772	-	427.772	376.738	332.322	241.461	87.500	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

Starting in FY 2017, funding realigned from PE 0607865A, PATRIOT Product Improvement (Project DV8).

CFT Supported, LTAMDS.

#### A. Mission Description and Budget Item Justification

The Lower Tier Air and Missile Defense Sensor (LTAMDS) satisfies the Warfighter's capability requirements in the Integrated Air and Missile Defense domain. The program provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the PATRIOT Advanced Capability (PAC-3) Missile Segment Enhancement (MSE) interceptor. The Army Requirements Oversight Council (AROC) approved LTAMDS requirements in April 2016.

The Army will competitively select the LTAMDS to service Air and Missile Defense threats using state of the art technology, reduce Operating and Sustainment, mitigate obsolescence, and increase reliability and maintainability.

LTAMDS FY 2020 funding will be utilized for procurement of prototypes, integration of LTAMDS technology into prototypes, further development of system performance specifications, and to initiate contractor verification testing. FY 2020 activities support the FY 2018 NDAA requirement to accelerate LTAMDS Initial Operational Capability to not later than December 2023.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Lower Tier Missile Defense Sensor	57.388	84.981	427.772
<b>Description:</b> Provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the Patriot Advanced Capability (PAC-3) Missile Segment Enhancement (MSE) interceptor.			
<ul> <li>FY 2019 Plans:</li> <li>Coordinate competitive LTAMDS Sense-Off demonstration</li> <li>Conduct LTAMDS Sense-Off demonstration</li> <li>Select single vendor to integrate LTAMDS solution</li> <li>Execute System Requirements Review with selected vendor</li> <li>Award OTA agreement to build and integrate LTAMDS solution for Initial Operational Capability / Urgent Material Release</li> </ul>			

PE 0604114A: *Lower Tier Air Missile Defense (LTAMD)* S... Army UNCLASSIFIED Page 3 of 9

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Exhibit R-2A, RDT&E Project Justif	ication: PB	2020 Army							Date: Ma	arch 2019	
Appropriation/Budget Activity       R-1 Program Element (Number/Name)       Project (Number/Name)         2040 / 4       PE 0604114A / Lower Tier Air Missile       EX2 / Lower Tier Air         Defense (LTAMD) Sensor       (LTAMD) Capability									ame) Missile Defe	nse	
B. Accomplishments/Planned Prog	rams (\$ in N	<u>/lillions)</u>						F	Y 2018	FY 2019	FY 2020
<ul> <li>Identify and purchase long-lead item</li> </ul>	IS										
FY 2020 Plans: - Initiate LTAMDS prototype manufacture and integration activities - Conduct knowledge point and functional reviews of vendor prototypes - Initiate Contractor Verification Testing											
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 to FY 2020 funding increase of \$342.791 million funds activities to achieve FY2018 NDAA requirement to accelerate LTAMDS Initial Operational Capability to not later than December 2023.											
Title:       FY18 Congressional Rescission       0.049								-	-		
Title: FY 2019 SBIR/STTR TRANSFE	ER								-	4.267	-
Description: FY 2019 SBIR/STTR TI	RANSFER										
<b>FY 2019 Plans:</b> FY 2019 SBIR/STTR TRANSFER											
FY 2019 to FY 2020 Increase/Decre FY 2019 SBIR/STTR TRANSFER	ase Statem	ent:									
				Accon	nplishments	s/Planned P	rograms Su	btotals	57.437	89.248	427.772
C. Other Program Funding Summa	ry (\$ in Milli	ons)									
	• •		FY 2020	FY 2020	FY 2020					<u>Cost To</u>	
Line Item	FY 2018	FY 2019	Base	000	<u>Total</u>	FY 2021	FY 2022	FY 2023	FY 2024	Complete	Total Cost
• DV8: Patriot Product Improvement • C12101: Lower Tier Air and Missile Defense Sensor	//.391 -	/5.288 -	96.430 0.000	-	96.430 0.000	102.095 -	81.545 36.000	97.510 66.300	96.395 195.000	0.000 Continuing	626.654 Continuing
<u>Remarks</u>											

### D. Acquisition Strategy

To enhance the Warfighter's lethality, survivability, and combat effectiveness, the Army is using full and open competitive processes within Other Transactions Authority (OTA) agreements for rapid prototyping, qualification, and initial fielding efforts to meet the intent of FY 2018 NDAA Congressional language. Middle Tier Acquisition approach (Section 804, FY 2016 NDAA) authorities will be leveraged in conjunction with the OTA to facilitate and accelerate the LTAMDS program. OTA promotes non-traditional defense contractor involvement, cost sharing arrangements, and accelerates schedules. A FEDBIZOPS announcement and subsequent LTAMDS

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604114A I Lower Tier Air Missile	EX2 / Lowe	er Tier Air Missile Defense
	Defense (LTAMD) Sensor	(LTAMD) C	Capability

Industry Day generated government-contractor dialogue, provided contractor cost and schedule estimates, verified industry technology and manufacturing readiness, and informed stakeholders on design approaches and potential materiel solutions. This approach also provides senior leader decision points along the way to make informed decisions based on industry ability to meet threshold requirements.

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	020 Arm	y								Date:	March 20	019	
Appropriation/Budge 2040 / 4	et Activity	/				R-1 Pro PE 060 Defens	ogram Ele 94114A / L e (LTAMD	ement (N ower Tie ) Sensor	umber/Na r Air Missi	ame) ile	Project EX2 / L (LTAME	: <b>(Numbe</b> ower Tier )) Capabil	<b>r/Name)</b> Air Missii lity	e Defens	е
Management Service	es (\$ in M	lillions)		FY	2018	FY	FY 2020 FY FY 2019 Base			FY 2 O(	FY 2020 OCO Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management	MIPR	Various : Redstone Arsenal, AL	6.285	3.515	Oct 2017	4.515	Oct 2018	2.350	Oct 2019	-		2.350	Continuing	Continuing	-
Systems Engineering and Technical Assistance (SETA)	Various	Systems Engineering and Technical Assistance : Huntsville, AL	3.000	5.000	Oct 2017	5.000	Oct 2018	6.000	Oct 2019	-		6.000	Continuing	Continuing	-
		Subtotal	9.285	8.515		9.515		8.350		-		8.350	Continuing	Continuing	N/A
Product Developmer	Product Development (\$ in Millions)		ſ	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
Concept Definition	C/CPFF	Raytheon, Lockheed Martin, Technovative Applications, Northrop Grumman : Andover MA; Liverpool NY; Brea CA; Linthicum MD	24.495	40.322	Mar 2018	10.000	Jan 2019	-		-		-	Continuing	Continuing	-
Product Development Support	C/TBD	TBD : TBD	-	-		3.000	Oct 2018	4.000	Oct 2019	-		4.000	Continuing	Continuing	-
Rapid Prototyping	TBD	TBD : TBD	-	-		51.366	Sep 2019	369.172	Jan 2020	-		369.172	Continuing	Continuing	-
SBIR/STTR	TBD	TBD : TBD	-	-		4.267		-		-		-	0.000	4.267	-
		Subtotal	24.495	40.322		68.633		373.172		-		373.172	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 O	2020 CO	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	TBD	TBD : TBD	-	-		-		2.250		-		2.250	Continuing	Continuing	-
		Subtotal	-	-		-		2.250		-		2.250	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E I	Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army								Date:	March 20	)19				
Appropriation/Budge 2040 / 4	ppropriation/Budget Activity D40 / 4					R-1 Pro PE 060 Defense	ogram Ele 4114A / L e (LTAMD	e <b>ment (N</b> ower Tiel ) Sensor	<b>umber/N</b> a r Air Missi	ame) ile	Project EX2 / Lo (LTAMD	<b>(Number</b> ower Tier ) Capabil	r/ <b>Name)</b> Air Missil ity	e Defense	e
Fest and Evaluation (\$ in Millions)				2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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 Planning/Targets/ Interceptors/U.S. Other Government Agencies (OGAs)	MIPR	RDEC, SED, WSMR- T&E Support : Huntsville, AL; White Sands, NM	-	8.600	Jan 2018	11.100	Jan 2019	44.000	Jan 2020	-		44.000	Continuing	Continuing	-
		Subtotal	-	8.600		11.100		44.000		-		44.000	Continuing	Continuing	N/A
Prior Years FY 2018					2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	33.780	57.437		89.248		427.772		-		427.772	Continuing	Continuing	N/A

**Remarks** 



xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019		
ppropriation/Budget Activity )40 / 4	<b>R-1 Program</b> PE 0604114A <i>Defense (LTA)</i>	<b>Element (Numbe</b> I Lower Tier Air M MD) Sensor	er/Name) ⁄lissile	<b>Project (Number/Nai</b> EX2 / Lower Tier Air I (LTAMD) Capability	ne) Iissile Defense nd Year 2019 2019		
	Schedule Detail	S					
		S	tart	E	ind		
Events		Quarter	Year	Quarter	Year		
Concept Definition		4	2017	4	2019		
Select Single Vendor		4	2019	4	2019		
Contractor Verification Testing		1	2020	3	2021		
Qualification Testing		4	2021	1	2023		
Developmental Test & Evaluation		4	2021	2	2022		
Initial Operational Capability (Urgent Material Release)		4	2022	4	2022		
Limited User Test/Early User Test (LUT/EUT)		3	2022	4	2022		
Production Long Lead Decision		2	2023	2	2023		
Production Contract Award		4	2023	4	2023		
Production		4	2024	4	2027		

Exhibit R-2, RDT&E Budget Item						Date: Marc	ch 2019					
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACE	ation, Army 0&P)	I BA 4: Adva	anced	<b>R-1 Progra</b> PE 060411	am Elemen 5A / Techno	t (Number/ blogy Matur	Name) ation Initiati	ves			
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	-	145.618	95.229	196.676	-	196.676	156.986	272.762	314.992	254.062	0.000	1,436.325
AX3: Technology Maturation Initiatives*	-	0.000	0.000	0.000	-	0.000	10.000	138.244	296.992	250.456	0.000	695.692
AX4: Computational Prototyping Environment (CPE)	-	0.000	0.000	3.966	-	3.966	5.426	6.918	0.000	0.000	0.000	16.310
AX5: Next Generation Close Combat Missile	-	0.000	0.000	9.000	-	9.000	5.000	0.000	0.000	0.000	0.000	14.000
AX6: Active Protection Systems Integration	-	0.000	0.000	9.400	-	9.400	10.500	0.000	0.000	0.000	0.000	19.900
AX7: Multi-Mission High Energy Laser (MMHEL) Sys Demo	-	0.000	0.000	18.650	-	18.650	8.150	0.000	0.000	0.000	0.000	26.800
AX8: Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)	-	0.000	0.000	27.200	-	27.200	4.000	0.000	0.000	0.000	0.000	31.200
AX9: Adv Mobility Experimental Prototype Adv Tech	-	0.000	0.000	10.500	-	10.500	15.800	10.500	7.200	3.606	0.000	47.606
AY1: MUM-T Platform Enabler	-	0.000	0.000	7.200	-	7.200	4.500	4.200	0.000	0.000	0.000	15.900
AY2: Army Operational Fires	-	0.000	0.000	18.900	-	18.900	28.400	41.900	10.800	0.000	0.000	100.000
AY3: Strategic Long Range Cannon	-	0.000	0.000	91.860	-	91.860	65.210	71.000	0.000	0.000	0.000	228.070
DS3: Technology Maturation Initiatives	-	145.618	95.229	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	240.847

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

### <u>Note</u>

The following Projects within this Program Element (PE) are new starts:

\* AX8 (Adv Leth and Accuracy Sys for Med Calber)

\* AX9 (Adv Mobility Experimental Prototype Adv Tech)

\* AY1 (MUM-T Platform Enabler)

\* AY2 (Army Operational Fires)

\* AY3 (Strategic Long Range Cannon)

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 I BA 4: Advanced	PE 0604115A I Technology Maturation Initiatives	
Component Development & Prototypes (ACD&P)		

#### A. Mission Description and Budget Item Justification

This Program Element (PE) funds experimental prototyping and demonstration of selected technology enabled capabilities to support advanced ground systems, aviation systems, command, control, communications & reconnaissance systems and equipment, precision weapons, High Energy Laser (HEL) systems, and Soldier equipment. Funding facilitates maturation and demonstration of advanced technologies and systems in relevant environments and tactical/operational scenarios as well as the maturation and demonstration of a robust Virtual Proving Ground (VPG) for rapid, accurate, and computational prototyping of major Army platforms. Benefits include maturing technologies to a goal of Technology Readiness Level (TRL) 7, informing emerging requirements for future programs of record, and reducing technology risk in order to transition of leap-ahead capabilities into acquisition programs. Technology Maturation Initiative efforts mature and integrate advanced component technologies into system and sub-system technology demonstrators and experimental prototypes, which are then validated and transitioned to priority Army experimentation efforts and programs of record. Computational Prototyping Environment (CPE) efforts include demonstration of physics-based, computational modeling integrated with new advances in deep learning to explore design tradespaces and understand defeat strategies for prototype platforms. This PE provides the Army with an improved mechanism for enabling greater competition in the latter stages of technology maturation and establishes a closer alignment between Science and Technology (S&T) efforts and acquisition programs.

The cited work is consistent with the Under Secretary of Defense, Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this PE is performed by the Army Futures Command (AFC), the Engineer Research Development Center (ERDC), and U.S. Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT).

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	115.221	95.347	99.584	-	99.584
Current President's Budget	145.618	95.229	196.676	-	196.676
Total Adjustments	30.397	-0.118	97.092	-	97.092
<ul> <li>Congressional General Reductions</li> </ul>	-0.093	-0.118			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	35.000	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-4.510	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	97.092	-	97.092

#### **Change Summary Explanation**

FY 2018 Congressional Add to Project DS3, Technology Maturation Initiatives for Multi-Mission High-Energy Laser Research (\$35.000 million). FY 2020 increase due to new starts for Projects AX8, AX9, AY1, AY2, and AY3 to support Army Modernization Priorities.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060411 <i>Initiatives</i>	am Elemen 5A / Techno	<b>t (Number/</b> ology Matur	Name) ation	<b>Project (Number/Name)</b> AX4 / Computational Prototyping Environment (CPE)			
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
AX4: Computational Prototyping Environment (CPE)	-	0.000	0.000	3.966	-	3.966	5.426	6.918	0.000	0.000	0.000	16.310
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

In Fiscal Year (FY) 2019 this effort was funded in Program Element (PE) 0604115A (Technology Maturation Initiatives) / Project DS3 (Technology Maturation Initiatives).

#### A. Mission Description and Budget Item Justification

This Project funds the development and demonstration of a robust Virtual Proving Ground (VPG) for rapid, accurate, and computational prototyping of major Army platforms. Computation Prototyping Environment (CPE) provides the ability to validate platform design variations in a VPG, in a way that identifies potential performance and design failures, and assesses mitigating solutions and trades prior to cost-bearing production and manufacturing. Activities under this Project include the maturation and integration of physics-based, computational modeling with new advances in deep learning in order to provide the ability to virtually explore design tradespaces and understand possible defeat strategies. This Project leverages recent Department of Defense (DOD) advancements in large data tradespace analytics, high-fidelity physics-based modeling, deep learning techniques, high-performance computing capabilities, and inverse modeling approaches to enable rapid computational prototyping to inform emerging acquisition programs.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy.

Funding has been realigned to reflect the FY 2020 financial restructure and Army Modernization Priorities.

Work in this Project is performed by the Engineer Research and Development Center (ERDC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Computational Prototyping Environment (CPE)	-	-	3.966
<b>Description:</b> Computational Prototyping Environment (CPE) matures and integrates physics-based, computational modeling with new advances in deep learning in order to demonstrate a robust Virtual Proving Ground (VPG) that provides the ability to virtually explore design tradespaces and understand possible defeat strategies for prototype Army platforms. Demonstrates rapid computational prototyping to inform emerging acquisition programs through large data tradespace analytics, high-fidelity physics-based modeling, deep learning techniques, high-performance computing capabilities, and inverse modeling approaches. CPE capabilities will be piloted to support and inform Army Future Vertical Lift platform designs.			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / Technology Maturation Initiatives	Project AX4 / C Enviro	t (Number/I Computation nment (CPE	g	
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2018	FY 2019	FY 2020
Will integrate physical test data from Future Vertical Lift platforms into leverage DOD high-performance computing to begin integration of artic Develop framework for incorporating environmental and mission relever for physical test data, computational models, and operation environmental	prototype VPG to validate computational models. Will ificial intelligence and machine learning algorithms into ant data to virtual proving ground. Develop data reposents.	o VPG. itory			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> In FY 2019, funding for this effort resides in PE/Proj 0604115A/DS3. F 2020 financial restructure and Army Modernization Priorities.	Funding has been realigned in FY 2020 to reflect the F	Y			
	Accomplishments/Planned Programs Sul	ototals	-	-	3.966
Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E F	nibit R-3, RDT&E Project Cost Analysis: PB 2020 Army													19	
Appropriation/Budge 2040 / 4	propriation/Budget Activity 40 / 4							ement (N Technolog	umber/N y Maturai	<b>ame)</b> tion	Project AX4 / Co Environi	(Number omputation ment (CP	/ <b>Name)</b> nal Protoi E)	typing	
Support (\$ in Millions)					2018	FY 2	019	FY 2 Ba	2020 se	FY 2 OC	020 CO	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	Award Cost Corr Date Cost Corr		Total Cost	Target Value of Contract
Computational Prototyping Environment	C/Various	ERDC : Vicksburg, MS	-	-		-		3.966		-		3.966	12.500	16.466	-
		Subtotal	-	-		-		3.966		-		3.966	12.500	16.466	N/A
			Prior Years	FY	2018	FY 2	019	FY 2 Ba	2020 se	FY 2 OC	020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals -							3.966		-		3.966	12.500	16.466	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 /																Dat	:e: N	larch	י 20 ו	19								
Appropriation/Budget Activity 2040 / 4								<b>R-1 I</b> PE 0 Initia	Prog 604 tives	gram 1154 s	n Ele A / <i>T</i>	emer Techn	nt (N nolog	umt y M	ber/N atura	lame ation	<del>)</del> )	Pr AX En	ojec (4 / C iviror	t (N Com nme	umb puta nt (C	ate: March 2019 nber/Name) Itational Prototyping (CPE) FY 2023 FY 20 2 3 4 1 2 3						
		FY	2018	3		FY	201	9		FY	202	20		FY	202	1		FY	2022			FY	2023	3		FY	2024	4
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Computational Prototyping Environment																												

				Date: March	n 2019
ropriation/Budget Activity ) / 4	<b>R-1 Progra</b> PE 0604115 <i>Initiatives</i>	m Element (Number SA / Technology Matu	/Name) ration	Project (Number/Name AX4 / Computational Pr Environment (CPE)	e) rototyping
	Schedule Deta	ails			
		Sta	rt	En	d
Events		Quarter	Year	Quarter	Year
Computational Prototyping Environment		3	2018	4	2022

Exhibit R-2A, RDT&E Project Ju	bit R-2A, RDT&E Project Justification: PB 2020 Army												
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060411 <i>Initiatives</i>	am Elemen 5A / Techno	t (Number/ blogy Matur	Name) ation	<b>Project (N</b> AX5 / Next Missile	umber/Nan Generatior	ne) a Close Corr	nbat	
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	
AX5: Next Generation Close Combat Missile	-	0.000	0.000	9.000	-	9.000	5.000	0.000	0.000	0.000	0.000	14.000	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### Note

In Fiscal Year (FY) 2019, this effort was previously funded in Program Element (PE) 0604115A (Technology Maturation Initiatives) / Project DS3 (Technology Maturation Initiatives).

### A. Mission Description and Budget Item Justification

This Project demonstrates a prototype close combat missile with a multi-pulse, boost-sustain flight propulsion system providing extended range and decreased time of flight. Activities mature proof-of-principle hardware into an integrated tactical-representative design, and demonstrate a prototype missile with lethality overmatch of emerging threats. Early prototyping work concludes in FY 2021 to mature technology and demonstrate needed Warfighter capability in advance of acquisition program of record.

Work in this PE complements PE 0603462A, Next Generation Close Combat Vehicle Advanced Technology.

Funding has been realigned to reflect the FY 2020 financial restructure and Army Modernization Priorities.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the U.S. Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Next Generation Close Combat Missile	-	-	9.000
<b>Description:</b> This effort demonstrates a prototype close combat missile with a multi-pulse, boost-sustain flight propulsion system providing extended range and decreased time of flight.			
<i>FY 2020 Plans:</i> Will optimize, integrate, and conduct experimental testing of the prototype propulsion subsystem component hardware (Electro-Mechanical Control Actuation System, Airframe, Launch Motor, and a Boost-Sustain Propulsion Section). Will conduct wind tunnel testing to verify predicted aerodynamic and control surface performance. Will exercise subsystem performance models in an integrated flight simulation and mature flight software.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / Technology Maturation Initiatives	<b>Proje</b> AX5 / Missil	<b>ct (Number/I</b> Next Genera le	Name) tion Close Co	ombat
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
In FY 2019, funding for this effort resides in PE/Proj 0604115A/DS3.					
	Accomplishments/Planned Programs Sub	ototals	-	-	9.000
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E F	nibit R-3, RDT&E Project Cost Analysis: PB 2020 Army													19	
Appropriation/Budge 2040 / 4	t Activity					R-1 Pro PE 0604 Initiative	9 <b>gram El</b> 4115A / 7 es	ement (N Fechnolog	umber/N y Maturai	<b>ame)</b> tion	<b>Project</b> AX5 / No Missile	(Number ext Gener	r/ <b>Name)</b> ration Clos	se Comb	at
Support (\$ in Millions	s)			FY	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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
Next Generation Close Combat Missile	Various	AMRDEC : Huntsville, AL	-	-		-		9.000		-		9.000	5.000	14.000	-
		Subtotal	-	-		-		9.000		-		9.000	5.000	14.000	N/A
			Prior Years	FY	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals -					0.000		9.000		-		9.000	5.000	14.000	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020																	Da	te: N	/larc	h 20	19							
Appropriation/Budget Activity 2040 / 4								<b>R-1 I</b> PE 0 <i>Initia</i>	Prog 604 htives	<b>gran</b> 115/ s	n Ele A / 7	emer Fechri	nt (N nolog	uml y M	ber/l atura	Name Nation	e)	P A M	<b>roje</b> X5 / lissile	ct (N Nex e	lum t Ge	ate: March 2019 Iber/Name) eneration Close Combat FY 2023 FY 202 2 3 4 1 2 3					at	
EventNeme		FY	′ 201	8		FY	201	19		FY	202	20		FY	202	21		FY	202	2		FY	202	3		FY	202	4
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Next Generation Close Combat Missile																												
													1				1				1				<u> </u>			

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army Date: March 2019												
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (I</b> PE 0604115A / Technolo Initiatives	Number/Name) gy Maturation	Project (Number/Nam AX5 / Next Generation Missile	<b>e)</b> Close Combat								
	Schedule Details											
		Start	Er	ıd								
Events	Quart	ter Year	Quarter	Year								
Next Generation Close Combat Missile	1	2019	4	2021								

Exhibit R-2A, RDT&E Project Ju	bit R-2A, RDT&E Project Justification: PB 2020 Army														
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progr</b> a PE 060411 <i>Initiatives</i>	am Element 15A / Techno	t <b>(Number/</b> blogy Matur	Name) ation	Project (N AX6 / Activ	ject (Number/Name) 6 I Active Protection Systems Integrati					
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			
AX6: Active Protection Systems Integration	-	0.000	0.000	9.400	-	9.400	10.500	0.000	0.000	0.000	0.000	19.900			
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-					

#### Note

In Fiscal Year (FY) 2019, this effort was funded in Program Element (PE) 0604115A (Technology Maturation Initiatives) / Project DS3 (Technology Maturation Initiatives).

#### A. Mission Description and Budget Item Justification

This Project matures, integrates, and demonstrates protection and survivability technologies as part of active protection systems (APS) prototyping for the Army's combat fleet of vehicles. Activities integrate complimentary survivability technologies to enable layers of enhanced protection capability, providing greater survivability against current and emerging advanced threats. This Project demonstrates a suite of technologies on a fielded combat vehicle platform using an APS common architecture, and defines component interface standards and specifications that will enable adaptive APS solutions. Activities support the Army's APS strategy to maintain or reduce vehicle weight by reducing reliance on armor with other means such as sensing, warning, hostile fire detection, and active countermeasures.

Work in this Project is coordinated with PE 0603462A (Next Generation Combat Vehicle Advanced Technology) and transitions to PE 0604852A (Suite of Vehicle Protection Systems - EMD).

Funding has been realigned to reflect the FY 2020 financial restructure and Army Modernization Priorities.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work is performed by the U.S. Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Agile Layered Protection: APS Integration Advanced Technology Demonstrator	-	-	9.400
<b>Description:</b> Activities integrate and demonstrate mature APS technologies layered through a common architecture on an Army ground combat vehicle platform, addressing technical and integration challenges for a system designed to address both current and emerging advanced threats. Selects and integrates mature component technologies that are best suited to optimize added capability for the ATD platform. Demonstrates a suite of APS technologies and effects that optimize performance levels for survivability and protection through advanced threat detection, multiple threat defeat systems, and improved situational awareness. Work is coordinated with PE 0602622A, 0603004A, 0602705A, 0602712A, 0603710A, 0602601A, 0603270A, 0603313A, 0603005A, 0603462A.			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / Technology Maturation Initiatives	Project AX6 / A	t (Number/N Active Protec	Name) ation Systems	s Integration
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
<b>FY 2020 Plans:</b> Will continue to integrate selected APS technologies onto the combat vehicle p APS system function on the demonstrator, and test and evaluate the platform v does not introduce unintended degraded performance to the vehicle?s mission vehicle Product Manager?s acquisition planning for the APS protection suite. V approach and select additional (mature) APS component technologies for integ options for protection and survivability for the vehicle platform. Will design and technologies.	elatform demonstrator. Will validate the integra vehicle to ensure the added suite of technolog . Upon completion of testing, results will infor Vill continue the vehicle protection layering gration, offering incremental improvement begin integration of additional layered protect	ated gies m tion			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> In FY 2019, funding for this effort resides in PE/Project 0604115A/DS3.					
	Accomplishments/Planned Programs Su	btotals	-	-	9.400
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E P	Project Co	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604115A / Technology Maturation InitiativesProject (Number/Name) AX6 / Active Protection Systems Integration									egration	
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	:020 se	FY 2	2020 CO	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
Engineer Integration of APS Layered Protection	C/Various	Various : Various	-	-		-		6.400		-		6.400	0.000	6.400	-
Validation of APS Layered Protection	Various	Various : Various	-	-		-		2.000		-		2.000	0.000	2.000	-
Integration of added APS Layered Protection	C/Various	Various : Various	-	-		-		1.000		-		1.000	0.000	1.000	-
		Subtotal	-	-		-		9.400		-		9.400	0.000	9.400	N/A
			Prior Years	FY	2018	FY 2	2019	FY 2 Ba	:020 se	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		9.400		-		9.400	0.000	9.400	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army																					D	ate	: Ma	arch	201	19			
Appropriation/Budget Activity 2040 / 4							R-1 Program Element (Number/Name)Project (Number/Name)PE 0604115A / Technology MaturationAX6 / Active Protection Systems IntegrationInitiativesInitiatives								egrat	tion													
FY 2018						FY	201	19		FY	202	20	FY 2021				FY 2022				FY 2023				FY 2024		1		
Event Name			3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	6 4	1		2	3	4	1	2	3	4
Integration of APS Layered Protection Technologies (0604115A	DS	3 in F	Y 2019)	)																									
Validation of Integrated Layered Protection Technologies																													
Integration of Added APS Layered Protection Technologies																													
Validation of Added APS Layered Protection Technologies																													

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A <i>I Technology Maturation</i> <i>Initiatives</i>	Project (N AX6 / Activ	umber/Name) ve Protection Systems Integration

# Schedule Details

	St	art	E	nd
Events	Quarter	Year	Quarter	Year
Integration of APS Layered Protection Technologies (0604115A, DS3 in FY 2019)	1	2019	3	2020
Validation of Integrated Layered Protection Technologies	3	2020	4	2020
Integration of Added APS Layered Protection Technologies	3	2020	3	2021
Validation of Added APS Layered Protection Technologies	3	2021	4	2021

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 Progra</b> PE 060411 <i>Initiatives</i>	am Elemen 5A / Techno	t (Number/ blogy Matur	<b>Jumber/Name)</b> ti-Mission High Energy Laser Sys Demo					
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
AX7: Multi-Mission High Energy Laser (MMHEL) Sys Demo	-	0.000	0.000	18.650	-	18.650	8.150	0.000	0.000	0.000	0.000	26.800
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### <u>Note</u>

In Fiscal Year (FY) 2019, this effort was funded in Program Element (PE) 0604115A (Technology Maturation Initiatives) / Project DS3 (Technology Maturation Initiatives).

#### A. Mission Description and Budget Item Justification

This Project matures and demonstrates an integrated a 50 kilowatt (kW)-class laser weapon system into a Stryker platform, providing a system-level, High Energy Laser (HEL) experimental prototype for demonstration in realistic operating environments. These demonstrations will inform requirements, decrease risk for future Army HEL acquisition programs, and support the future development of warfighter Tactics/Techniques/Procedures and Concept of Operations. HEL weapon systems are expected to complement conventional offensive and defensive weapons at a lower cost-per-shot than current systems and without the need to stockpile ordnance. A 50 kW-class laser weapon system has the potential to engage and defeat rockets, artillery, mortars (RAM); unmanned aerial vehicles (UAVs); sensors; and optics for maneuvering Brigade Combat Teams (BCTs). Demonstrations will also inform potential future capability to defeat both fixed- and rotary-wing manned aircraft. Leveraging Government investments and Industry technology advancements, will review and select existing HEL subsystem designs for integration into a Stryker combat vehicle; will conduct integration and demonstration of a system-level HEL experimental prototype; and will provide assessment of technical performance in an operational environment.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the United States Army Space and Missile Defense Command/Army Forces Strategic Command (SMDC/ARSTRAT).

Funding has been realigned to reflect the FY 2020 financial restructure and to support Army Modernization Priorities in support of the National Defense Strategy.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Multi-Mission High Energy Laser (MMHEL) Integration and Demonstration	-	-	18.650
<b>Description:</b> This effort matures, integrates and demonstrates HEL technologies on Army Stryker to inform Maneuver-Short Range Air Defense (M-SHORAD) requirements and reduce risk for M-SHORAD. The goal is to protect maneuvering forces from RAM and UAS threats. Knowledge gained from demonstration will be transitioned to PEO Missiles and Space to inform the future objective M-SHORAD Program of Record following the FY21 demonstration.			
FY 2020 Plans: Will complete procurement and integration of system bardware: will complete evaluation of subsystems against performance			
parameters; will continue integrating initial firing doctrine as well as Battle Management, Communications, Command, Control,			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: I	March 2019												
Appropriation/Budget Activity 2040 / 4	ation/Budget Activity       R-1 Program Element (Number/Name)       Program Element (Number/Name)         PE 0604115A / Technology Maturation       AX         Initiatives       (Maturation)														
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020											
Computer, and Intelligence software; will begin planning technology readiness demonstration; and begin the system level test/fix/test process of MMHEL.	level 7 demonstration, procure targets for the														
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> This effort is realigned from PE/Project 0604115A/DS3 in FY 2020.															
	Accomplishments/Planned Programs Subto	otals -	-	18.650											
N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A															
Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
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Appropriation/Budge 2040 / 4		R-1 Pro PE 060 Initiative	o <b>gram Ele</b> 4115A / 7 es	ement (N Fechnolog	umber/N ay Matura	<b>ame)</b> tion	<b>Project (Number/Name)</b> AX7 I Multi-Mission High Energy (MMHEL) Sys Demo				ser				
Product Developmen	FY 2018 FY 2			FY 2 Ba	Y 2020 F Base		2020 CO	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 Cos		Cost To Complete	Total Cost	Target Value of Contract
Multi-Mission High Energy Laser (MMHEL) Integration and Demonstration	C/Various	SMDTC : Huntsville, AL	-	-		-		18.650		-		18.650	8.150	26.800	-
		Subtotal	-	-		-		18.650		-		18.650	8.150	26.800	N/A
	Prior Years	FY	FY 2018 FY 2019 Base FY 2019					FY : Of	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
		0.000 18.650						18.650	8.150	26.800	N/A				

**Remarks** 

Chibit R-4, RDT&E Schedule Profile: PB 2020 Army     Date: March 2019																															
Appropriation/Budget Activity 2040 / 4								R-1 Program Element (Number/Name)Project (IPE 0604115A / Technology MaturationAX7 / MuInitiatives(MMHEL)										t <b>(N</b> Aulti EL) (	<b>(Number/Name)</b> ulti-Mission High Energy Laser .) Sys Demo												
E	Y 20	( 2019 FY 2020 FY 20					202	1		F	Y 2	022			FY	20	23		F	Y 2	2024	4									
Event Name	1	2	3 4	1	2	2 :	3 4	1		2	3	4	1	:	2	3	4	1	2		3	4	1	2	3	4	1	1	2	3	4
Multi-Mission High Energy Laser (MMHEL) – System-Level Des	ign (l	PE 06	0	j																											
MMHEL – Subsystem Design Refinement, Assembly, and Deliv	ery (I	PE 06	04115.																												
MMHEL – Firing Doctrine and Experimental Prototype System S	oftw	are (F	PE 060411	5.																											
MMHEL – Experimental Prototype System Integration and Chec	kout	(PE 0	604115A, F	Pro																											
MMEHL – Experimental Prototype System Demonstration and A	sses	s																													

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A <i>I Technology Maturation</i> <i>Initiatives</i>	Project (N AX7 / Multi (MMHEL) S	<b>umber/Name)</b> i-Mission High Energy Laser Sys Demo

# Schedule Details

	St	art	E	nd
Events	Quarter	Year	Quarter	Year
Multi-Mission High Energy Laser (MMHEL) ? System-Level Design (PE 0604115A, Proj	3	2018	4	2018
MMHEL ? Subsystem Design Refinement, Assembly, and Delivery (PE 0604115A, Projec	4	2018	4	2019
MMHEL ? Firing Doctrine and Experimental Prototype System Software (PE 0604115A	1	2019	3	2021
MMHEL ? Experimental Prototype System Integration and Checkout (PE 0604115A, Pro	2	2019	4	2020
MMEHL ? Experimental Prototype System Demonstration and Assess	4	2020	4	2021

Exhibit R-2A, RDT&E Project Ju	stification:	PB 2020 A	rmy							Date: Marc	h 2019			
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060411 <i>Initiatives</i>	am Elemen 5A / Techno	t (Number/ blogy Matur	Name) ation	<b>Project (N</b> AX8 / Adv Calber (AL	oject (Number/Name) <8 / Adv Leth and Accuracy Sys for M alber (ALAS-MC)				
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		
AX8: Adv Leth and Accuracy Sys for Med Calber (ALAS-MC)	-	0.000	0.000	27.200	-	27.200	4.000	0.000	0.000	0.000	0.000	31.200		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

#### <u>Note</u>

This Project is a new start in FY 2020.

### A. Mission Description and Budget Item Justification

This Project matures and integrates next-generation 50mm weapon system technologies transitioned from under the Advanced Lethality and Accuracy System for Medium Caliber (ALAS-MC) advanced technology development effort into a vehicle-agnostic combat turret to inform requirements for the Next Generation Combat Vehicle (NGCV). This Project integrates and assesses critical ALAS-MC 50mm technology components for on-the-move engagement of moving personnel and materiel targets, bringing the subsystem to Technology Readiness Level (TRL) 7. Under Advanced Targeting and Lethality Automated System (ATLAS), this Project matures and integrates advanced Artificial Intelligence/Machine Learning (AI/ML) algorithms to enable aided target detection/recognition capability for NGCV using next generation, multi-spectral electro-optical and infrared (EO/IR) targeting sensors. Al/ML algorithms are integrated with real-time intelligent fire control and mission planning interfaces to demonstrate automated turret capabilities, and provide overmatch via reduced target acquisition and engagement timelines.

Work in this Project is related to and fully integrated with the efforts funded in PE 0603462A, Project BF5, Advanced Lethality and Accuracy System for Med Cal; and PE 0603462A, Project BG1, Sensors for Autonomous Operations and Survivability Advanced Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the U.S. Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Advanced Lethality and Accuracy System for Med Cal (ALAS-MC)	-	-	5.000
<b>Description:</b> This effort matures and integrates the next generation 50mm weapon system technologies transitioned from the Advanced Lethality and Accuracy System for Medium Caliber (ALAS-MC) advanced technology development effort into vehicle-agnostic combat turret to inform requirements for the Next Generation Combat Vehicle.			
<b>FY 2020 Plans:</b> Will mature next generation 50mm armament and fire control systems to TRL 7 by integrating and assessing 50mm component technologies for on-the-move engagement of moving personnel and materiel targets.			
FT 2019 to FT 2020 increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>Project</b> AX8 / A Calber (	(Number/I dv Leth and ALAS-MC)	Name) d Accuracy Sy	rs for Med	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
This effort is a new start in FY 2020.					
<i>Title:</i> Advanced Targeting and Lethality Automated System (ATLAS)			-	-	22.200
<b>Description:</b> The Advanced Targeting and Lethality Automated System (ATLA novel algorithms and sensor enhancements in a Next Generation Combat Veh integrates autonomous, wide-area search sensors and gimballed targeting sen recognition, and identification of threats for significantly decreased time to engagintelligent fire control system to demonstrate an end-to-end engagement system and soldier touch-points with robotic turret concepts.	AS) effort matures, integrates, and demonstraticle (NGCV) vehicle agnostic, robotic turret. It isors with real-time computer aided detection, agement. It integrates target acquisition with m on NGCV platforms, and enable experiment	es tation			
<i>FY 2020 Plans:</i> Will mature synthetic, augmented, and real threat data sets to train and test au a variety of complex, cluttered environments. Will execute initial demonstration ATR processing in a relevant test environment using a stationary vehicle. Will of integration approaches with intelligent fire control systems. Synthetic imagery of the-move target detection and recognition algorithms for a wider variety of envir stationary target indicators.	tomated target recognition (ATR) algorithms in of advanced targeting sensors with embedde develop and demonstrate sensor and algorithr development and data collections will inform o ironments. Will develop and mature moving ar	n d n n- nd			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> This effort is a new start in FY 2020.					
	Accomplishments/Planned Programs Sub	ototals	-	-	27.200
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 060 Initiative	o <b>gram Ele</b> 4115A / 7 es	ement (N Fechnolog	<b>umber/N</b> y Matura	<b>ame)</b> tion	Project AX8 / A Calber	(Numbe dv Leth a (ALAS-M(	<b>r/Name)</b> nd Accura C)	cy Sys fo	or Med
Product Developmer	nt (\$ in Mi	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	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
ALAS-MC: Procure Ammo Rounds H/W	C/Various	ARDEC : Picatinny, NJ	-	-		-		3.700		-		3.700	0.000	3.700	-
ALAS-MC: Control Unit	C/Various	ARDEC : Picatinny, NJ	-	-		-		0.300		-		0.300	0.000	0.300	-
ALAS-MC: Test Hardware	TBD	ARDEC : Picatinny, NJ	-	-		-		0.200		-		0.200	0.000	0.200	-
ATLAS: System Design	TBD	CERDEC : Fort Belvoir, VA	-	-		-		5.000		-		5.000	0.000	5.000	-
ATLAS: Artificial Intelligence/Machine Learning Development	TBD	CERDEC : Fort Belvoir, VA	-	-		-		6.500		-		6.500	0.000	6.500	-
ATLAS: Data Collection and Synthetic Data	TBD	CERDEC : Fort Belvoir, VA	-	-		-		9.300		-		9.300	0.000	9.300	-
ATLAS: Integration and Test	TBD	CERDEC : Fort Belvoir, VA	-	-		-		1.400		-		1.400	0.000	1.400	-
	_	Subtotal	-	-		-		26.400		-		26.400	0.000	26.400	N/A
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY	2020 CO	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
ALAS-MC	TBD	ARDEC : Picatinny, NJ	-	-		-		0.800		-		0.800	0.000	0.800	-
		Subtotal	-	-		-		0.800		-		0.800	0.000	0.800	N/A
			Prior Years	FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		27.200		-		27.200	0.000	27.200	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy								Date: March 20	19		
Appropriation/Budget Activity 2040 / 4			<b>R-1 Pr</b> PE 060 Initiativ	<b>ogram</b> 04115A ⁄es	Elemen I Techn	it (Number/Name ology Maturation	e)	<b>Project (N</b> AX8 I Adv Calber (AL	t (Number/Name) Adv Leth and Accuracy Sys for Med (ALAS-MC)			
Event Name	me FY 2018 FY				2020	FY 2021	F	TY 2022	FY 2023	FY 2024		
ALAS-MC: Procure Ammo Rounds H/W	1 2 3 4	1 2 3	3 4	1 2	3 4	1 2 3 4	1	2 3 4	1 2 3 4	1 2 3 4		
ALAS-MC: Control Unit				1								
ALAS-MC: Test Hardware				1								
ATLAS: System Design												
ATLAS: AI/ML Development												
ATLAS: Data Collection and Synthetic Data												
ATLAS: Integration and Test												
						1	<u> </u>			<u> </u>		

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	rch 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program</b> PE 0604115A <i>Initiatives</i>	Element (Numbe I Technology Mate	r/Name) uration	Project (Number/Na AX8 I Adv Leth and A Calber (ALAS-MC)	<b>me)</b> Accuracy Sys for Mec
	Schedule Details	S			
		Sta	art	E	End
Events		Quarter	Year	Quarter	Year
ALAS-MC: Procure Ammo Rounds H/W		2	2020	1	2022
ALAS-MC: Control Unit		3	2020	1	2022
ALAS-MC: Test Hardware		3	2020	1	2022
ATLAS: System Design		1	2020	2	2021
ATLAS: AI/ML Development		1	2020	3	2021
ATLAS: Data Collection and Synthetic Data		1	2020	3	2021
ATLAS: Integration and Test		1	2020	4	2021

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	vrmy							Date: Marc	ch 2019			
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progr</b> a PE 060411 <i>Initiatives</i>	am Elemen ISA / Techno	t (Number/ blogy Matur	Name) ation	<b>Project (N</b> AX9 I Adv Adv Tech	ect (Number/Name) I Adv Mobility Experimental Prototy Tech				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost		
AX9: Adv Mobility Experimental Prototype Adv Tech	-	0.000	0.000	10.500	-	10.500	15.800	10.500	7.200	3.606	0.000	47.606		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

#### Note

This Project is a new start in Fiscal Year (FY) 2020.

### A. Mission Description and Budget Item Justification

This Project integrates and demonstrates advanced powertrain, power generation, and running gear technologies into a prototype ground combat vehicle. Advanced Mobility Experimental Prototype activities will demonstrate increased mobility, increased maneuver speeds, reduced fuel demands, and onboard power generation available for advanced lethality and protection technologies. The experimental prototype will be evaluated in realistic operating environment to validate performance and capability enhancements to inform ground combat vehicle programs of record.

This work is coordinated with PE/Project 0603462A/BG4 (Advanced Mobility Experimental Prototype (AMEP)).

The cited work is consistent with the Under Secretary of Defense, Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the U.S. Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Advanced Mobility Experimental Prototype	-	-	10.500
<b>Description:</b> Efforts integrate and demonstrate advanced powertrain, power generation, and running gear technologies into a ground combat vehicle to demonstrate reduced percentage of no-go terrain for ground vehicles, increased maneuver speeds across all traversable terrain, reduced fuel demands thus extending operation time between resupply, and onboard power generation to enable the integration of energy based capabilities such as directed energy weapons and electromagnetic armor. This effort is coordinated with efforts in PE/Project 0603462A/BG4.			
FY 2020 Plans: Will fabricate powertrain, power generation, and running gear technologies. Will develop designs for integration onto a surrogate combat vehicle platform, minimizing modifications to surrogate structure. Will develop and mature air induction/filtration, exhaust system, fuel cooling, final drives, and controls.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		[	Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A <i>I Technology Maturation</i> <i>Initiatives</i>	<b>Project (Nu</b> AX9 / Adv M Adv Tech	<b>mber/N</b> Iobility	<b>lame)</b> Experimental	Prototype
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	2018	FY 2019	FY 2020
This effort is a new start in FY 2020 and was not funded in FY 2019.					
	Accomplishments/Planned Programs Sub	totals	-	-	10.500
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E P	Project Co	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	,				R-1 Pro PE 060 Initiative	o <b>gram El</b> e 4115A / 7 es	ement (N Fechnolog	umber/N ay Maturai	<b>ame)</b> tion	Project AX9 / A Adv Tec	<b>roject (Number/Name)</b> X9 I Adv Mobility Experimental Proto dv Tech			ototype
Product Developmen	nt (\$ in Mi	llions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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
Initial Integration Design of Components	C/Various	TARDEC : Warren, MI	-	-		-		1.000		-		1.000	0.000	1.000	-
Develop air handling, cooling system, final drives & controls	C/Various	TARDEC : Warren, MI	-	-		-		3.000		-		3.000	0.000	3.000	-
Fabricate Powertrain Technologies	C/Various	TARDEC : Warren, MI	-	-		-		3.500		-		3.500	4.000	7.500	-
Fabricate Advanced Running Gear	C/Various	TARDEC : Warren, MI	-	-		-		2.500		-		2.500	3.000	5.500	-
Design Integration for Surrogate Platform	C/Various	TARDEC : Warren, MI	-	-		-		0.500		-		0.500	4.500	5.000	-
		Subtotal	-	-		-		10.500		-		10.500	11.500	22.000	N/A
Prior Years			FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals			-		0.000		10.500		-		10.500	11.500	22.000	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army														Date	: Mar	ch 20	19		
Appropriation/Budget Activity 2040 / 4					R-1 PE <i>Init</i>	1 Pro 0604 tiative	<b>gram E</b> 4115A / es	lemen Techn	i <b>t (Nu</b> ology	mber/l Matur	Name ation	)	Proje AX9 Adv	e <b>ct (N</b> I Adv Tech	lumbe Mobili	r/Na ty Ex	<b>me)</b> :perim	ental F	Prototy	уре
		-V 2019		<b>E</b> \	( 2010		EV 2	020		EV 201	24		EV 201		-	X 20			V 201	24
Event Name	1	2 3 4	4 1	1 2	3 4	4 1	2	3 4	1	2 3	4	1	2 3	4	1	2 3	23	1	2 3	4
Initial Integration Design of Components	·							·		·		·	·			·				
Fabricate Powertrain Technologies																	l			
Fabricate Advanced Running Gear											•									
Perform Design Integration for Surrogate Vehicle Platform																				
Vehicle Test Plan Development & Final Integration																				
Develop air handling, cooling system, final drives & controls tes	ting																			
Initial Test & Evaluation																				
Data Analysis																				
																	l			
																	l			
																	ſ			
											I									

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mare	ch 2019
Appropriation/Budget Activity 040 / 4	<b>R-1 Program El</b> PE 0604115A / Initiatives	lement (Numbe Technology Mati	r/Name) uration	<b>Project (Number/Nar</b> AX9 I Adv Mobility Ex <sub>l</sub> Adv Tech	ne) perimental Prototype
Sc	hedule Details				
		Sta	art	E	nd
Events		Quarter	Year	Quarter	Year
Initial Integration Design of Components		1	2020	4	2020
Fabricate Powertrain Technologies		1	2020	3	2021
Fabricate Advanced Running Gear		1	2020	3	2021
Perform Design Integration for Surrogate Vehicle Platform		4	2020	4	2021
Vehicle Test Plan Development & Final Integration		1	2022	4	2022
Develop air handling, cooling system, final drives & controls testing		3	2020	4	2022
Initial Test & Evaluation		1	2023	2	2023
Data Analysis		3	2023	4	2023

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019		
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060411 <i>Initiatives</i>	am Element 5A / Techno	t (Number/l blogy Matur	Project (N AY1 / MUN	Number/Name) M-T Platform Enabler				
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	
AY1: MUM-T Platform Enabler	-	0.000	0.000	7.200	-	7.200	4.500	4.200	0.000	0.000	0.000	15.900	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### <u>Note</u>

This Project is a new start in Fiscal Year (FY) 2020.

#### A. Mission Description and Budget Item Justification

This Project will mature and demonstrate Manned Unmanned Teaming (MUMT) technologies in a realistic operating environment to drive down risk in three critical areas for ground MUMT: remote lethality, unmanned maneuver and network. These major technical hurdles will be addressed by integrating mature technologies into the MUMT Campaign of Learning through three, synergistic integration efforts: Unmanned Aerial Vehicle (UAV)/ground platform integration, a transportable MUMT simulation environment and an advanced interface for the Warfighter.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the U.S. Army Futures Command.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Unmanned Aerial Vehicle (UAV) / Ground Platform Integration	-	-	4.050
<b>Description:</b> This effort matures and demonstrates in an operational environment technologies that address critical capability challenges related to the integration of Unmanned Aerial Vehicles (UAVs) and ground vehicle platforms. This effort also improves human-machine interactions through an intuitive Warfighter Machine Interface (WMI) between operators and unmanned platforms. The end state is to analyze the operational impact of multiple advanced enabling technologies to reduce risk in critical capabilities that support MUMT operations.			
<i>FY 2020 Plans:</i> Will conduct task and workflow analysis for the integration of electro-optic sensors, a communications repeater, and advanced WMI to improve situational awareness and network communications. Will select baseline platforms for the ground and aerial vehicles. Will mature the demonstrator technology by optimizing subsystem performance during hardware and software integration on the vehicle platform. Will conduct engineering demonstration of integrated technologies to validate approach prior to operational demonstrations.			
FY 2019 to FY 2020 Increase/Decrease Statement: This effort is a new start in FY 2020			
<i>Title:</i> Transportable Manned Unmanned Teaming (MUMT) Simulation	-	-	3.150

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A <i>I Technology Maturation</i> <i>Initiatives</i>	<b>Proje</b> AY1 /	ct (Number/I MUM-T Platf	Name) form Enabler	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
<b>Description:</b> This effort provides an immersive, transportable Manned Unman in order to gather insights from diverse user groups to shape and inform MUMT Specifically, it provides the capability to optimize Warfighter Machine Interface for multiple MUMT scenarios. The end state is to provide Soldiers across the f requisite knowledge to formulate the appropriate Concept of Operations (CON disbursed against near-peer adversaries with greater lethality and force project	ned Teaming (MUMT) simulation environmen Tactics, Techniques and Procedures (TTPs) (WMI) implementations and advanced payloa ighting echelon, from command to end user, t OPS) 7.200 for MUMT in order to operate and ion.	t .ds he I fight			
<b>FY 2020 Plans:</b> Will design and begin development of a realistic, transportable simulator to virtuvarious conditions and modes. Will mature the simulation environment and ass assessments to shape and inform MUMT TTPs. Will develop scenarios for virtus software improvements to the WMI.	ually assess the control vehicle layout under ociated technologies in preparation for user v ual simulation that will engage the user base o	irtual on			
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> This effort is a new start in FY 2020.					
	Accomplishments/Planned Programs Sub	ototals	-	-	7.200
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E	Project Co	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity			R-1 Pro PE 060 Initiative	o <b>gram Ele</b> 4115A / 7 es	ement (N Technolog	umber/N y Maturai	<b>ame)</b> tion	Project AY1 / N	(Number IUM-T Pla	r/ <b>Name)</b> htform Ena	bler			
Product Developme	nt (\$ in Mi	llions)		FY 2018		FY 2019		FY 2020 Base		FY 2 O(	020 FY 2020 CO Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
UAV / Ground Platform Integration	C/Various	TARDEC : Warren, MI	-	-		-		4.050		-		4.050	8.700	12.750	-
Transportable Simulator	C/Various	TARDEC : Warren, MI	-	-		-		3.150		-		3.150	0.000	3.150	-
		Subtotal	-	-		-		7.200		-		7.200	8.700	15.900	N/A
Prior Years FY 2018							FY 2020 FY FY 2019 Base C				2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals						0.000 7.200 -					7.200	8.700	15.900	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	۲m	/																			Dat	te: N	/larcl	ם 20 <sup>-</sup>	19			
Appropriation/Budget Activity 040 / 4								<b>R-1 F</b> PE 0 Initia	Prog 604 tives	<b>jram</b> 115/ S	• Ele	emen echn	nt (Nu nology	umb y Ma	er/N atura	ame tion	e)	Pr Aገ	ojec (1 / /	t (N MUN	lumt M-T I	oer/l Plati	Nam form	<b>e)</b> Ena	bler			
		E)	( 204	•		EV	204	•		EV	202			EV	202			EV	2022			EV	202	,				
Event Name	1	2	3	•	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	3 4	1	2	3	4
UAV/Ground Platform Integration																									ł			
Transportable Simulator																												
													·								-			ľ				

hibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March	า 2019
propriation/Budget Activity 40 / 4 Ini	- <b>1 Program Element (Number</b> E 0604115A / Technology Matu itiatives	<b>Name)</b> ration	Project (Number/Nam AY1 / MUM-T Platform	<b>e)</b> Enabler
Sched	dule Details			
	Sta	rt	En	d
Events	Sta Quarter	rt Year	En Quarter	d Year
Events UAV/Ground Platform Integration	Sta Quarter 1	rt Year 2020	En Quarter 4	d Year 2022

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A				Date: Marc	ch 2019					
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0604115A / Technology MaturationAY2 / Army Operational FiresInitiativesInitiatives										
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
AY2: Army Operational Fires	-	0.000	0.000	18.900	-	18.900	28.400	41.900	10.800	0.000	0.000	100.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note			·			·					·	

This Project is a new start in Fiscal Year (FY) 2020.

### A. Mission Description and Budget Item Justification

This Project matures and demonstrates a ground-launched, treaty-compliant weapon system capable of destroying critical relocatable, time sensitive targets in contested Anti-Access/Area Denied (A2/AD) environments. Activities include system-level prototyping to extend the range of Army fires well beyond 499km to complement other fires developments.

Work in this Project complements PE 0603464 Long Range Precision Fires Advanced Technology.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the U.S. Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Army Operational Fires	-	-	18.900
<b>Description:</b> This effort matures and demonstrates a ground-launched, treaty-compliant weapon system capable of destroying critical relocatable, time sensitive targets in contested A2/AD environments.			
FY 2020 Plans: Will develop system architecture and interfaces; will initiate fire control software development; and perform sub-system testing and evaluation of solid rocket booster and launch platform hardware.			
FY 2019 to FY 2020 Increase/Decrease Statement: This effort is a new start in FY 2020			
Accomplishments/Planned Programs Subtotals	-	-	18.900
C. Other Program Funding Summary (\$ in Millions)			

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

N/A

**Remarks** 

Exhibit R-2A, RDT&E Project Justification: PB 2020 Arr	my	Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A <i>I Technology Maturation</i> <i>Initiatives</i>	Project (Number/Name) AY2 / Army Operational Fires
D. Acquisition Strategy		
N/A		
E. Performance Metrics		
N/A		
DE 000111EA: Technology Meturation Initiatives		

Exhibit R-3, RDT&E	Project Co	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4		R-1 Pro PE 060 Initiative	o <b>gram El</b> o 4115A / 7 es	ement (N Fechnolog	Project AY2 / A	(Number rmy Oper	r/ <b>Name)</b> ational Fir	es							
Product Developme	FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total						
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Award Cost Date Cost		Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Army Operational Fires	C/Various	AMRDEC : Huntsville, AL	-	-		-		18.900		-		18.900	81.100	100.000	-
Subtotal			-	-		-		18.900		-		18.900	81.100	100.000	N/A
			Prior Years	FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 Of	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals -				-		0.000		18.900		-		18.900	81.100	100.000	N/A

**Remarks** 

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٨rmy	'																		Da	ate: N	Marc	h 20	19			
Appropriation/Budget Activity 2040 / 4	ropriation/Budget Activity ) / 4							R-1 Program Element (Number/Name)Project (Number/Name)PE 0604115A I Technology MaturationAY2 I Army OperationalInitiativesInitiatives								Nam tiona	e) al Fire	es									
		EV	201	0		EV	20/	10	1	EV	/ 20	20	1	EV	202	1		EV 2	022	1	EV	202	3	-	.v 20	124	
Event Name	1	2	3	• 4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3 4	1	2	3	4	1	2 3	3 4	
Army Operational Fires																											
									_1							1				_1				1			

hibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: March	2019
propriation/Budget Activity 40 / 4	<b>R-1 Progra</b> PE 060411 <i>Initiatives</i>	m Element (Number 5A / Technology Matu	r/Name) uration	Project (Number/Name AY2 / Army Operational	e)   Fires
	Schedule Det	ails			
		Sta	art	En	d
Events		Quarter	Year	Quarter	Year
Army Operational Fires		1	2020	4	2023

Exhibit R-2A, RDT&E Project Ju	Date: March 2019											
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)       Project (Number/Name)         PE 0604115A / Technology Maturation       AY3 / Strategic Long Range Canno         Initiatives       Initiatives										
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
AY3: Strategic Long Range Cannon	-	0.000	0.000	91.860	-	91.860	65.210	71.000	0.000	0.000	0.000	228.070
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

This Project is a new start in Fiscal Year (FY) 2020.

### A. Mission Description and Budget Item Justification

This Project matures and integrates long-range armament technologies for both weapons and munitions to demonstrate potential deep strike objective capabilities from future cannon artillery systems. It will demonstrate revolutionary performance to support Long Range Fires by further developing, integrating, and demonstrating enhanced lethality and range extension solutions for cannon system performance with maximum effects. Strategic Long Range Cannon activities include integrating component technologies into sub-system and system-level experimental prototypes for novel cannon, munition, and fire control, including guidance and propulsion. Extended Range Cannon Artillery (ERCA) activities mature, integrate, and demonstrate a novel sub-system for ammunition handling and a long-range artillery projectile to support prototyping and experimentation of a next-generation, extended range armaments system that will provide significantly increased range and accuracy without an increase in platform weight. This Project also demonstrates and experiments with emerging and commercially-available technology components to demonstrate improved Stinger capabilities when used in a Man Portable Air Defense System (MANPADS) configuration.

The cited work is consistent with the Under Secretary of Defense for Research and Engineering priority focus areas and the Army Modernization Strategy. Work in this Project is performed by the U.S. Army Futures Command (AFC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Strategic Long Range Cannon	-	-	64.860
<b>Description:</b> This effort will integrate and prototype subsystem technologies to further enhance range, lethality, and precision enablers for extended range cannon and munition systems.			
FY 2020 Plans: Will scale up cannon and projectile technology components and fabricate sub-system prototype hardware leveraging activities and information gained under 0603464A/AE6 (Strategic Long Range Cannon Advanced Technology). Will integrate test hardware and conduct subsystem testing and experimentation.			
FY 2019 to FY 2020 Increase/Decrease Statement: This effort is a new start in FY 2020			
Title: Extended Range Cannon Artillery (ERCA) Autoloader	-	-	11.000

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		0	)ate: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / Technology Maturation Initiatives	Project (Nu AY3 / Strate	<b>nber/N</b> gic Lori	<b>lame)</b> ng Range Ca	nnon
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2	018	FY 2019	FY 2020
<b>Description:</b> This effort matures, integrates, and demonstrates a novel technic to support the prototyping of a next-generation, extended range armaments sy and accuracy without an increase in platform weight.	ology sub-system prototype for ammunition han ystem that will provide significantly increased ra	ndling Inge			
<i>FY 2020 Plans:</i> Will mature and integrate ammunition handling automation technologies into a validation of performance.	a sub-system prototype for demonstration and				
FY 2019 to FY 2020 Increase/Decrease Statement: This is an FY 2020 new start effort					
Title: Extended Range Cannon Artillery (ERCA) Projectile			-	-	4.000
<b>Description:</b> This effort integrates component technologies that provide optim payload into a long-range artillery projectile sub-system for demonstration and prototyping of a next-generation, extended range armaments system that accuracy without an increase in platform weight.	nized range, precision, counter-measure, and d experimentation. Activities support the matura will provide significantly increased range and	tion			
<i>FY 2020 Plans:</i> Will mature and integrate enabling component technologies into long-range ar validate increased range, sensor optimization and integration, and improved p extended ranges in contested and GPS-denied environments.	rtillery projectile sub-system. Will demonstrate a performance for armor and counter-battery defe	and at at			
FY 2019 to FY 2020 Increase/Decrease Statement: This is an FY 2020 new start effort					
Title: Dismounted Man-Portable Air Defense System (MANPADS) Experimen	t		-	-	12.000
<b>Description:</b> This effort demonstrates and experiments with potential governments improve the effective range of the Stinger missile in the man-portable air defent this effort is to demonstrate improved Stinger capabilities when used in a MAN	ment and/or industry technology components to nse system (MANPADS) configuration. The go NPADS configuration.	al of			
<b>FY 2020 Plans:</b> Will select technology components from government and/or industry sources a experimentation in realistic and representative operational environment(s). Wi system component options to demonstrate improved effective range of the Sti	and conduct system demonstrations and ill conduct experimentation efforts using various inger missile when configured for man-portable	air			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019				
Appropriation/Budget Activity 2040 / 4	Project (Number/I AY3 / Strategic Lor	(Number/Name) rategic Long Range Cannon					
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020			
defense (MANPADS). Experimentation results will inform requirements Defense (M-SHORAD) capabilities.	s and systems planning for future Mobile Short-Range	e Air					
FY 2019 to FY 2020 Increase/Decrease Statement: This is an FY 2020 new start effort							
	Accomplishments/Planned Programs Su	btotals -	-	91.860			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A							

Exhibit R-3, RDT&E	Project Co	o <b>st Analysis:</b> PB 2	020 Arm	У								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity					<b>R-1 Pro</b> PE 060 <i>Initiativ</i>	o <b>gram El</b> o 4115A / 7 es	ement (N Technolog	umber/N ly Matura	<b>ame)</b> tion	Project AY3 / S	(Number trategic Lo	r/ <b>Name)</b> ong Range	e Cannoi	n
Product Developmer	nt (\$ in Mi	llions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
Strategic Long Range Cannon	C/Various	ARDEC : Picatinny, NJ	-	-		-		64.860		-		64.860	136.210	201.070	-
Extended Range Cannon Artillery (ERCA) Autoloader	C/Various	ARDEC : Picatinny, NJ	-	-		-		11.000		-		11.000	0.000	11.000	-
Extended Range Cannon Artillery (ERCA) Projectile	C/Various	ARDEC : Picatinny, NJ	-	-		-		4.000		-		4.000	0.000	4.000	-
Subtotal						-		79.860		-		79.860	136.210	216.070	N/A
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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 Man-Portable Air Defense System (MANPADS) Experiment	Option/ Various	PEO M&S, PM Cruise MIssile Defense System : Huntsville, AL	-	-		-		12.000		-		12.000	0.000	12.000	-
		Subtotal	-	-		-		12.000		-		12.000	0.000	12.000	N/A
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000 91.860			-		91.860	136.210	228.070	N/A	
		· · · · · ·													

**Remarks** 

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army																				Da	te: N	Marc	h 20	19				
Appropriation/Budget Activity 2040 / 4	opropriation/Budget Activity 40 / 4							R-1 Program Element (Number/Name)ProjePE 0604115A / Technology MaturationAY3 /InitiativesInitiatives									r <b>oje</b> Y3 /	ct (N Stra	lum	<b>ber</b> / c Lo	Nam ng F	ie) Range	e Car	non				
		-	0040			FV	204	•		FV	202	•		FV	2024			FV	202	•		FV		•			202	
Event Name	1	2	3	4	1	2	201	9 4	1	2	3	4	1	2	3	4	1	2	3	Z 4	1	2	3	4	1	2	3	4
Strategic Long Range Cannon Hardware Contracting Activities																									•			
Extended Range Cannon Artillery (ERCA) Autoloader																												
Extended Range Cannon Artillery (ERCA) Projectile																												
Dismounted Man-Portable Air Defense System (MANPADS) Ex	perin	nent																										
													1			1					1				L			

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Da	ate: Marc	h 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program</b> PE 0604115A <i>Initiatives</i>	Element (Numbe I Technology Mat	<b>r/Name)</b> uration	Project (Num AY3 / Strateg	nber/Nam ic Long R	<b>e)</b> ange Cannon
	Schedule Details	5				
		art		Er	d	
Events		Quarter	Year	Qua	arter	Year
Strategic Long Range Cannon Hardware Contracting Activities		2	2020	4	4	2021
Extended Range Cannon Artillery (ERCA) Autoloader			0000			
		1	2020	2	4	2020

1

Dismounted Man-Portable Air Defense System (MANPADS) Experiment

2020

4

2020

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 0604115A / Technology MaturationDS3 / Technology Maturation Initiatives										
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
DS3: Technology Maturation Initiatives	-	145.618	95.229	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	240.847
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### <u>Note</u>

Beginning in Fiscal Year (FY) 2020, Program Element (PE) 0604115A (Technology Maturation Initiatives) / Project DS3 (Technology Maturation Initiatives) has been realigned to:

PE 0604115A Technology Maturation Initiatives:

- \* Project AX3 (Technology Maturation Initiatives)
- \* Project AX4 (Computational Prototyping Environment (CPE))
- \* Project AX5 (Next Generation Close Combat Missile)
- \* Project AX6 (Active Protection Systems Integration)
- \* Project AX7 (Multi-Mission High Energy Laser (MMHEL) Sys Demo)
- \* Project AX8 (Adv Leth and Accuracy Sys for Med Calber ALAS-MC)
- \* Project AX9 (Adv Mobility Experimental Prototype Adv Tech)
- \* Project AY1 (MUM-T Platform Enabler)

\* Project AY2 (Army Operational Fires)

\* Project AY3 (Strategic Long Range Cannon)

### A. Mission Description and Budget Item Justification

This Project funds the maturation, integration, and demonstration of advanced technology demonstrators and experimental prototypes to support advanced ground systems; aviation systems; command, control, communication & reconnaissance systems and equipment; precision weapons, High Energy Laser (HEL) systems; and Soldier equipment. Technology Maturation Initiative (TMI) efforts mature and integrate component technologies into early system and sub-system experimental prototypes for demonstration in relevant environments and tactical/operational scenarios, taking technologies to a goal of Technology Readiness Level (TRL) 7. Technology demonstrators and experimental prototypes are validated and transitioned to priority Army experimentation and acquisition efforts to inform requirements for future programs of record and reduce the risk of technology insertion. These efforts are typically 2-4 years in duration, and are approved by Army senior leadership based on priority and opportunity, to ensure that demonstrations have high potential for filling capability gaps and transitioning. Activities include the maturation, integration, and demonstration of HEL prototype weapons performance on a combat platform in realistic operational environments in support of the Army's objective capability for Maneuver-Short Range Air Defense (M-SHORAD). A 50 kilowatt (kW)-class laser weapon system has the potential to engage and defeat rockets, artillery, mortars (RAM), unmanned aerial systems(UASs), sensors, and optics for maneuvering brigade combat teams (BCTs). Activities also include sub-system (APS) components to provide modular and layered vehicle protection effects (hard-kill and soft-kill), enabling power projection and enhanced survivability. Computational Prototyping Environment (CPE) efforts include demonstration of physics-based, computational modeling integrated with new advances in deep learning to explore

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	larch 2019				
Appropriation/Budget Activity 2040 / 4	<b>lame)</b> Maturation Ini	tiatives			
design tradespaces and understand defeat strategies for prototype platforms. competition in the latter stages of technology maturation and establishing a clo	This Project provides the Army with an improve oser alignment between Science and Technolo	ed mechanism for e gy (S&T) efforts and	nabling greate acquisition p	er programs.	
The cited work is consistent with the Under Secretary of Defense, Research an Project is performed by the Army Futures Command (AFC); the United States ARSTRAT); and the Engineer Research and Development Center (ERDC).	nd Engineering priority focus areas and the Arr Army Space and Missile Defense Command/A	my Modernization S Army Forces Strateg	trategy. Work ic Command	(in this (SMDC/	
Funding has been realigned to reflect the FY 2020 financial restructure and Ar	my Modernization Priorities.				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020	
Title: Vehicle Survivability Subsystem Demonstrator		9.860	7.361	-	
<ul> <li>Description: The Vehicle Survivability Subsystem effort integrates and demonstrates cost effective, lightweight designs for the optimization of hull, frame, body, cab and armor technologies to achieve survivability systems weight reductions of 10-15% and increased vehicle survivability against advanced and emerging threats. This effort is coordinated with efforts in PE 0603005A.</li> <li>FY 2019 Plans:</li> <li>Complete design optimization of the integrated survivability demonstrator to prepare for system level durability and blast testing, achieving survivability systems weight reductions and increasing survivability against advanced and emerging threats. Integrate passive blast technologies and active blast mitigation system countermeasures into a demonstrator for underbody blast and structural evaluation. Conduct durability and blast testing to demonstrate the performance of integrated blast components, including surrogate armor, active blast mitigation, advanced energy absorbing (EA) floors, adjustable EA seats and restraints, and lighter weight hull with same or better levels of protection.</li> </ul>					
Planned progression of the effort, which concludes in FY 2019.					
Title: Advanced Powertrain Subsystem Demonstrator		12.433	10.600	-	
<b>Description:</b> The Advanced Powertrain Subsystem Demonstrator effort fabrical scalable combat vehicle powertrain technologies into a high power dense and powertrain will demonstrate advancements in engine and transmission subsyster order to provide an integrated advanced propulsion system. This effort is corrected advanced propulsion system.					
<b>FY 2019 Plans:</b> Build upon and add components to the major subsystem integration of the mult transmission, as part of the overall advanced powertrain demonstrator integration as expected. Using a reduced risk strategy, mature and demonstrate high power	ti-cylinder engine and the advanced high efficie ion. Verify and validate that all components fur er-density and more fuel efficient integrated	ency nction			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	arch 2019				
Appropriation/Budget Activity 2040 / 4	ion/Budget Activity PE 0604115A / Technology Maturation Initiatives Project (Number/Name) DS3 / Technology Maturation Initiatives						
B. Accomplishments/Planned Programs (\$ in Millions)	F	Y 2018	FY 2019	FY 2020			
powertrain to support military tracked vehicles. Optimize system controls to imp applications. The technology is being developed for future military vehicle appli future infantry vehicles.	and						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Planned progression of the effort, which concludes in FY 2019.							
Title: Modular Active Protection System (MAPS) Demonstration			8.641	-	-		
<b>Description:</b> This effort conducts Active Protection System (APS) component adaption, aligned with Survivability Sets 1, 2, and 3, as well as Expedited APS with the Army's modular approach to active protection, and resolve component technology demonstrators and conducts demonstrations of soft-kill and hard-ki the modular and safe design approach, and to reduce technical risk for APS tratactical vehicle platforms.	iply m thin						
Title: Active Protection Systems (APS) Integration and Demonstration		-	7.404	-			
<b>Description:</b> This effort synchronizes emerging S&T products with the Vehicle matures key Active Protection System (APS) technologies to a Technology Refuture ground platforms. It matures Modular Active Protection Framework (MAF them onto ground combat vehicles for prototype system test and demonstration system development processes that ensure safety compliance for future VPS is	nd d ates n						
<b>FY 2019 Plans:</b> Conduct system-level testing of the Modular Active Protection Framework and APS effector and sensor technologies that are MAF-compliant for system-level integration of selected APS effector and sensor technologies on desired comba	I						
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Beginning in FY 2020, this effort realigns to PE 0604115A/Project AX6 as part							
Title: Multi-Mission High Energy Laser (MMHEL)		78.684	54.741	-			
<b>Description:</b> This effort matures and integrates a 50 kW-class laser system int High Energy Laser (HEL) experimental prototype for demonstration in realistic will inform requirements, decrease risk for future Army HEL acquisition program warfighter Tactics/Techniques/Procedures (TTPs) and Concept of Operations (	, is ed						

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019		
Appropriation/Budget Activity 2040 / 4	Projec DS3 /	ect (Number/Name) I Technology Maturation Initiatives			
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2018	FY 2019	FY 2020
to complement conventional offensive and defensive weapons at a lower cost- need to stockpile ordnance. A 50 kW-class laser weapon system has the poter (RAM); UAVs; sensors; and optics for maneuvering BCTs. Demonstrations wil fixed- and rotary-wing manned aircraft. Leveraging Government investments a and select existing HEL subsystem designs for integration into a Stryker vehic system-level HEL experimental prototype; and will provide assessment of tech					
<i>FY 2019 Plans:</i> Complete design reviews of HEL subsystems (including laser, beam control, p Management Command, Control, and Computers (BMC3) architecture). Begin evaluate 50kW-class laser subsystems against performance parameters. Deve define BMC4I interfaces with Army BMC4I network. Develop target laser vulne of laser energy required to destroy a given target based upon the location of th are delivered, integrate into a system-level experimental prototype and begin s	and ount tems				
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Beginning in FY 2020, this effort realigns to PE 0604115A/Project AX7 as part	of the financial restructure.				
Title: MMHEL Integration and Demonstration (CA)			35.000	-	-
<b>Description:</b> This effort procures equipment/components/subsystems at an admonth schedule. This enables completion of the MMHEL Technology Readine original schedule.	ccelerated rate compared to the original MMHE ss Level 7 demonstration 12 months earlier that	L 48 an			
Title: Next Generation Close Combat Missile			-	9.424	-
<b>Description:</b> The Next Generation Close Combat Missile (NG CCM) effort der a multi-pulse, boost-sustain flight propulsion system providing extended range proof-of-principle hardware into an integrated tactical-representative design an overmatch of emerging threats to address near-term Warfighter needs, in adva	monstrates a prototype close combat missile w and decreased time of flight. Activities mature and demonstrate a prototype missile with lethality ance of acquisition program of record.	ith /			
<b>FY 2019 Plans:</b> Optimize and tailor missile propellant formulation to balance performance vers Experiment with the Maneuver Center of Excellence/Maneuver Battle Lab. Eva	sus shock-sensitivity. Conduct a Force Effective aluate preliminary design concepts as a basis f	ness or			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: M	arch 2019		
Appropriation/Budget Activity 2040 / 4	Projec DS3 /	et (Number/Name) I Technology Maturation Initiatives			
B. Accomplishments/Planned Programs (\$ in Millions)		[	FY 2018	FY 2019	FY 2020
trade studies, development of detailed designs, and NG CCM prototype develor support further system maturation and testing of NG CCM?s increased range a	els to				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Beginning in FY 2020, this effort realigns to PE 0604115A/Project AX5 as part					
Title: Computational Prototyping Environment			1.000	2.219	-
<b>Description:</b> The Computational Prototyping Environment (CPE) effort creates leverages recent Department of Defense advancements in large data tradespart deep learning techniques, high performance computing capabilities, and inverse the early developmental verification and validation of selected weapons platform potential performance and design failures, while also testing and mitigating solid Ground (VPG) prior to cost-bearing production and manufacturing. CPE efforts prototyping in a robust VPG for early performance verification of new capabilities.	t ling, es				
<b>FY 2019 Plans:</b> Complete initial prototype VPG build. Integrate and validate existing high-fidelit the prototype VPG to provide an initial proof of concept in support of future VPG	with				
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Beginning in FY 2020, this effort realigns to PE 0604115A/Project AX4 as part					
Title: FY 2019 SBIR / STTR Transfer			-	3.480	-
Description: FY 2019 SBIR / STTR Transfer					
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
	Accomplishments/Planned Programs Sub	totals	145.618	95.229	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>					

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019		
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604115A / Technology Maturation Initiatives	Project (N DS3 / Tech	umber/Name) nology Maturation Initiatives

### D. Acquisition Strategy

Activities are conducted both in-house and through competitively awarded contracts using best value source selection procedures. Multiple competitive contracts will be awarded. The Other Transaction Agreement (OTA) # W15QKN-14-9-1001 Initiative (Task Order) DOTC-16-01-INIT-0302 will be the primary contract vehicle for the MMHEL effort.

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	2020 Army	/								Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604115A / Technology Maturation Initiatives				Project (Number/Name) DS3 / Technology Maturation Initiatives						
Product Development (\$ in Millions)			FY 2018		FY 2	019	FY 2020 Base		FY 2 O(	2020 CO	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
Vehicle Survivability Subsystem Demonstrator	C/Various	Various : Various	11.954	9.860		7.361		-		-		-	0.000	29.175	-
Advanced Powertrain Subsystem Demonstrator	C/Various	Various : Various	14.512	12.433		10.600		-		-		-	0.000	37.545	-
Modular Active Protection Systems (MAPS) Demonstrations	C/Various	Various : Various	21.073	8.641		-		-		-		-	0.000	29.714	-
Active Protection Systems (APS) Integration	C/Various	Various : Various	-	-		7.404		-		-		-	0.000	7.404	-
Multi-Mission High Energy Laser (MMHEL)	C/Various	Various : Huntsville, AL	-	78.684		54.741		-		-		-	0.000	133.425	-
MMHEL Integration and Demonstration (CA)	C/Various	Various : Huntsville, AL	-	35.000		-		-		-		-	0.000	35.000	-
Computational Prototyping Environment	C/Various	Various : Various	-	1.000		2.219		-		-		-	0.000	3.219	-
Next Generation Close Combat Missile	C/Various	Various : Various	-	-		9.424		-		-		-	0.000	9.424	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		3.480		-		-		-	0.000	3.480	-
		Subtotal	47.539	145.618		95.229		-		-		-	0.000	288.386	N/A
			Prior Years	FY 2	018	FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	47.539	145.618		95.229		-		-		-	0.000	288.386	N/A

**Remarks** 

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army	,																		Date	e: Ma	arch 2	201	9			
Appropriation/Budget Activity 2040 / 4							<b>R-1</b> PE Initia	Prog 0604 ative:	g <b>ram</b> 1154 s	n Ele 4 / 7	emen Fechn	i <b>t (Nı</b> ology	umt / M	oer/N atura	ame tion	e)	Pro DS	o <b>ject</b> 3 / <i>T</i> e	(Ni ech	umbe nolog	er/N gy N	ame) latura	atio	n Init	iativ	/es	
Г																											
Event Name		FY	2018	<b> </b>	F	Y 20	019	<b>_</b>	FY	202	20		FY	202	1		FY 2	2022	_		FY 2	2023	_		FY :	2024	4
Vehicle Survivability Subsystem Demonstrator	1	2	3 4			Z   3	5 4	1	2	3	4	1	2	3	4	1	2	3 4	4	1	2	3	4	1	2	3	4
Advanced Powertrain Subsystem Demonstrator																											
Modular Active Protection Systems (MAPS) Demonstrations																											
Active Protection Systems (APS) Integration																											
Multi-Mission High Energy Laser (MMHEL) - System-Level Desi																											
MMHEL - Subsystem Design Refinement, Assembly, and Delive	ry																										
MMHEL - Firing Doctrine and Experimental Prototype System Se	oftwa	re																									
MMHEL - Experimental Prototype System Integration and Check	out																										
Next Generation Close Combat Missile																											
Computational Prototyping Environment																											

hibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	h 2019
propriation/Budget Activity 40 / 4	<b>R-1 Program</b> PE 0604115A <i>Initiatives</i>	Element (Number I Technology Matu	r/Name) uration	Project (Number/Nan DS3 / Technology Mat	ne) uration Initiatives
	Schedule Details	3			
		Sta	art	E	nd
I 4       PE 0         Initia       Schedul         Events         Vehicle Survivability Subsystem Demonstrator         Advanced Powertrain Subsystem Demonstrator       Advanced Powertrain Subsystem Demonstrator         Modular Active Protection Systems (MAPS) Demonstrations       Active Protection Systems (APS) Integration         Multi-Mission High Energy Laser (MMHEL) - System-Level Design       MMHEL - Subsystem Design Refinement, Assembly, and Delivery		Quarter	Year	Quarter	Year
Vehicle Survivability Subsystem Demonstrator		1	2017	4	2019
Advanced Powertrain Subsystem Demonstrator		1	2017	4	2019
Modular Active Protection Systems (MAPS) Demonstrations		1	2017	4	2018
Active Protection Systems (APS) Integration		1	2019	4	2021
Multi-Mission High Energy Laser (MMHEL) - System-Level Design		1	2018	3	2018
MMHEL - Subsystem Design Refinement, Assembly, and Delivery		4	2018	4	2019
MMHEL - Firing Doctrine and Experimental Prototype System Software	are	1	2019	3	2021
MMHEL - Experimental Prototype System Integration and Checkout		2	2019	4	2020
Next Generation Close Combat Missile		1	2019	4	2021
Computational Prototyping Environment		1	2018	4	2022

<u>Note</u>

N/A

Exhibit R-2, RDT&E Budget Item	n Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACD	ation, Army )&P)	I BA 4: Adva	anced	<b>R-1 Progra</b> PE 060411	am Element 7A I Maneu	t <b>(Number/I</b> ver - Short	<b>Name)</b> Range Air I	Defense (M·	-SHORAD)		
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	-	19.201	79.016	33.100	6.000	39.100	105.700	341.100	382.600	308.700	Continuing	Continuing
Fl4: 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	Continuing	Continuing

#### A. Mission Description and Budget Item Justification

M-SHORAD is an Air Defense weapon system consisting of multiple ground-to-air missile launchers, sensors and a gun on a Stryker A1 combat vehicle. M-SHORAD provides the Army improved capabilities for defense of maneuver formations and other tactical echelons from low altitude air attack and surveillance. Adaptive threats have developed a suite of airborne threat capabilities, supported by an integrated mix of surface-to-air and surface-to-surface shooters that threaten the ability of maneuver forces to conduct operations. Specifically, maneuver formations require the improved M-SHORAD air defense identification and defeat capabilities to counter Fixed Wing (FW), Rotary Wing (RW), Unmanned Aircraft Systems (UAS) and Rocket, Artillery and Mortar (RAM) threats.

The M-SHORAD capability will be provided through a multi-phase approach with a rapidly fielded Initial M-SHORAD system (supported by an Army Approved Directed Requirement) and an enduring M-SHORAD (supported by a Joint Requirements Oversight Council approved Capability Development Document (CDD) or Capability Production Document (CPD)) that will field the full capability. First, the Army will field the Initial M-SHORAD solution based on a FY 2018 Directed Requirement, which was informed by the FY 2017 M-SHORAD Demonstration. This system will provide the capability to identify, track, and neutralize or destroy low-altitude air threats to include FW, RW, and Group 3 UAS while keeping pace and surviving with the maneuver Brigades. The Initial M-SHORAD will be fielded to four M-SHORAD battalions. In addition, M-SHORAD will transition the Multi-Mission High Energy Laser (MMHEL) from Science and Technology into the M-SHORAD Program of Record. With the increased capability provided by the MMHEL technology, M-SHORAD will provide the long term capability to counter a broader range of FW, RW, UAS, and indirect fires (RAM) threats.

FY 2020 dollars in the amount of \$39.100 million (\$33.100 million base and \$6.000 million OCO) will complete the Initial M-SHORAD capability development and integration into existing maneuver formation equipment. Efforts will include: completion of testing to achieve Urgent Materiel Release and Safety Certification; continuation of the development; and finalization of the required program documentation.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Ar	my			Date:	March 2019
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	4: Advanced	<b>R-1 Program El</b> PE 0604117A / <i>I</i>	ement (Number/Name) Maneuver - Short Range	e Air Defense (M-SHOF	RAD)
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	20.000	118.085	102.806	-	102.806
Current President's Budget	19.201	79.016	33.100	6.000	39.100
Total Adjustments	-0.799	-39.069	-69.706	6.000	-63.706
<ul> <li>Congressional General Reductions</li> </ul>	-0.016	-0.069			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-62.000			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	23.000			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-0.783	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-69.706	6.000	-63.706

#### **Change Summary Explanation**

The FY 2019 decrease of \$39.069 million consists of a \$62.000 million Army Budget Office withhold, an \$23.000 million addition from OCO and a \$0.069 million Congressional reduction.

The FY 2020 decrease of \$69.706 million consists of a \$63.706 million realignment of funding within the Air and Missile Defense portfolio to support Army Modernization in support of the National Defense Strategy and a \$6.000 million realignment to OCO.

Exhibit R-2A, RDT&E Project Ju	stification:	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060411 Defense (N	a <b>m Elemen</b> 7A I Maneu I-SHORAD	<b>t (Number/</b> iver - Short )	Name) Range Air	Project (N FI4 / Mane (M-SHORA	umber/Nan uver - Shon \D)	<b>ne)</b> t Range Air	Defense
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: 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	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

This program supports the Cross functional Team (CFT), M-SHORAD.

#### A. Mission Description and Budget Item Justification

M-SHORAD is an Air Defense weapon system consisting of multiple ground-to-air missile launchers, sensors and a gun on a Stryker A1 combat vehicle. M-SHORAD provides the Army improved capabilities for defense of maneuver formations and other tactical echelons from low altitude air attack and surveillance. Adaptive threats have developed a suite of airborne threat capabilities, supported by an integrated mix of surface-to-air and surface-to-surface shooters that threaten the ability of maneuver forces to conduct operations. Specifically, maneuver formations require the improved M-SHORAD air defense identification and defeat capabilities to counter Fixed Wing (FW), Rotary Wing (RW), Unmanned Aircraft Systems (UAS) and Rocket, Artillery and Mortar (RAM) threats.

The M-SHORAD capability will be provided through a multi-phase approach with a rapidly fielded Initial M-SHORAD system (supported by an Army Approved Directed Requirement) and an enduring M-SHORAD (supported by a Joint Requirements Oversight Council approved Capability Development Document (CDD) or Capability Production Document (CPD)) that will field the full capability. First, the Army will field the Initial M-SHORAD solution based on a FY 2018 Directed Requirement, which was informed by the FY 2017 M-SHORAD Demonstration. This system will provide the capability to identify, track, and neutralize or destroy low-altitude air threats to include FW, RW, and Group 3 UAS while keeping pace and surviving with the maneuver Brigades. The Initial M-SHORAD will be fielded to four M-SHORAD battalions. In addition, M-SHORAD will transition the Multi-Mission High Energy Laser (MMHEL) from Science and Technology into the M-SHORAD Program of Record. With the increased capability provided by the MMHEL technology, M-SHORAD will provide the long term capability to counter a broader range of FW, RW, UAS, and indirect fires (RAM) threats.

FY 2020 dollars in the amount of \$39.100 million (\$33.100 million base and \$6.000 million OCO) will complete the Initial M-SHORAD capability development and integration into existing maneuver formation equipment. Efforts will include: completion of testing to achieve Urgent Materiel Release and Safety Certification; continuation of the development; and finalization of the required program documentation.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: Initial M-SHORAD Materiel Development/Integration	19.201	75.711	33.100	6.000	39.100
Description: Develop, test and integrate the Initial M-SHORAD system.					
FY 2019 Plans:					

PE 0604117A: *Maneuver - Short Range Air Defense (M-SH...* Army

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army						Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4	R-1 Pro PE 060 <i>Defens</i>	ogram Elen 04117A / Ma se (M-SHOF	n <b>ent (Numbe</b> aneuver - Sho 2AD)	<b>r/Name)</b> rt Range Air	Project (N FI4 / Mane (M-SHORA	umber/Nar uver - Shoi AD)	<b>ne)</b> rt Range Air	Defense
B. Accomplishments/Planned Programs (\$ in Millions)				FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<ul> <li>Complete fabrication of production representative articles</li> <li>Begin testing to achieve Urgent Materiel Release</li> <li>Continue the development and finalization of the required program docume</li> </ul>	entation							
<ul> <li>FY 2020 Base Plans:</li> <li>Complete testing to achieve Urgent Materiel Release and Safety Certificati</li> <li>Complete required program documentation</li> <li>Completes final prototypes</li> <li>Complete Initial M-SHORAD development effort</li> <li>Transition MMHEL from Science and Technology into the M-SHORAD Pro the Secretary of Defense (OSD) Manufacturing Technology (ManTech) program</li> </ul>	on gram of Re gram	ecord using	the Office of					
<ul> <li>FY 2020 OCO Plans:</li> <li>Complete testing to achieve Urgent Materiel Release and Safety Certificati</li> <li>Complete required program documentation</li> <li>Complete final prototypes</li> <li>Complete Initial M-SHORAD development effort</li> </ul>	on							
FY 2019 to FY 2020 Increase/Decrease Statement: Decrease from FY 2019 to FY 2020 is due to anticipated completion of proto	otype builds	6.						
Title: FY 2019 SBIR / STTR Transfer				-	3.305	-	-	-
<i>FY 2019 Plans:</i> FY 2019 SBIR / STTR Transfer								
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer								
Accomplishn	nents/Plan	ned Progra	ims Subtotal	<b>s</b> 19.201	79.016	33.100	6.000	39.100
C. Other Program Funding Summary (\$ in Millions)	EV 2020	EV 2020					Coot To	
Line ItemFY 2018FY 2019Base• C14301: Maneuver - Short0.000Range Air Defense (M-SHORAD)	<u>OCO</u> 262.100	<u>Total</u> 262.100	<u>FY 2021</u> 537.400	<u>FY 2022</u> 292.200	<u>FY 2023</u> 80.500	<u>FY 2024</u> 78.600	Complete Continuing	<u>Total Cost</u> Continuing

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Exhibit R-2A, RDT&E Project Ju	istification: PB	2020 Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 Pi</b> PE 06 <i>Defen</i>	r <b>ogram Ele</b> n 04117A / <i>Ma</i> se (M-SHOR	nent (Numb aneuver - Sh RAD)	<b>er/Name)</b> ort Range Air	Project (N FI4 / Mane (M-SHOR	<b>lumber/Na</b> euver - Shc AD)	<b>me)</b> ort Range Ail	r Defense
C. Other Program Funding Sum	mary (\$ in Milli	ons <u>)</u>									
<u>Line Item</u> Remarks	<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> Complete	<u>Total Cost</u>

M-SHORAD procurement is funded through C14301. This includes Initial M-SHORAD procurement (FY 2020 through FY 2022).

#### D. Acquisition Strategy

The acquisition approach begins with the Initial M-SHORAD. The Initial M-SHORAD uses the FY 2017 M-SHORAD Demonstration as the initial basis to identify near-term initial solutions. The Program Office uses Defense Ordnance Technology Consortium (DOTC) Other Transactional Authority (OTA) agreements for the development and purchase of five Initial M-SHORAD prototypes according to the content of the Directed Requirement. The OTA efforts include: Mission Equipment Package (MEP); Platform Integrator effort to procure the Stryker vehicle and integrate the MEP; and the Stinger Launcher.

In addition, the Program Office will use FY 2021-2024 funds for an M-SHORAD with the MMHEL capability. The Program Office plans to award a single competitive OTA agreement. In FY 2021-2024, the Program will conduct development activities, component qualification, Operational Performance Assessment and Logistics and Safety Certifications. An Urgent Materiel Release and First Unit Equipped are planned for FY 2024.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	У								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	1				R-1 Pro PE 060 Defens	o <b>gram Ele</b> 4117A / M e <i>(M-SHC</i>	ement (N Maneuver DRAD)	umber/Na - Short R	a <b>me)</b> ange Air	Project FI4 / Ma (M-SHC	<b>(Numbe</b> ineuver - DRAD)	r/ <b>Name)</b> Short Rar	nge Air D	efense
Management Service	s (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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 Management	Various	Trident, Intuitive Research and others : Huntsville, Alabama	-	1.699	Mar 2018	2.595	Oct 2018	1.601	Oct 2019	-		1.601	0.000	5.895	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		3.305		-		-		-	0.000	3.305	-
		Subtotal	-	1.699		5.900		1.601		-		1.601	0.000	9.200	N/A
Product Developmen	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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 and Technical Support	MIPR	Aviation and Missiles Research Development and Engineering Center : Redstone Arsenal, AL	-	-		1.781	Oct 2018	1.557	Oct 2019	-		1.557	0.000	3.338	-
System Development, Prototypes and Integration	C/CPAF	Defense Ordnance Technology Consortium (DOTC) (DRS Sustainment Systems, General Dynamics Land Systems and Raytheon Missile systems) : Various	-	14.876	Aug 2018	56.676	Oct 2018	8.925	Oct 2019	5.100	Oct 2019	14.025	0.000	85.577	-
Government Furnished Equipment (GFE)	MIPR	Program Executive Officer Missiles and Space : Various	-	2.374	Jul 2018	4.522	Oct 2018	0.474	Oct 2019	0.900	Oct 2019	1.374	0.000	8.270	-
		Subtotal	-	17.250		62.979		10.956		6.000		16.956	0.000	97.185	N/A
Government Furnished Equipment (GFE)	MIPR	systems) : Various Program Executive Officer Missiles and Space : Various Subtotal	- -	2.374	Jul 2018	4.522 62.979	Oct 2018	0.474	Oct 2019	0.900	Oct 2019	1.374	0.000	8.270 97.185	- ;

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	ıy								Date:	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Pro PE 060 Defens	ogram Ele 4117A / M e (M-SHC	ement (N /laneuver )RAD)	umber/Na - Short R	<b>ame)</b> ange Air	Project FI4 / Ma (M-SHC	(Number aneuver - DRAD)	r/ <b>Name)</b> Short Rar	nge Air D	efense
Product Developme	nt (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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
Remarks	<b>, , ,</b> , , , , , , , , , , , , , , , ,	,													
MEP is by DRS Sustainme Platform Integration is by 0 Stinger Missile Launcher is Significant GFE includes M M299 launchers are by Lo FAAD-C2 systems and rad	Antegration a ent Systems General Dyna s by Raytheo M299 Hellfire ockheed Mart dios are by N	(St. Louis, MO): \$7.050 amics Land Systems (Li on Missile Systems (Tus launchers, FAAD-C2 sy in Corp. (Orlando, FL): \$ lorthrop Grumman (Red	oner. ) million FY ma, OH an con, AZ): \$ vstems and \$1.125 milliondo Beac	18, \$30.040 d Anniston, 0.776 millio radios. on FY18. h, CA): \$1.2	million FY1 AL): \$7.050 n FY18, \$3.4 49 million F	9 and \$3.9 million FY <sup>,</sup> 881 million Y18.	00 million F1 18, \$22.400 FY19 and \$(	/20. million FY1 ).325 millio	9 and \$9.80 n FY20.	0 million FY	20.	_			
Support (\$ in Million	ıs)			FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Costs	MIPR	Aviation and Missiles Command (AMCOM) : Redstone Arsenal, AL	-	0.252	Jul 2018	3.460	Oct 2018	2.049	Oct 2019	-		2.049	0.000	5.761	-
		Subtotal	-	0.252		3.460		2.049		-		2.049	0.000	5.761	N/A
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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
Developmental Testing	MIPR	Redstone Test Center (RTC) and White Sands Missile Range (WSMR) : Redstone, AL and WSMR, NM	-	-		2.386	Oct 2018	9.511	Oct 2019	-		9.511	0.000	11.897	-
Test Support	MIPR	RTC, WSMR, Target Management	-	-		4.291	Oct 2018	8.983	Oct 2019	-		8.983	0.000	13.274	-

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				R-1 Pro PE 060 Defense	g <b>ram Ele</b> 4117A / M e <i>(M-SHC</i>	ement (N Maneuver DRAD)	umber/N - Short R	<b>ame)</b> Pange Air	<b>Project</b> FI4 / Ma (M-SHO	<b>(Number</b> neuver - RAD)	r/ <b>Name)</b> Short Ran	ge Air D	efense
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2 OC	020 CO	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
		Office and others : Redstone, AL and WSMR, NM													
	_	Subtotal	-	-		6.677		18.494		-		18.494	0.000	25.171	N/A
			Prior Years	FY 2	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2 OC	020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	19.201		79.016		33.100		6.000		39.100	0.000	137.317	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	١rmy	/																				Dat	te: N	Marc	h 20	)19			
Appropriation/Budget Activity 2040 / 4								<b>R-1</b>   PE 0 <i>Defe</i>	Prog 604 nse	gran 117/ ( <i>M</i> -3	n El A / / SH(	<b>eme</b> i Mane DRAL	n <b>t (N</b> uvei ))	lum r - S	ber Short	Nar Rai	ne) nge .	Air	Pro FI4 (M·	o <b>jec</b> I M -SH	<b>t (N</b> lane OR/	lumt euvei AD)	<b>per/</b> r - S	Nam Short	n <b>e)</b> Rar	nge .	Air E	Defe	nse
			( 204)			EV				EV		20		-		24			- > -				FV	202	2				24
Event Name	1	2	3	в 4	1	2	3	4	1	2	20	20	1	2	r 20 3	21	1		2	3	4	1	Р Т 2	3	3	1	2	3	4
Directed Requirement	D	irected	d Requir	emen	t																								
Initial M-SHORAD Material Development/Integration				li de	ritial M	-SHOI	RAD M	aterial I	Develo	pmen	t/Integ	gration																	
Initial M-SHORAD Testing								Initial	м-зно	ORAD	Testi	ng																	
Initial M-SHORAD First Unit Equipped (FUE)													Initi	3 ial M-S	HORA	AD FU	=												
M-SHORAD Other Transactional Authority (OTA) Award												2 M-SHO			ward														
M-SHORAD Design, Development, Prototype Build and Perform	ance	Asse	essmer	nt								MS	HOR	AD De	sign, (	Develo	pment	, Prot	otype	Build	and	Perform	nance	Asses	sment	t			
M-SHORAD FUE																													M-SI

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019					
Appropriation/Budget Activity     R-1       1040 / 4     PE       Defe	<b>Program Element (Numbe</b> 0604117A / Maneuver - Sho ense (M-SHORAD)	r/ <b>Name)</b> rt Range Air	<b>Project (Number/Name)</b> FI4 <i>I Maneuver - Short Range Air Defer</i> (M-SHORAD)				
Schedu	le Details						
	Sta	art	E	nd			
Events	Quarter	Year	Quarter	Year			
Directed Requirement	2	2018	2	2018			
Initial M-SHORAD Material Development/Integration	4	2018	1	2020			
Initial M-SHORAD Testing	4	2019	1	2021			
Initial M-SHORAD First Unit Equipped (FUE)	2	2021	2	2021			
M-SHORAD Other Transactional Authority (OTA) Award	4	2020	4	2020			
M-SHORAD Design, Development, Prototype Build and Performance Assessm	ent 4	2020	3	2024			
M-SHORAD FUE	4	2024	4	2024			

Exhibit R-2, RDT&E Budget Item							Date: March 2019					
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					<b>R-1 Program Element (Number/Name)</b> PE 0604118A <i>I TRACTOR BEAM</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	10.400	52.894	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	63.294
XW0: TRACTOR BEAM	-	10.400	52.894	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	63.294

#### A. Mission Description and Budget Item Justification

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

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	10.400	52.894	0.000	-	0.000
Current President's Budget	10.400	52.894	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
<ul> <li>Congressional General Reductions</li> </ul>	-	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
<ul> <li>Reprogrammings</li> </ul>	-	-			
<ul> <li>SBIR/STTR Transfer</li> </ul>	-	-			

Exhibit R-2, RDT&E Budget Item							Date: Marc	h 2019				
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				anced	<b>R-1 Program Element (Number/Name)</b> PE 0604119A <i>I Army Advanced Component Development &amp; Prototyping</i>							
COST (\$ in Millions)	Prior Years	Prior Years         FY 2018         FY 2019         FY 2020         FY 2020         FY 2020         FY 2020         FY 2020         FY 2021         FY 2022         FY 2023         F								FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	115.116	4.529	119.645	32.150	32.863	21.368	26.627	0.000	232.653
BR2: Advanced Component Development & Prototyping	-	0.000	0.000	115.116	4.529	119.645	32.150	32.863	21.368	26.627	0.000	232.653

#### A. Mission Description and Budget Item Justification

The Advance Component Development & Prototype budget line includes multiple efforts across the Army's Battlefield Operational Systems necessary to evaluate integrated technologies in the most high fidelity and realistic operating environment as possible to assess the performance or cost reduction potential of advanced technology.

Projects focus on proving component and subsystem maturity prior to integration in major and complex systems and may involve risk reduction initiatives. Efforts also includes advanced technology demonstrations to expedite technology transition from the laboratory to operational use, with the goal of transitioning systems into the acquisition process within the FYDP.

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	115.116	4.529	119.645
Total Adjustments	0.000	0.000	115.116	4.529	119.645
<ul> <li>Congressional General Reductions</li> </ul>	-	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
<ul> <li>Reprogrammings</li> </ul>	-	-			
<ul> <li>SBIR/STTR Transfer</li> </ul>	-	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	115.116	4.529	119.645

Exhibit R-2, RDT&E Budget Iten	n Justificat	ion: PB 202	20 Army							Date: Mare	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	anced	<b>R-1 Program Element (Number/Name)</b> PE 0604120A <i>I Assured Positioning, Navigation and Timing (PNT)</i>										
COST (\$ in Millions)	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	-	132.810	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	132.810
ED5: Assured Positioning, Navigation and Timing (PNT)	-	21.469	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	21.469
EH8: DISMOUNTED	-	13.846	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	13.846
EH9: PSEUDOLITES	-	53.332	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	53.332
EJ2: MOUNTED	-	32.621	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	32.621
EJ3: ANTI-JAM ANTENNA	-	11.542	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.542

#### Note

Program Element (PE) 0604120A transitioned to PE 1206120A beginning in FY19.

#### A. Mission Description and Budget Item Justification

Network Enabling Functions (Assured PNT).

Assured Positioning, Navigation and Timing (PNT) will provide the Army's ground maneuver forces access to trusted PNT information under conditions where spacebased PNT Global Positioning System (GPS) may be limited or denied. Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 Apr 2010, approved the Positioning, Navigation and Timing Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. The Material Development Decision (MDD) was approved on 30 Jul 2013. The Assured PNT draft Capabilities Development Document was validated by the Army Requirements Oversight Council (AROC) on 28 Jul 2014. The Assured PNT Cross Functional Team is drafting individual Capability Development Documents for each product.

PNT is a critical enabler of many Army systems. The current GPS capability is a fixed frequency system vulnerable to current and emerging threats, and field conditions (e.g. urban, dense vegetation), which means Warfighter assured access and integrity to PNT is not guaranteed. This situation degrades mission performance to an unacceptable level. Therefore, current Army systems cannot operate at the required PNT Assurance Levels with GPS alone.

Assured PNT consists of one project (ED5) Assured PNT and four separate and interdependent PNT products; (EH8) Dismounted A-PNT System, (EH9) Pseudolite, (EJ2) Mounted A-PNT System (MAPS), and (EJ3) Anti-Jam Antenna System (AJAS). These interdependent PNT products assure access to and integrity of PNT information. Each product provides a degree of standalone capability that can be leveraged across the solutions and enterprise enablers to raise the capabilities in all environments and across all formations and warfighting functions. Project Manager (PM) PNT manages these four products (Dismounted A-PNT System, Pseudolite, Mounted A-PNT System (MAPS), and AJAS) constructed to develop, test, field, and sustain the A-PNT materiel solution.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 A	rmy			Date:	March 2019
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	4: Advanced	<b>R-1 Program El</b> PE 0604120A / A	ement (Number/Name) Assured Positioning, Na	) vigation and Timing (P	NT)
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	164.967	0.000	0.000	-	0.000
Current President's Budget	132.810	0.000	0.000	-	0.000
Total Adjustments	-32.157	0.000	0.000	-	0.000
<ul> <li>Congressional General Reductions</li> </ul>	-0.114	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-25.000	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-5.479	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-1.564	-	-	-	-

#### **Change Summary Explanation**

FY 2018 congressional marks of \$23.679 million and \$1.321 million due to contract delays.

· · ·	ustification	: PB 2020 A	rmy							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progr</b> PE 060412 Navigation	<b>am Elemen</b> 20A I Assure and Timing	<b>t (Number/</b> ed Positionii (PNT)	Name) ng,	Project (N ED5 / Assu Timing (PN	umber/Na ıred Positi IT)	<b>me)</b> oning, Naviga	ation and
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
ED5: Assured Positioning, Navigation and Timing (PNT)	-	21.469	0.000	0.000	-	0.000	0.000	0.000	0.000	0.00	0.000	21.469
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bu Network Enabling Functions (As Resiliency and Software Assura (GPS)-challenged environment of for Selective Availability Anti-Spo embedded Ground Based-GPS support client systems in synchr The Assured PNT Enterprise En GPS solutions that leverage con	dget Item J sured PNT). nce Measure until future P pofing Modu Receiver Ap onizing RSA abler require nmercial cap	ustification es (RSAM) p ositioning, N le (SAASM) plications N M deployme ements will l pabilities, ex	brovides res Navigation a -based GPS lodule (GB- ent to comb be refined b isting contra	siliency and and Timing S receivers GRAM)/Mic at forces. by conductir acts, industi	software as (PNT) solut including th croGRAM, ng technical ry, academi	ssurance pr ions are full ne dismount RSAM will c demonstrat a, and the v	ocesses tha y implemen ed/mounted coordinate ir tions includi varfighter in	it mitigate r ted. RSAW Defense A itegrated so ng Alternati an iterative	isks in a Glo I will result in dvanced Gl oftware testi ive Navigatio process.	obal Positi n software PS Receiv ng with ho on (ALT N	oning System security upd er (DAGR) a ost platforms AV) and net-	n ates nd the and enabled
Title: PNT System of System (Si	OSA) Testin	a and Resili	<u>ency and S</u>	oftware Ass	surance Mo	dification (R	SOW)		Fĭ	2018	FY 2019	FY 2020
<b>Description:</b> The effort supports	testing of P	NT System	of Systems	Architectu	re (SOSA) c	of Army PN1	capabilitie:	s and Resil	iency	21.405		
and Software Assurance Modific		,										
and Software Assurance Modific		,			Accomplis	shments/Pl	anned Prog	jrams Sub	totals	21.469	-	

PE 0604120A: Assured Positioning, Navigation and Timi... Army

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604120A / Assured Positioning,	ED5 I Assı	red Positioning, Navigation and
	Navigation and Timing (PNT)	Timing (PN	IT)

Development Engineering Center (CERDEC) to develop and evaluate solutions to enhance the resiliency of Global Positioning System (GPS)-dependent systems operating in evolving contested environments. PNT SOSA testing and RSAM implementation will complete software development for Defense Advanced GPS Receiver (DAGR), Ground Based GPS Receiver Applications Module (GB-GRAM), and MicroGRAM to include engineering build testing and formal qualification testing, as well as integration and integration testing, for platforms utilizing DAGR, GB-GRAM and MicroGRAM engineering builds.

The Assured PNT Enterprise Enabler requirements will be refined by conducting technical demonstrations including Alternative Navigation and net-enabled GPS solutions that leverage commercial capabilities, existing contracts, industry, academia, and the warfighter in an iterative process.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060 <i>Naviga</i>	ogram Ele 4120A / A tion and 7	e <b>ment (N</b> Assured F Fiming (Pl	l <b>umber/N</b> Positioning NT)	<b>ame)</b> g,	Project ED5 / A Timing	( <b>Numbe</b> ssured P (PNT)	r/Name) ositioning,	Navigati	on and
Management Service	es (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 O(	2020 CO	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	Allot	PM PNT : Various	1.134	1.559	Oct 2017	-		-		-		-	0.000	2.693	-
		Subtotal	1.134	1.559		-		-		-		-	0.000	2.693	N/A
Remarks Program Element (PE) 060 Product Developme	04120A proje nt (\$ in M	ect ED5 transitions to Pl	<u>= 1206120A</u>	project FJ	8 beginning 2018	in FY19. FY	2019	FY 2 Ba	2020 ISE	FY 2 OC	2020 CO	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
AM2P - DOTC GPS Receiver Prototypes	C/FFP	Rockwell Collins : Cedar Rapids, IA	0.630	-		-		-		-		-	0.000	0.630	-
AM2P - DOTC GPS Receiver Prototypes	C/CPFF	L-3 IEC : Anaheim, CA	0.600	-		-		-		-		-	0.000	0.600	-
AM2P - DOTC GPS Receiver Prototypes	C/CPFF	EOIR Technologies : Fredericksburg, VA	3.982	-		-		-		-		-	0.000	3.982	-
AM2P - DOTC GPS Receiver Prototypes	C/CPFF	SAVIT : Rockaway, NJ	0.286	-		-		-		-		-	0.000	0.286	-
AM2P - GPS/PGM Integration	MIPR	various : various	2.989	-		-		-		-		-	0.000	2.989	-
Develop Pseudolite Competitive Prototype Contractor 1	C/CPIF	Datapath - Rockwell Collins : Cedar Rapids, IA	3.615	-		-		-		-		-	0.000	3.615	-
Develop Pseudolite Competitive Prototype Contractor 2	C/CPIF	L-3 Communications : Anaheim, CA	3.237	-		-		-		-		-	0.000	3.237	-
RSAM - DAGR Software Development	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	-	3.643	Mar 2018	-		-		-		-	0.000	3.643	-
RSAM - GB-GRAM Software Development	SS/CPFF	GCC Technologies : Oakland, MD	2.770	4.516	Jun 2018	-		-		-		-	0.000	7.286	-

Appropriation/Budget Activity       R-1 Program Element (Number/Name)       Project (Number/Name)	Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	19	
Product Development (s in Million Contraction Room Room Room Room Room Room Room Ro	Appropriation/Budge 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 060 <i>Naviga</i>	ogram Ele 4120A I A tion and T	ement (N Assured F Fiming (Pl	<b>umber/N</b> Positioning VT)	<b>ame)</b> 7,	Project ED5 / A Timing	( <b>Numbe</b> ssured Po (PNT)	r/Name) ositioning,	Navigati	ion and
Contract Bride (Contraction Sympo (SAM) (SAM) - Develop (SAM) (Integration Modifications (SAM) - Develop (SAM) (Various)         Contraction Sympo (SAM) (Various)         Performing Autivity & Location         Prior Various         Prior Various         Various (Various)         Performing Various         Various (Various)         Various	Product Developmen	nt (\$ in M	illions)	ſ	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	]		
RSAM         Various	Cost Category Item	Contract Method & Type	Performing Activity & Location	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 Modernization Prior Miges         TBD         Various : Various         1.223         Feb 2019         .         Image: Contract in the state	RSAM - Develop RSAM Integration Modifications	Various	Various : Various	-	0.476	Mar 2018	-		-		-		-	0.000	0.476	-
Subtool         18.100         9.858	Army Modernization Priorities	TBD	Various : Various	-	1.223	Feb 2019	-		-		-		-	0.000	1.223	-
Remarks Program Element (PE) 0601-12C4 project EDS transitions to P 12061204 project FJ8 beginnering support (\$ in Million:         FY 2018         FY 2019         FY 2010 Base         FY 2020 OC         FY 2020 Total         FY 2020 Total           Support (\$ in Million:         Vertow to the total support support         Performing Activity & Location         Prior Veras         Cost         Award Date         Cost         Support Base         Support Support         FY 2020 Total         F			Subtotal	18.109	9.858		-		-		-		-	0.000	27.967	N/A
Contract Method StypePerforming Activity & LocationPrior YearsCostAward DateCostAward DateCostAward DateAward CostAward DateAward CostAward DateCostCostCostTotal CostTotal<	Program Element (PE) 060 Support (\$ in Millions	4120A proje s)	ect ED5 transitions to PE	<u>= 1206120A</u>	project FJ	8 beginning 2018	in FY19.	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	]		
Engineering and Technical Contracting Services         C/FFP         Various : Various         6.186         3.259         Mar 2018 $\sim$	Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Technical Government ServicesMIPRC4ISR : Various1.8520.205Jan 2018 </td <td>Engineering and Technical Contracting Services</td> <td>C/FFP</td> <td>Various : Various</td> <td>6.186</td> <td>3.259</td> <td>Mar 2018</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>0.000</td> <td>9.445</td> <td>-</td>	Engineering and Technical Contracting Services	C/FFP	Various : Various	6.186	3.259	Mar 2018	-		-		-		-	0.000	9.445	-
AM2P - Government EngMIPRARDEC : Picatinny, NJ3.996 <td>Engineering and Technical Government Services</td> <td>MIPR</td> <td>C4ISR : Various</td> <td>1.852</td> <td>0.205</td> <td>Jan 2018</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>0.000</td> <td>2.057</td> <td>-</td>	Engineering and Technical Government Services	MIPR	C4ISR : Various	1.852	0.205	Jan 2018	-		-		-		-	0.000	2.057	-
AM2P - Joint PGM SME       MIPR       Various : Various       3.441       -       -       -       -       -       0.000       3.441       -       -       -       -       0.000       3.441       -       -       -       -       -       0.000       3.441       -       -       -       -       -       -       0.000       3.441       -       -       -       -       -       -       0.000       3.441       -       -       -       -       -       -       -       0.000       18.939       -       -       -       -       -       -       -       -       -       -       -       -       -       -       0.000       18.939       -	AM2P - Government Eng	MIPR	ARDEC : Picatinny, NJ	3.996	-		-		-		-		-	0.000	3.996	-
Subtotal       15.475       3.464       -       -       -       -       0.000       18.939         Remarks Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.       -       -       -       0.000       18.939         Test and Evaluation (\$ in Millions)       FY 2018       FY 2019       FY 2020 FY 2019       FY 2020 Base       FY 2020 CO       FY 2020 Total       FY 2020	AM2P - Joint PGM SME	MIPR	Various : Various	3.441	-		-		-		-		-	0.000	3.441	-
Remarks         Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.         Test and Evaluation (\$ in Millions)       FY 2018       FY 2019       FY 2020 Base       FY 2020 OCO       FY 2020 Total         Contract       Contract       Image: Contract dot in the state of the state			Subtotal	15.475	3.464		-		-		-		-	0.000	18.939	N/A
Test and Evaluation (\$ in Millions)         FY 2018         FY 2019         FY 2020 Base         FY 2020 OCO         FY 2020 Total           Contract         Image: Contract descent d	<u>Remarks</u> Program Element (PE) 060	4120A proje	ect ED5 transitions to PE	E 1206120A	project FJ	8 beginning	in FY19.						_			
Contract Con	Test and Evaluation	(\$ in Milli	ions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total			
MethodPerformingPriorAwardAwardAwardAwardAwardCost TotalVaCost Category Item& TypeActivity & LocationYearsCostDateCostDateCostDateCostDateCost <td>Cost Category Item</td> <td>Contract Method &amp; Type</td> <td>Performing Activity &amp; Location</td> <td>Prior Years</td> <td>Cost</td> <td>Award Date</td> <td>Cost</td> <td>Award Date</td> <td>Cost</td> <td>Award Date</td> <td>Cost</td> <td>Award Date</td> <td>Cost</td> <td>Cost To Complete</td> <td>Total Cost</td> <td>Target Value of Contract</td>	Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AM2P - Bench Top Component Level TestMIPRVarious : Various0.1120.0000.112	AM2P - Bench Top Component Level Test	MIPR	Various : Various	0.112	-		-		-		-		-	0.000	0.112	-

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Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Army	/								Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4						<b>R-1 Program Element (Number/Name)</b> PE 0604120A / Assured Positioning, Navigation and Timing (PNT)					Project ED5 / A Timing	<b>Project (Number/Name)</b> ED5 <i>I Assured Positioning, Navigation and</i> <i>Timing (PNT)</i>			
Test and Evaluation	(\$ in Milli	ions)	[	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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
AM2P - Flight Tests	MIPR	Various : Yuma Proving Ground, AZ	0.780	-		-		-		-		-	0.000	0.780	-
SOSA Testing/RSAM - Government Eng Support	MIPR	Various : Various	0.942	1.885	Mar 2018	-		-		-		-	0.000	2.827	-
SOSA Testing/RSAM - Contractor Eng Support	Various	Various : Various	-	1.278	Mar 2018	-		-		-		-	0.000	1.278	-
Platform Integration Testing	Various	Various : Various	0.500	3.175	Apr 2018	-		-		-		-	0.000	3.675	-
SOSA Testing/RSAM Test Equipment	Various	Various : Various	-	0.250	Aug 2018	-		-		-		-	0.000	0.250	-
	1	Subtotal	2.334	6.588		-		-		-		-	0.000	8.922	N/A
<u>Remarks</u> Program Element (PE) 060	)4120A proj	ect ED5 transitions to PE	E 1206120A Prior Years	project FJ	8 beginning 2018	in FY19.	2019	FY 2 Ba	2020 Ise	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	37.052	21.469		0.000		-		-		-	0.000	58.521	N/A
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2020	Army					Date: March 20	19
Appropriation/Budget Activity 2040 / 4		<b>R-1 F</b> PE 0 <i>Navi</i> g	Program Elemen 604120A / Assure gation and Timing	t (Number/Name ed Positioning, g (PNT)	e) Project (N ED5 / Ass Timing (Pl	<b>lumber/Name)</b> ured Positioning, NT)	Navigation and
	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Event Name	1 2 3 4 1	2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
PNT System of Systems Architecture (SOSA) Testing	SOSA Testing						
RSAM - DAGR Software Development	DAGR Software Development						
RSAM - GB-GRAM Software Development	GB-GRAM Software Developm	ent					
Platform Integration Testing	Platform Integrat	ion					
						•	

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army					Date: March	n 2019
ppropriation/Budget Activity 040 / 4	<b>R-1 Program Ele</b> PE 0604120A / As Navigation and Ti	ment (Number ssured Position ming (PNT)	r/ <b>Name)</b> hing,	Project (Nu ED5 / Assu Timing (PN	Imber/Nam red Position T)	e) ing, Navigation and
	Schedule Details					
		Sta	art		En	d
Events		Quarter	Year	Q	uarter	Year
PNT System of Systems Architecture (SOSA) Testing		1	2017		4	2019
RSAM - DAGR Software Development		1	2018		4	2019
RSAM - GB-GRAM Software Development		4	2017		4	2019
Platform Integration Testing		3	2018		4	2019

Note

Program Element (PE) 0604120A project ED5 transitions to PE 1206120A project FJ8 beginning in FY19.

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The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units to support the capability development document requirements. This will be implemented by utilizing a competitive Other Transaction Agreement (OTA) contract vehicle to obtain prototypes. The Government will conduct laboratory and performance

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604120A / Assured Positioning,	EH8 / DISA	MOUNTED
	Navigation and Timing (PNT)		
testing. The findings from these test offerts will determine whether or not to pro	people to test fix test events. Providing initial or	nuinmont to	coocified unite will recult in an

testing. The findings from these test efforts will determine whether or not to proceed to test-fix-test events. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

# E. Performance Metrics

N/A

Proper dation/Budget Activity       Project (Number/Name) Project (	Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19			
Management Services (\$ in Willions)       FY 2018       FY 2019       FY 2020       FY 2020       FY 2020       FY 2020       Total       Total       Target Value of Contract         Cost Category tem       Method       Performing       Prior       Cost       Award       Cost	Appropriation/Budg 2040 / 4	jet Activity	/				<b>R-1 Pro</b> PE 060 <i>Naviga</i>	ogram Ele 04120A / A tion and 7	ement (N Assured F Fiming (Pl	lumber/N Positioning NT)	<b>ame)</b> g,	Project EH8 / <i>L</i>	roject (Number/Name) H8 / DISMOUNTED					
Contract Cost Category temPerforming Activity & LocationPrior VearsCostAward DateCostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward 	Management Servio	ces (\$ in M	lillions)		FY 2	2018	FY 2019 FY		FY 2 Ba	FY 2020 Base		2020 CO	FY 2020 Total	]				
Project Management Support - Government Support - Government 	Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract		
Project Management Support - Contractor       C/CPFF       Various : Various       0.180       0.248       May 2018       -       -       -       -       -       0.000       0.428       -       NA         Support - Contractor       Subtotal       0.605       0.344       -       -       -       -       -       0.000       0.428       NA         Remarks Program Element (PE) 060/120A protect BH transitions to PE 1206120A protect BH transitions to PE 1206120A protect SUBJECT       FY 2018       FY 2019       FY 2019       FY 2020 Base       FY 2020 OCO       FY 2020 Total         Product Development (E) 060/120A protect Method & Type       Performing Activity & Location       Prior       Cost       Award Date       Cost       Award Date       Cost       Maward Date       Cost       OCOC       FY 2020 Total       Cost Total       Tage       Tage         Development of a Dismounted A-Code capable prototype       C/CPFF       L3, IEC : Anaheim, CA       0.524       8.484       Jun 2018       -       -       -       Award       Cost       Mard       0.600       9.008       -       -       0.000       9.008       -       -       0.000       9.008       -       -       0.000       9.008       -       -       -       0.000<	Project Management Support - Government	Allot	PM PNT : APG, MD	0.425	0.096	May 2018	-		-		-		-	0.000	0.521	-		
Subtotal0.6050.344000.4000.494N/ARemarks Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.FY 2019FY 2019FY 2020 BaseFY 2020 OCOFY 2020 TotalFY 2020 Total	Project Management Support - Contractor	C/CPFF	Various : Various	0.180	0.248	May 2018	-		-		-		-	0.000	0.428	-		
Remarks Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.         Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.         Product Development (\$ in Millions)       FY 2018       FY 2020 Base       FY 2020 Coc       FY 2020 Total         Contract Method & Type       Performing Ativity & Location       Prior Years       Award Cost       Award Date       Award Cost       Award Date       Cost       Cost       Total         Development of a Dismounted M-Code capable prototype       CCPFF       CR       Cast       Award Date       Award Cost       Award Date       Cost       Cost       Total         Development of a Dismounted M-Code capable prototype       CCPFF       CR       Cost       Award Date       Cost       <th colspan="6</td> <td></td> <td></td> <td>Subtotal</td> <td>0.605</td> <td>0.344</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td></td> <td>-</td> <td>0.000</td> <td>0.949</td> <td>N/A</td>			Subtotal	0.605	0.344		-		-		-		-	0.000	0.949	N/A		
Method & TypeMethod Activity & LocationPrior YearsCostAward DateCostAward DateCostAward DateAward CostAward DateCostAward DateAward CostAward CostAward CostAward CostAward CostAward CostAward 	Product Developme	ent (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2 OC	2020 CO	FY 2020 Total			Target		
Development of a Dismounted M-Code capable prototypeC/CPFFL3, IEC : Anaheim, CA0.5248.484Jun 20180.0009.008-Development of a small SWAP-C multi sensor navigation prototypeMIPRCERDEC Command Power and Integration Directorate : APG, MD1.2531.513Apr 20180.0009.008-Dismounted A- PNT Prototyping & DevelopmentTBDTBD-1.2531.513Feb 20190.0003.253-Dismounted A- PNT Prototyping & DevelopmentTBDTBD-3.253Feb 20190.0003.253-Dismounted A- PNT Prototyping & DevelopmentTBDTBD1.77713.2500.00015.027N/A	Cost Category Item	Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Value of Contract		
Development of a small SWAP-C multi sensor navigation prototypeCERDEC Command Power and Integration Directorate : APG, MD1.2531.513Apr 20180.0002.766Dismounted A- PNT Prototyping & DevelopmentTBDTBDTBD3.253Feb 20190.0003.253Dismounted A- PNT Prototyping & DevelopmentTBDTBDTBD1.77713.2500.00015.027N/A	Development of a Dismounted M-Code capable prototype	C/CPFF	L3, IEC : Anaheim, CA	0.524	8.484	Jun 2018	-		-		-		-	0.000	9.008	-		
Dismounted A- PNT Prototyping & Development         TBD         TBD         TBD         TBD         Subtoal         1.777         13.253         Feb 2019         -         Image: Feb 2019         Image: Feb 2	Development of a small SWAP-C multi sensor navigation prototype	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	1.253	1.513	Apr 2018	-		-		-		-	0.000	2.766	-		
Subtotal         1.777         13.250         -         -         -         0.000         15.027         N/A	Dismounted A- PNT Prototyping & Development	TBD	TBD : TBD	-	3.253	Feb 2019	-		-		-		-	0.000	3.253	-		
			Subtotal	1.777	13.250		-		-		-		-	0.000	15.027	N/A		

#### Remarks

Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

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Appropriation/Budget Activity 2040 / 4         R-1 Program Element (Number/Name) PE 0604120A / Asured Positioning, Navigation and Timing (PNT)         Project (Number/Name) EH8 / DISMOUNTED         Project (Number/Name) EH8 / DISMOUNTED           Support (\$ in Millions)	Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Army	/								Date:	March 20	19	
Support (\$ in Millions)FY 2018FY 2019FY 2019FY 2010FY 2010<	Appropriation/Budge 2040 / 4	t Activity	<b>y</b>				<b>R-1 Pro</b> PE 060 <i>Navigat</i>	R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)Project (Number/Nar EH8 / DISMOUNTED								
Contract Method Method Stype         Performing Activity & Location         Prior Years         Cost Cost         Award Date         Cost Cost         Award Date         Cost Cost         Award Date         Cost         Award Date         Cost         Award Date         Cost         Award Date         Cost         Award Date         Cost         Cost         Total Contract         Target Contract           Engineering and Technical Services - Contractor         Various         CSISR : Various         0.425         0.252         Nov 2017         -         -         -         -         0.000         0.677         -         -         -         -         0.000         0.269         -         -         -         0.000         0.269         -         -         0.000         0.269         -         -         0.000         0.269         -         -         0.000         0.269         -         -         0.000         0.269         -         -         0.000         0.269         N//           Remarks Program Element (PE) 0604 t20A project Edge tarbitistons to PE t206120A project FJ 2018         FY 2019         FY 2019         FY 2020         Cost Total         Cost Total         Cost Total	Support (\$ in Millions	s)		ſ	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total			
Engineering and Technical Services - Government         Various         C5ISR : Various         0.425         0.252         Nov 2017         -         -         -         -         0.000         0.677         -           Engineering and Technical Services - Contractor         C/CPFF         Various         0.269         -         -         -         -         -         0.000         0.677         -           Services - Contractor         Various : Various         0.269         -         -         -         -         -         0.000         0.677         -           Services - Contractor         Subtotal         0.694         0.252         -         -         -         -         0.000         0.670         0.000         0.677         -           Services - Contractor         Subtotal         0.694         0.252         -         -         -         -         0.000         0.946         N//           Remarks         Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.         FY 2019         FY 2019         FY 2020         FY 2020         Cost To Compte Cost Cost Cost Cost Potals         3.076         13.846         0.000         -         -         -         0.000         16.922         N//	Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Technical Services - Contractor       C/CPFF       Various : Various       0.269       -       -       -       -       -       0.000       0.269       -         Remarks Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.       FY 2019       FY 2020 Base       FY 2020 OCO       FY 2020 Total       Cost To Complete       Total       Target Value of Contract         Prior       Prior       FY 2018       FY 2019       FY 2020 Base       FY 2020 OCO       FY 2020 Total       Cost To Complete       Total       Total       Total       Total       Cost To Complete       N//         Remarks       Project Cost Totals       3.076       13.846       0.000       -       -       -       0.000       16.922       N//         Remarks       Value of Cost Total       3.076       13.846       0.000       -       -       -       0.000       16.922       N//         Remarks       Value of Cost Totals       3.076       13.846       0.000       -       -       -       0.000       16.922       N//         Remarks       Value of Cost Totals       S.076       Value of Cost Totals       S.076       Value of Cost Totals       S.076       S.076       S.076       S.076	Engineering and Technical Services - Government	Various	C5ISR : Various	0.425	0.252	Nov 2017	-		-		-		-	0.000	0.677	-
Subtotal         0.694         0.252         -         -         -         -         -         0.000         0.946         N//           Remarks Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.         FY 2019         FY 2020 Base         FY 2020         FY 2020 Total         FY 2020 Complete         FY 2	Engineering and Technical Services - Contractor	C/CPFF	Various : Various	0.269	-		-		-		-		-	0.000	0.269	-
Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.       FY 2019       FY 2020       FY 2020       Cost To tall       Total       Total       Cost Totals       Total       Cost Totals       Total       Cost Totals       N//         Remarks       9.000       -       -       -       0.000       16.922       N//			Subtotal	0.694	0.252		-		-		-		-	0.000	0.946	N/A
Project Cost Totals         3.076         13.846         0.000         -         -         0.000         16.922         N//           Remarks         Image: State of the stat	Prior Years FY 2018					2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total     Target       Total     Value of       Cost     Contract       0.677     -       0.269     -       0.946     N/A       Total     Target       Value of     Contract       16.922     N/A	
Project Cost Totals         3.076         13.846         0.000         -         -         0.000         16.922         N//           Remarks			_	Years	FY 2	2018	FY 2	2019	Ba	se	00	0	Total	Complete	Cost	Contract
Remarks			Project Cost Totals	3.076	13.846		0.000		-		-		-	0.000	16.922	N/A

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Ar	my							Date: March 2	019
Appropriation/Budget Activity 2040 / 4			<b>R-1 F</b> PE 00 <i>Navig</i>	Program Elemen 604120A I Assur gation and Timing	n <b>t (Number/Name</b> ed Positioning, g (PNT)	9)	Project (N EH8 / D/S	<b>lumber/Name)</b> MOUNTED	
				1	1			I	
Event Name	FY 2018	FY 20	19	FY 2020	FY 2021	F	FY 2022	FY 2023	FY 2024
Dismounted A-PNT Risk Reduction Activities	1 2 3 4					1	2 3 4		

khibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: March	n 2019	
opropriation/Budget Activity 040 / 4	<b>R-1 Program E</b> PE 0604120A <i>I</i> <i>Navigation and</i>	Element (Number/Name)Project (Number/Name)I Assured Positioning, d Timing (PNT)EH8 I DISMOUNTED				
	Schedule Details	;			Date: March 2019(Number/Name)ISMOUNTEDEndQuarterYear22019	
		Sta	irt	En	d	
Events		Quarter	Year	Quarter	Year	
Dismounted A-PNT Risk Reduction Activities		4	2017	2	2010	

#### <u>Note</u>

Program Element (PE) 0604120A project EH8 transitions to PE 1206120A project FJ9 beginning in FY19.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc		
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 0604120A / Assured Positioning, Navigation and Timing (PNT)Project (N EH9 / PSE					umber/Nan UDOLITES	ne)				
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
EH9: PSEUDOLITES	-	53.332	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	53.332
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

Network Enabling Functions (Assured PNT).

Highly accurate Positioning, Navigation and Timing (PNT) data is a key enabler and a cross cutting capability for Army forces to execute their mission. The Army requires ground maneuver forces access to trusted PNT information under conditions where space-based PNT may be limited or denied to maintain its Global Positioning System (GPS) military advantage on the battlefield. The current GPS capability is a fixed frequency system which is vulnerable to current and emerging threats and field conditions.

Pseudolite (satellite-like transmitters) assure GPS access and integrity by providing PNT via terrestrial and airborne-based radio navigation GPS transmitters in electronically or physically challenged environments using a higher power signal. Area protection is provided through the deployment of Pseudolite transmitters supporting a Brigade Combat Team area of operations. Pseudolite supports continued operations of PNT-enabled systems such as Blue Force Tracker, Communications Networks and Precision Guided Munitions. Pseudolite consists of three segments:

1. Pseudolite Transmitter segment provides terrestrial and airborne radio navigation (GPS-like) service in electronically or physically challenged environments using a high power signal.

2. Command and Control (C2) segment to control the Pseudolite transmitters on the battlefield.

3. Receiver segment, which will develop software upgrades to current and future military GPS receivers to receive and process the Pseudolite signals.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Pseudolites	53.332	-	-
<b>Description:</b> Pseudolite Technology Maturation and Risk Reduction to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system.			
Accomplishments/Planned Programs Subtotals	53.332	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604120A / Assured Positioning,	EH9 / PSE	UDOLITES
	Navigation and Timing (PNT)		

#### D. Acquisition Strategy

The Pseudolite Technology Maturation and Risk Reduction (TMRR) acquisition strategy was approved by the Milestone Decision Authority and Milestone A was successfully completed in May 2015. The Pseudolite product is finalizing the TMRR Phase of the acquisition life-cycle.

The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units to support the capability development document requirements. This will be implemented by utilizing an Other Transaction Agreement (OTA) competitive contract vehicle to obtain prototypes. The Government will conduct laboratory and performance testing. The findings from these test efforts will determine whether or not to proceed to test-fix-test events. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060 <i>Naviga</i>	ogram Ele 4120A / A tion and 7	ement (N Assured F Timing (Pl	l <b>umber/N</b> Positioning NT)	<b>ame)</b> g,	Project EH9 / P	(Numbe SEUDOL	r/Name) ITES		
Management Service	es (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 O(	2020 CO	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 - Government	Allot	PM PNT : APG, MD	1.942	0.326	Feb 2018	-		-		-		-	0.000	2.268	-
Project Management Support - Contractor	C/CPFF	Various : Various	2.238	5.112	Dec 2017	-		-		-		-	0.000	7.350	-
FFRDC	SS/CR	MITRE : Various	0.700	1.200	Mar 2018	-		-		-		-	0.000	1.900	-
		Subtotal	4.880	6.638		-		-		-		-	0.000	11.518	N/A
Product Developmer	nt (\$ in Mi	illions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method	Performing	Prior Years	Cost	Award	Cost	Award	Cost	Award	Cost	Award	Cost	Cost To	Total	Target Value of
Pseudolite Prototype - Transmitter Contractor 1	C/CPFF	Datapath - Rockwell Collins : Cedar Rapids IA	12.585	-	Date	-	Duto	-	Duto	-	Duto	-	0.000	12.585	-
Pseudolite Prototype - Transmitter Contractor 2	C/CPFF	L-3 Communications : Anaheim, CA	14.027	9.679	Mar 2018	-		-		-		-	0.000	23.706	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	9.042	3.496	Dec 2017	-		-		-		-	0.000	12.538	-
Pseudolite GPS Receiver Upgrade (DAGR & PGK)	SS/CPFF	Various : Various	8.949	5.204	Aug 2018	-		-		-		-	0.000	14.153	-
Pseudolite Command & Control	C/Various	Various : Various	4.231	5.145	May 2018	-		-		-		-	0.000	9.376	-
OEM Platform Integration Development for Air Platform	SS/CPFF	PEO Aviation : Various	2.776	-		-		-		-		-	0.000	2.776	-
PM Platform Integration Development	MIPR	Various : Various	0.200	-		-		-		-		-	0.000	0.200	-
APNT Enterprise Enablers	MIPR	Various : Various	-	15.148	Sep 2018	-		-		-		-	0.000	15.148	-

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060 <i>Naviga</i> t	ogram Ele 4120A I A tion and T	ement (N Assured F Fiming (P	lumber/N Positioning NT)	<b>ame)</b> g,	Project EH9 / P	(Number SEUDOL	r/ <b>Name)</b> ITES		
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
		Subtotal	51.810	38.672		-		-		-		-	0.000	90.482	N/A
<u>Remarks</u> Program Element (PE) 060	4120A proj	ect EH9 transitions to PE	1206120A	project FK	1 beginning	in FY19.						-	1		
Support (\$ in Millions	s)			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 and Technical Services - Government	Various	C4ISR : Various	6.294	1.984	Dec 2017	-		-		-		-	0.000	8.278	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	9.639	5.239	Dec 2017	-		-		-		-	0.000	14.878	-
		Subtotal	15.933	7.223		-		-		-		-	0.000	23.156	N/A
Remarks Program Element (PE) 060	4120A proj	ect EH9 transitions to PE	E 1206120A	project FK	1 beginning	in FY19.						-			
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
Pseudolite Prototype Lab and Field Testing	MIPR	Various : Various	2.130	0.799	Feb 2018	-		-		-		-	0.000	2.929	-
		Subtotal	2.130	0.799		-		-		-		-	0.000	2.929	N/A
<u>Remarks</u> Program Element (PE) 060	4120A proj	ect EH9 transitions to PE	E 1206120A	project FK	1 beginning	in FY19.						-			
			Prior Years	FY	2018	FY	2019	FY : Ba	2020 ase	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	74.753	53.332		0.000		-		-		-	0.000	128.085	N/A
PE 0604120A: Assured	d Position	ning, Navigation and	l Timi		UN		SIFIED								E 40

Army

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Exhibit R-3, RDT&E Project Cost Analysis: PB	Date: March 2019								
Appropriation/Budget Activity 2040 / 4	R-1 Program El PE 0604120A / / Navigation and	ement (Number/N Assured Positionin Timing (PNT)	Name) Projec bg, EH977	Project (Number/Name) EH9 / PSEUDOLITES					
	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

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A		Date: March 2019							
Appropriation/Budget Activity 2040 / 4		F F A	R-1 Program Elemer PE 0604120A <i>I Assur</i> Navigation and Timing	nt (Number/Name red Positioning, g (PNT)	Number/Name)Project (Number/Name)Positioning,EH9 / PSEUDOLITESPNT)PNT				
				T	I		,		
Event Name	FY 2018	FY 201	9 FY 2020	FY 2021	FY 2022	FY 2023	FY 2024		
Pseudolite (PL) Prototype Development Contractor 1		1 Z J	4 1 2 3 4	1 2 3 4	1 2 3	4 1 2 3 4	1 2 3 4		
Pseudolite (PL) Prototype Development Contractor 2	PL Prototype Dev Ctr 1								

hibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date	e: March 2019		
propriation/Budget Activity 40 / 4	<b>R-1 Program Element (Num</b> PE 0604120A <i>I Assured Posi</i> <i>Navigation and Timing (PNT)</i>	-1 Program Element (Number/Name)Project (NE 0604120A I Assured Positioning, avigation and Timing (PNT)EH9 I PSI				
	Schedule Details					
		Start		End		
Events	Quarter	Start Year	Quart	End er Year		
Events Pseudolite (PL) Prototype Development Contractor 1	Quarter 3	Start Year 2015	Quart 4	End er Year 2019		

#### <u>Note</u>

Program Element (PE) 0604120A project EH9 transitions to PE 1206120A project FK1 beginning in FY19.
Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	opropriation/Budget Activity 40 / 4						<b>t (Number/</b> ed Positionii (PNT)	Name) ng,	Project (N EJ2 / MOU	lumber/Name) JNTED		
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
EJ2: MOUNTED	-	32.621	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	32.621
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

Network Enabling Functions (Assured PNT).

The Mounted Assured Positioning, Navigation and Timing System (MAPS) provides positioning, navigation and timing (PNT) data and is a key enabler and a cross cutting capability for Army ground maneuver forces to execute their mission in support of the Network Enabling Function. Army ground maneuver Forces require access to trusted PNT information under conditions where space-based PNT may be limited or denied to maintain its Global Positioning System (GPS) military advantage on the battlefield. The current GPS capability is a fixed frequency system which is vulnerable to current and emerging threats and field condition.

The MAPS is a scalable, upgradable system mounted on Army ground force platforms. It fuses GPS with complimentary navigation and timing technologies to provide trusted PNT to client systems and platforms. The MAPS distributes PNT data to multiple systems directly and via the network, reducing the dependency on multiple GPS receiver devices on a single platform. In order to achieve performance requirements in the highest threat level conditions, an Anti-Jam Antenna will be integrated with the MAPS. These two products each provide a degree of A-PNT protection. Integrated together, however, these two products will close the capability gap and achieve the desired performance.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Mounted A-PNT System	32.621	-	-
<b>Description:</b> Risk Reduction efforts to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system. Also, the entrance into an Other Transaction Agreement (OTA) competitive contract vehicle to obtain prototypes for testing, platform integration, and client system integration.			
Accomplishments/Planned Programs Subtotals	32.621	-	-
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u>			
<b>D. Acquisition Strategy</b> The goal of the Mounted A-PNT program is to deliver distributed A-PNT capabilities to mounted platforms over time in an iterative, a of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today	affordable ma v will be evalu	anner. The fir ated for perfo	st iteration ormance

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604120A / Assured Positioning,	EJ2 / MOU	INTED
	Navigation and Timing (PNT)		

and operational suitability and equipped to select critical units to support the stand-alone requirements of Requirements Definition Package (RDP) 1. This will be implemented by utilizing an Other Transaction Agreement (OTA) competitive contract vehicle to obtain prototypes. The Government will conduct Electromagnetic Interference and Environmental Testing as well as performance testing in the System Integration Lab (SIL) and anechoic chamber testing. The findings from these test efforts will determine whether or not to proceed to test fix test events and begin platform integration. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060 <i>Naviga</i>	ogram Ele 4120A I A tion and T	ement (N Assured F Fiming (Pl	l <b>umber/N</b> Positioning NT)	<b>ame)</b> g,	Project EJ2 / M	(Numbe OUNTED	r/Name)		
Management Service	es (\$ in M	illions)	ſ	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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 - Government	Allot	PM PNT : APG, MD	0.383	1.116	Nov 2017	-		-		-		-	0.000	1.499	-
Project Management Support - Contractor	C/CPFF	Various : Various	0.238	0.170	Dec 2017	-		-		-		-	0.000	0.408	-
FFRDC	SS/CR	MITRE : Various	1.450	0.300	Sep 2018	-		-		-		-	0.000	1.750	-
		Subtotal	2.071	1.586		-		-		-		-	0.000	3.657	N/A
Product Developmer	nt (\$ in Mi	illions)		FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	]		I
	Contract Method	Performing	Prior	FY	2018 Award	FY	2019 Award	Ba	Award	00	CO Award	Total	Cost To	Total	Target Value of
Cost Category Item	& Type	Activity & Location	Years	Cost	Date	Cost	Date	Cost	Date	Cost	Date	Cost	Complete	Cost	Contract
Prototype Development Contractor 1	C/CPFF	Rockwell Collins : Cedar Rapids, IA	0.555	2.720	Dec 2017	-		-		-		-	0.000	3.275	-
Prototype Development Contractor 2	C/CPFF	Northrup Grumman : San Diego, CA	-	0.438	Dec 2017	-		-		-		-	0.000	0.438	-
Prototype Development Contractor 3	C/CPFF	GPS Source : Pueblo, CO	1.234	-		-		-		-		-	0.000	1.234	-
Engineering and Technical Product Support	MIPR	C4ISR : Various	1.805	2.293	Nov 2017	-		-		-		-	0.000	4.098	-
Development of the Systems Engineering and Integration Lab	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	0.965	7.060	Dec 2017	-		-		-		-	0.000	8.025	-
Stryker Integration	C/CPFF	General Dynamics Land Systems : Sterling Heights MI	2.214	5.746	Aug 2018	-		-		-		-	0.000	7.960	-
Mounted and AJAS Prototype Development	C/Various	TBD : TBD	-	7.400	Dec 2018	-		-		-		-	0.000	7.400	-

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 060 <i>Naviga</i>	ogram El 4120A / A tion and T	ement (N Assured F Timing (P	l <b>umber/N</b> Positioning NT)	<b>ame)</b> g,	Project EJ2 / M	: <b>(Numbe</b> OUNTED	r/Name)		
Product Developmen	nt (\$ in M	illions)		FY	2018	FY :	2019	FY 2 Ba	2020 Ise	FY	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	6.773	25.657		-		-		-		-	0.000	32.430	N/A
Remarks Program Element (PE) 060 On schedule for competitiv	04120A proje ve award of t	ect EJ2 transitions to PE he Mounted and Anti-Ja	1206120A m Antenna	project FK2 System (A	2 beginning JAS) prototy	in FY19. pe develop	ment contra	rct.	2020	FY	2020	FY 2020	]		
	3)	1		FY 2	2018	FY 2	2019	Ba	ise	0	CO	Total			
Cost Category Item	Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Technical Services - Government	Various	C5ISR : various	1.267	0.497	Nov 2017	-		-		-		-	0.000	1.764	-
Engineering and Technical Services - Contractor	C/CPFF	Various : Various	3.210	2.196	Dec 2017	-		-		-		-	0.000	5.406	-
		Subtotal	4.477	2.693		-		-		-		-	0.000	7.170	N/A
Remarks															
Program Element (PE) 060	04120A proje	ect EJ2 transitions to PE	1206120A	project FK	2 beginning	in FY19.			-			_			
Test and Evaluation	(\$ in Milli	ions)		FY 2	2018	FY :	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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 - Contractor	C/CPFF	Various : Various	0.786	0.164	Dec 2017	-		-		-		-	0.000	0.950	-
ED3 Operational Needs Statement (ONS) Testing	TBD	ATEC : MD, AZ	-	2.331	Jun 2018	-		-		-		-	0.000	2.331	-
ALT NAV Performance Testing	TBD	Dept of Energy (DOE) and CERDEC : MD, SC	-	0.190	Jun 2018	-		-		-		-	0.000	0.190	-
		Subtotal	0.786	2.685		-		-		-		-	0.000	3.471	N/A
PE 0604120A: Assure	d Position	ning, Navigation and	l Timi		UN		SIFIED								556
Army						Page 26	of 35		R	-1 Line #	98				550

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	t Activity	/		<b>R-1 Program Element (Number/N</b> PE 0604120A <i>I Assured Positioning</i> <i>Navigation and Timing (PNT)</i>							ame) Project (Number/Nar g, EJ2 / MOUNTED				
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY	2019	FY	2020 ase	FY	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Award Cost Date		Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
<u>Remarks</u> Program Element (PE) 060	4120A proje	ect EJ2 transitions to PE	1206120A	project FK	2 beginning	in FY19.						_			
			Prior Years	FY	2018	FY	2019	FY	2020 ase	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	14.107	FY 2018 Award Date A project FK2 beginnin FY 2018 32.621		0.000		-		-		-	0.000	46.728	N/A

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army					Date: March 20	19
Appropriation/Budget Activity 2040 / 4		R-1 F PE 0 Navig	Program Elemen 604120A / Assurd gation and Timing	n <b>t (Number/Name</b> ed Positioning, g (PNT)	e) Project (N EJ2 / MOU	lumber/Name) JNTED	
Event Name	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Mounted A-PNT Risk Reduction Activities	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
ED3 ONS Testing		S Testing					
ALT NAV Performance Testing	ALT NA	/ Performance Testing					
			<u> </u>	1	<u> </u>	1	<u> </u>

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	h 2019			
ppropriation/Budget Activity 040 / 4	<b>R-1 Program Ele</b> PE 0604120A / A Navigation and T	ement (Numbe Assured Position Timing (PNT)	r/Name) ning,	ame) Project (Number/Name) I, EJ2 / MOUNTED				
	Schedule Details							
			4					
Evente		St	art Voar	Er	id Voor			
Events Mounted A-PNT Risk Reduction Activities		St Quarter 4	art Year 2017	Er Quarter 1	id Year 2019			
Events Mounted A-PNT Risk Reduction Activities ED3 ONS Testing		St Quarter 4 3	art Year 2017 2018	Er Quarter 1 4	rd Year 2019 2018			

### Note

Program Element (PE) 0604120A project EJ2 transitions to PE 1206120A project FK2 beginning in FY19.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060412 Navigation	am Element 20A / Assure and Timing	t <b>(Number/</b> d Positionir (PNT)	Name) ng,	Project (N EJ3 / ANTI	umber/Nan -JAM ANTE	ne) ENNA	
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
EJ3: ANTI-JAM ANTENNA	-	11.542	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	11.542
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

Network Enabling Functions (Assured PNT).

The Anti-Jam Antenna System (AJAS) provides point protection by steering electronic nulls at interference sources or beams at valid signal sources. This enables continuous Global Positioning System (GPS) signal acquisition and tracking in a navigation warfare (jamming) environment. The AJAS is deployed as a scalable component accessory to the Mounted Assured Positioning, Navigation and Timing System (MAPS).

The MAPS is a scalable, upgradable system mounted on Army ground force platforms. It fuses GPS with complimentary navigation and timing technologies to provide trusted PNT to client systems and platforms. The MAPS distributes Positioning, Navigation and Timing (PNT) data to multiple systems directly and via the network, reducing the dependency on multiple GPS receiver devices on a single platform. In order to achieve performance requirements in the highest threat level conditions, an Anti-Jam Antenna will be integrated with the MAPS. These two products each provide a degree of Assured-Positioning, Navigation and Timing (A-PNT) protection. Integrated together, however, these two products will close the capability gap and achieve the desired performance.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Anti-Jam Antenna System	11.542	-	-
<b>Description:</b> Risk reduction activities associated with the AJAS prototypes is to reduce technology risk and to determine the appropriate set of technologies to be integrated into the full system. The initiation of Other Transaction Agreement (OTA) competitive contract vehicle to obtain prototypes for test, user assessment and platform integration.			
Accomplishments/Planned Programs Subtotals	11.542	-	-

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

N/A

#### <u>Remarks</u>

#### D. Acquisition Strategy

The goal of the Anti-Jam Antenna System (AJAS) program is to deliver distributed A-PNT capabilities to mounted platforms over time in an iterative, affordable manner. The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units to support the stand-alone requirements of Requirements Definition Package (RDP) 1.

PE 0604120A: Assured Positioning, Navigation and Timi... Army

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 0604120A / Assured Positioning,	EJ3 / ANTI	-JAM ANTENNA
	Navigation and Timing (PNT)		

This will be implemented by utilizing an Other Transaction Agreement (OTA) competitive contract vehicle to obtain prototypes. The Government will conduct partial Electromagnetic Interference and Environmental Testing as well as performance testing in the System Integration Lab (SIL) and anechoic chamber testing. The findings from these test efforts will determine whether or not to proceed to test-fix-test events and begin platform integration. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

#### E. Performance Metrics

N/A

	i i ojeci o	Ust Analysis. PD 2		У								Dale.	March 20	19	
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (PE 0604120A / Assured Positioning, Navigation and Timing (PNT)EJ3 / AN							r/ <b>Name)</b> ANTENNA	4	
Management Servic	es (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2 O(	2020 CO	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 - Government	Allot	PM PNT : APG, MD	-	0.015	Nov 2017	-		-		-		-	0.000	0.015	-
Project Management Support - Contractor	C/CPFF	Various : Various	-	0.921	Dec 2017	-		-		-		-	0.000	0.921	-
FFRDC	SS/CR	MITRE : Various	-	0.862	May 2018	-		-		-		-	0.000	0.862	-
													++		
	_	Subtotal	-	1.798		-		-		-		-	0.000	1.798	N/A
Remarks Program Element (PE) 06 Product Developme	04120A proj nt (\$ in M	Subtotal ect EJ3 transitions to PE	- - 1206120A	1.798 project FK3	3 beginning i	- n FY19.	2019	- FY 2	2020	- FY 2	2020	- FY 2020	0.000	1.798	N/A
Remarks Program Element (PE) 06 Product Developme Cost Category Item	04120A proj nt (\$ in M Contract Method & Type	Subtotal ect EJ3 transitions to PE illions) Performing Activity & Location	- E 1206120A Prior Years	1.798 project FK: FY 2 Cost	3 beginning i 2018 Award Date	- n FY19. FY 2	2019 Award Date	- FY 2 Ba	2020 ase Award Date	- FY 2 OC	2020 CO Award Date	FY 2020 Total	0.000 Cost To Complete	1.798 Total Cost	N/A Target Value of Contract
Remarks Program Element (PE) 06 Product Developme Cost Category Item Engineering and Technical Product Suport	04120A proj nt (\$ in M Contract Method & Type MIPR	Subtotal ect EJ3 transitions to PE illions) Performing Activity & Location C5ISR : Various	- E 1206120A Prior Years -	1.798 project FK: FY 2 Cost 1.292	3 beginning i 2018 Award Date Dec 2017	- n FY19. FY 2 Cost	2019 Award Date	- FY 2 Ba Cost	2020 ase Award Date	- FY 2 OC Cost	2020 CO Award Date	FY 2020 Total Cost	0.000 Cost To Complete 0.000	1.798 Total Cost 1.292	N/A Target Value of Contract
Remarks Program Element (PE) 06 Product Developme Cost Category Item Engineering and Technical Product Suport Mounted and AJAS Prototype Development	04120A projent (\$ in M Contract Method & Type MIPR C/Various	Subtotal ect EJ3 transitions to PE illions) Performing Activity & Location C5ISR : Various TBD : TBD	- 1206120A Prior Years - -	1.798 project FK3 FY 2 Cost 1.292 5.320	3 beginning i 2018 Award Date Dec 2017 Dec 2018	- n FY19. FY 2 Cost -	2019 Award Date	- FY 2 Ba Cost -	2020 ise Award Date	- FY 2 O( Cost -	2020 CO Award Date	FY 2020 Total Cost	0.000 Cost To Complete 0.000 0.000	1.798 Total Cost 1.292 5.320	N/A Target Value of Contract -
Remarks Program Element (PE) 06 Product Developme Cost Category Item Engineering and Technical Product Suport Mounted and AJAS Prototype Development ALT NAV Enterprise Enablers	04120A proj nt (\$ in M Contract Method & Type MIPR C/Various MIPR	Subtotal ect EJ3 transitions to PE illions) Performing Activity & Location C5ISR : Various TBD : TBD CERDEC CP&I : APG, MD	- 1206120A Prior Years - - -	1.798 project FK: FY 2 Cost 1.292 5.320 2.802	3 beginning i 2018 Award Date Dec 2017 Dec 2018 Sep 2018	- n FY19. FY 2 Cost - - -	2019 Award Date	- FY 2 Ba Cost - - -	2020 ase Award Date	- FY 2 O( Cost - - -	2020 CO Award Date	- FY 2020 Total Cost - -	0.000 Cost To Complete 0.000 0.000 0.000	1.798 Total Cost 1.292 5.320 2.802	N/A Target Value of Contract - -

#### Remarks

Program Element (PE) 0604120A project EJ3 transitions to PE 1206120A project FK3 beginning in FY19. On schedule for competitive award of the Mounted and Anti-Jam Antenna System (AJAS) prototype contract.

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	020 Arm	y								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060 Navigat	<b>gram Ele</b> 4120A I A tion and T	e <b>ment (N</b> Assured F Timing (Pl	lumber/N Positioning NT)	ame) I,	Project EJ3 / A	(Number NTI-JAM	r/Name) ANTENNA		
Test and Evaluation	(\$ in Milli	ons)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Anti-Jam Antenna Live Sky Demo and Anechoic Chamber Test	MIPR	CERDEC - Command Power and Integration Directorate : APG, MD	-	0.330	Jul 2018	-		-		-		-	0.000	0.330	-
		Subtotal	-	0.330		-		-		-		-	0.000	0.330	N/A
<u>Remarks</u> Program Element (PE) 060	)4120A proje	ect EJ3 transitions to PE	1206120A Prior Years	project FK3	3 beginning i	in FY19. FY 2	2019	FY	2020 ase	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	11.542		0.000		-		-		-	0.000	11.542	N/A
<u>Remarks</u>															

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army										Date:	March 20	19		
Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06 <i>Navig</i> a	rogram 04120/ ation ar	Elemen A I Assure ad Timing	t (Num ed Posi t (PNT)	ber/Name tioning,	e)	Projec EJ3 / A	X (N Anti	umber I-JAM A	<b>Name)</b> ANTENNA	٩		
Event Neme	FY 2018	FY 20	)19	FY	2020	F	Y 2021		FY 2022	2	F۱	( 2023	F	Y 2024	
	1 2 3 4	1 2 3	3 4	1 2	3 4	1 2	3 4	1	2 3	4	1 2	3 4	1 2	3 4	Ļ
Anti-Jam Antenna Risk Reduction Activities	Risk Reduction Activities														
ALT NAV Enterprise Enablers	ALT NAV Enterprise Enal	blers													

hibit R-4A, RDT&E Schedule Details: PB 2020 Army				D	Date: March	2019
propriation/Budget Activity 40 / 4	<b>R-1 Program Elemen</b> PE 0604120A <i>I Assure</i> <i>Navigation and Timing</i>	n <b>t (Number/N</b> red Positionin g (PNT)	<b>lame)</b> g,	Project (Nur EJ3 / ANTI-J	mber/Name JAM ANTEN	e) INA
	Sahadula Dataila					
		Start	:		Enc	d
Events		Start	Year	Qu	Enc	d Year
Events Anti-Jam Antenna Risk Reduction Activities	Qu	Start Jarter	Year 2018	Qu	Enc iarter	d Year 2019

#### Note

Program Element (PE) 0604120 project EJ3 transitions to PE 1206120A project FK3 beginning in FY19.

Exhibit R-2, RDT&E Budget Item	hibit R-2, RDT&E Budget Item Justification: PB 2020 Army									Date: Marc	ch 2019		
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACD	ation, Army I 0&P)	BA 4: Adva	anced	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / Synthetic Training Environment Refinement & 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	
Total Program Element	-	109.165	39.890	136.761	-	136.761	22.672	10.668	7.735	7.896	0.000	334.787	
FD6: Synthetic Training Environment Refine & Prototype	-	109.165	39.890	41.676	-	41.676	15.672	10.668	7.735	7.896	0.000	232.702	
SV1: Soldier/Squad Virtual Trainer	-	0.000	0.000	95.085	-	95.085	7.000	0.000	0.000	0.000	0.000	102.085	

### A. Mission Description and Budget Item Justification

The Synthetic Training Environment (STE) is the next generation holistic collective training capability that will train units where they will fight, with whom they will fight with, and in complex operational environments to include dense urban and sub-terrain; within the entire range of combined arms maneuver tasks in support of Multi-Domain Operations. STE will be a common synthetic environment enabled by a core of Global Terrain/One World Terrain (OWT); common authoritative data and models; Training Simulation Software (TSS), and Training Management Tools (TMT). The STE will be available where training occurs (Home Station, Armories, Institutions, Shipboard, Deployed) and will include Air and Ground Reconfigurable Virtual Collective Trainers (RVCTs) and a Soldier/Squad Virtual Training (S/SVT) close combat training capability. The first increment of the SSVT is the Squad immersive Virtual Trainer (SiVT) capability and the Heads Up Display (HUD) 3.0 which comprises the Integrated Visual Augmentation System (IVAS). The STE will be cloud-enabled, compatible with the Army Enterprise Network, and service-based through the Common Operating Environment, including Live and Constructive. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle; a Secretary of Defense priority.

FY 2020 base funding of \$136.761 million will continue to develop and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate processes, and refine requirements for STE, support development and integration of the first increment of the S/SVT, which is an embedded STE training capability that includes OWT, TSS, TMT, into the operational capability of the IVAS. Based on these refined requirements and demonstrated prototype designs, integrated systems design of the end-item system can be initiated. Additionally, these efforts ensure the level of expertise required to operate and maintain the capability is consistent with the force structure. Increments 2 and 3 of SSVT provides the NEXTGEN Marksmanship and the NEXTGEN Call For Fire Artillery Virtual Training capability into the STE baseline. The SSVT system also combines individual Soldier and squad training capabilities (STE Squad Capability (SSC), Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF)), into a single capability.

Funds were realigned from PE 0604715A in FY 2019 and 2020 for the first increment of the SSVT which is the Squad immersive Virtual Trainer (SiVT) capability and the Heads Up Display (HUD) 3.0 which comprises the Integrated Visual Augmentation System (IVAS).

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Arr	ny			D	ate: March 2019
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	1: Advanced	<b>R-1 Program El</b> PE 0604121A / S	ement (Number/Name) Synthetic Training Enviro	) onment Refinemen	t & Prototyping
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	FY 2019	FY 2020 Base	FY 2020 OCC	FY 2020 Total
Previous President's Budget	1.600	77.939	56.867	-	56.867
Current President's Budget	109.165	39.890	136.761	-	136.761
Total Adjustments	107.565	-38.049	79.894	-	79.894
<ul> <li>Congressional General Reductions</li> </ul>	-0.001	-0.049			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-38.000			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	107.629	-			
SBIR/STTR Transfer	-0.063	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	79.894	-	79.894

#### **Change Summary Explanation**

Funds were realigned from FY 2019 and 2020 for the first increment of the SSVT which is the Squad immersive Virtual Trainer (SiVT) capability and the Heads Up Display (HUD) 3.0 which comprises the Integrated Visual Augmentation System (IVAS). The FY 2020 increase of \$79.894 million supports the Army's modernization priorities in support of the National Defense Strategy.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: Marc	ch 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060412 Environme	am Elemen 1A / Synthe nt Refineme	t (Number/ etic Training ent & Protot	Name) yping	<b>Project (Number/Name)</b> FD6 / Synthetic Training Environment Refine & Prototype				
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	
FD6: Synthetic Training Environment Refine & Prototype	-	109.165	39.890	41.676	-	41.676	15.672	10.668	7.735	7.896	0.000	232.702	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### A. Mission Description and Budget Item Justification

The Synthetic Training Environment (STE) is the next generation holistic collective training capability that will train units where they will fight, with whom they will fight with, and in complex operational environments to include dense urban and sub-terrain; within the entire range of combined arms maneuver tasks in support of Multi-Domain Operations. STE will be a common synthetic environment enabled by a core of Global Terrain/One World Terrain (OWT); common authoritative data and models; Training Simulation Software (TSS), and Training Management Tools (TMT). The STE will be available where training occurs (Home Station, Armories, Institutions, Shipboard, Deployed) and will include Air and Ground Reconfigurable Virtual Collective Trainers (RVCTs) and a Soldier/Squad Virtual Training (S/SVT) close combat training capability, and a live training capability. The first increment of the SSVT is the Squad immersive Virtual Trainer (SiVT) capability and the Heads Up Display (HUD) 3.0 which comprises the Integrated Visual Augmentation System (IVAS). The STE will be cloud-enabled, compatible with the Army Enterprise Network, and service-based through the Common Operating Environment, including Live and Constructive. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle; a Secretary of Defense priority.

FY 2020 base funding of \$41.676 million will continue to develop and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate processes, and refine requirements for STE, support development and integration of the first increment of the S/SVT, which is an embedded STE training capability that includes OWT, TSS, TMT, into the operational capability of the IVAS. Based on these refined requirements and demonstrated prototype designs, integrated systems design of the end-item system can be initiated. Additionally, these efforts ensure the level of expertise required to operate and maintain the capability is consistent with the force structure.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Program Management	1.536	5.791	3.528
<b>Description:</b> Will provide program management, engineering and technical oversight, contract support, and travel for the development of the program.			
FY 2019 Plans: Funding will be used for program execution of rapid prototyping which allows refinement of the requirement for the capability that will be acquired. Funds also support the translation of validated capability gaps into system specific requirements, including the Key Performance Parameters (KPPs) and Key System Attributes (KSAs). Efforts facilitate refinement and decisions on the acquisition strategy for the capability.			
FY 2020 Plans:			

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<ul> <li>Appropriation/Budget Activity 2040 / 4</li> <li>B. Accomplishments/Planned Programs (\$ in Millions) Funding will be used for program execution of rapid prototyping white that will be acquired. Funds also support the translation of validated the Key Performance Parameters (KPPs) and Key System Attribute acquisition strategy for the capability.</li> <li>FY 2019 to FY 2020 Increase/Decrease Statement: The decrease in FY20 funding aligns program funds to the program <i>Title:</i> Engineering, Support, Test &amp; Evaluation</li> </ul>	R-1 I PE 0 <i>Envir</i> d capability gaps es (KSAs). Efforts n management rec	Program Eler 604121A / Sy onment Refir ent of the req nto system s facilitate refin juirements.	nent (Numbe nthetic Traini ement & Pro- uirement for becific require nement and c	r <b>/Name)</b> ng otyping he capabilit ments, incl ecisions on	Project ( FD6 / Sy & Prototy F y uding the	Number/Na nthetic Train pe Y 2018	ame) ning Environr FY 2019	nent Refine FY 2020
<ul> <li>B. Accomplishments/Planned Programs (\$ in Millions)</li> <li>Funding will be used for program execution of rapid prototyping which that will be acquired. Funds also support the translation of validated the Key Performance Parameters (KPPs) and Key System Attribute acquisition strategy for the capability.</li> <li>FY 2019 to FY 2020 Increase/Decrease Statement: The decrease in FY20 funding aligns program funds to the program Title: Engineering, Support, Test &amp; Evaluation</li> </ul>	ich allows refinem d capability gaps es (KSAs). Efforts n management rec st and evaluation t	ent of the req nto system s facilitate refin juirements.	uirement for becific require nement and c	he capabilit ments, incl ecisions on	y uding the	Y 2018	FY 2019	FY 2020
Funding will be used for program execution of rapid prototyping whit that will be acquired. Funds also support the translation of validated the Key Performance Parameters (KPPs) and Key System Attribute acquisition strategy for the capability. <i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> The decrease in FY20 funding aligns program funds to the program <i>Title:</i> Engineering, Support, Test & Evaluation	ich allows refinem d capability gaps es (KSAs). Efforts n management rec st and evaluation t	ent of the req nto system s facilitate refin juirements.	uirement for becific require nement and c	he capabilit ments, incl ecisions on	y uding the			
FY 2019 to FY 2020 Increase/Decrease Statement: The decrease in FY20 funding aligns program funds to the program <i>Title:</i> Engineering, Support, Test & Evaluation	n management rec	juirements.						
<i>Title:</i> Engineering, Support, Test & Evaluation	st and evaluation							
<b>Description:</b> Will provide Engineering support and any related too	st and evaluation					107.629	34.099	38.148
<b>Description:</b> will provide Engineering, support, and any related tes		or the develo	oment of the	orogram.				
<ul> <li>FY 2019 funding develops and demonstrates prototype designs to restimates, evaluates processes, and refines requirements. Based on User Assessments of the prototypes an integrated systems prototype OTA. Additionally, these efforts ensure the level of expertise required defined force structure.</li> <li>FY 2020 Plans:</li> <li>FY 2020 funding will continue to develop, demonstrate, and conduct risk, validate designs, validate cost estimates, evaluate processes, and demonstrated prototype designs, integrated systems design of Additionally, these efforts ensure the level of expertise required to or an efforts.</li> </ul>	reduce technical r on refined requirer pe design of the e red to operate and ct User Assessme and refine require the end-item syst operate and maint	sk, validates nents, demor nd-item syste maintain the ents of prototy ments. Based em can be co ain the capab	designs, valid strated proto m can be init capability rer pe designs to l on refined re ntinued throu ility remains	lates cost ype design ated throug nains within reduce tec equirements gh an OTA vithin the de	s and h an the hnical			
force structure. <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase in FY20 funding is due to the integration of the live cap guidance.	pability into the S	ΓE, per the So	ecretary of the	e Army?s	btotals	109.165	39.890	41.676
C Other Preason Funding Summers (\$ in Millione)				<u> </u>				
C. Other Program Funding Summary (\$ in Millions) FY :	<u>2020</u> FY 2020	<u>FY</u> 2020					<u>Co</u> st To	
Line Item         FY 2018         FY 2019         E           • NA2020: Synthetic         -         -         20           Training Environment (STE)         -         -         20	Base <u>OCO</u> ).749 -	<u>Total</u> 20.749	<u>FY 2021</u> 70.978	<u>FY 2022</u> 70.887	<u>FY 2023</u> 72.969	<u>FY 2024</u> 66.683	<u>Complete</u> 0.000	<u>Total Cost</u> 302.266

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Exhibit R-2A, RDT&E Project Justification: PB 2020 /	ſmy				Date: March 2019
Appropriation/Budget Activity 2040 / 4		<b>R-1 Program Ele</b> PE 0604121A / Sy Environment Refi	ment (Number/Name) /nthetic Training nement & Prototyping	Project (N FD6 / Synt & Prototyp	lumber/Name) thetic Training Environment Refine ve
C. Other Program Funding Summary (\$ in Millions)					
Line Item FY 2018 FY 2	<u>FY 2020</u> FY <u>Base</u>	2020         FY 2020           OCO         Total	FY 2021 FY 2022	<u>FY 2023</u>	Cost To FY 2024 Complete Total Cost

### D. Acquisition Strategy

The Synthetic Training Environment (STE) program will employ an incremental acquisition strategy where the full capability will occur in multiple increments as new capability is developed and delivered. Initial competitive prototyping development efforts will be conducted through Other Transactional Authority (OTA) awards resulting in system prototypes that reduce program risk and technology maturation risk.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 A				у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	,				R-1 Pro PE 0604 Environ	gram Ele 4121A / S ment Ref	ement (N Synthetic Finement 8	umber/N Training & Prototyp	<b>ame)</b> bing	Project FD6 / S & Proto	( <b>Numbe</b> Synthetic 7 type	r/ <b>Name)</b> Training Er	ivironme	nt Refine
Management Service	es (\$ in M	illions)		FY 2	2018	FY 2	019	FY 2 Ba	:020 se	FY 2	2020 CO	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
Management Services	Various	PEO STRI : Orlando, FL	-	1.536		5.791		3.528		-		3.528	3.357	14.212	Continuing
		Subtotal	-	1.536		5.791		3.528		-		3.528	3.357	14.212	N/A
Product Development (\$ in Millions)			FY 2	2018	FY 2	019	FY 2 Ba	:020 se	FY 2	2020 CO	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	TBD	To Be Determined : To Be Determined	-	107.629		32.906		37.523		-		37.523	37.773	215.831	Continuing
		Subtotal	-	107.629		32.906		37.523		-		37.523	37.773	215.831	N/A
Support (\$ in Million	s)			FY 2	2018	FY 2	019	FY 2 Ba	:020 se	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Costs	TBD	To Be Determined : To Be Determined	-	-		1.193		0.625		-		0.625	0.841	2.659	Continuing
		Subtotal	-	-		1.193		0.625		-		0.625	0.841	2.659	N/A
			Prior Years	FY 2	2018	FY 2	019	FY 2 Ba	:020 se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	109.165		39.890		41.676		-		41.676	41.971	232.702	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB	2020 Army						Date: March 20	)19
Appropriation/Budget Activity 2040 / 4			<b>R-1 Prog</b> PE 0604 Environm	ram Eleme 121A / Syntl nent Refinen	nt (Number/Nam hetic Training nent & Prototyping	e) Project ( FD6 / Syr g & Prototy	Number/Name) nthetic Training Er pe	nvironment Refine
Event Name	FY 2018	FY 201	9	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
CDD	1 2 3 4		4 1	2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Acquisition Entry Point		CDD						
юс								
Other Transaction Authority 1	OTA 1							
OTA Tech Insertion					Tech	Insertion		
Integration Contract				Integration				
Production					Production			

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army	Date: N	larch 2019		
ppropriation/Budget Activity R- 040 / 4 Pl E/	<b>1 Program Element (Numb</b> 5 0604121A / Synthetic Train avironment Refinement & Pr	oer/Name) ning ototyping	Project (Number/N FD6 / Synthetic Tra & Prototype	Name) iining Environment Refine
Scheo	lule Details			
		Start		End
Events	Quarter	Year	Quarter	Year
CDD	2	2019	2	2019
Acquisition Entry Point	1	2020	1	2020
IOC	4	2021	4	2021
Other Transaction Authority 1	2	2018	4	2021
OTA Tech Insertion	4	2021	4	2024
Integration Contract	2	2020	4	2024
Production		2024	4	2024

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060412 Environme	umber/Nan ier/Squad V	<b>ne)</b> ⁄irtual Trainer								
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
SV1: Soldier/Squad Virtual Trainer	-	0.000	0.000	95.085	-	95.085	7.000	0.000	0.000	0.000	0.000	102.085
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### <u>Note</u>

S/SVT is not a New Start for FY2020. The program was previously funded under PE 0604715A.

#### A. Mission Description and Budget Item Justification

The Synthetic Training Environment (STE) is the next generation holistic collective training capability that will train units where they will fight, with whom they will fight with, and in complex operational environments to include dense urban and sub-terrain; within the entire range of combined arms maneuver tasks in support of Multi-Domain Operations. STE will be a common synthetic environment enabled by a core of Global Terrain/One World Terrain (OWT); common authoritative data and models; Training Simulation Software (TSS), and Training Management Tools (TMT). The STE will be available where training occurs (Home Station, Armories, Institutions, Shipboard, Deployed) and will include Air and Ground Reconfigurable Virtual Collective Trainers (RVCTs) and a Soldier/Squad Virtual Training (S/SVT) close combat training capability, and a live training capability. The first increment of the SSVT is the Squad immersive Virtual Trainer (SiVT) capability and the Heads Up Display (HUD) 3.0 which comprises the Integrated Visual Augmentation System (IVAS). The STE will be cloud-enabled, compatible with the Army Enterprise Network, and service-based through the Common Operating Environment, including Live and Constructive. The STE will provide the realistic repetitions necessary to fight 25 bloodless battles before the first battle; a Secretary of Defense priority.

FY 2020 base funding of \$95.085 million will continue to develop and demonstrate prototype designs to reduce technical risk, validate designs, validate cost estimates, evaluate processes, refine requirements, and support development and integration of the first increment of the S/SVT, which is an embedded STE training capability that includes OWT, TSS, TMT, into the operational capability of the IVAS. Based on these refined requirements and demonstrated prototype designs, integrated systems design of the end-item system can be initiated. Additionally, these efforts ensure the level of expertise required to operate and maintain the capability is consistent with the force structure.

The first increment of the SSVT which is the Squad immersive Virtual Trainer (SiVT) capability and the Heads Up Display (HUD) 3.0 which comprises the integrated Visual Augmentation System (IVAS). Increments 2 and 3 of SSVT provides the NEXTGEN Marksmanship and the NEXTGEN Call For Fire Artillery Virtual Training capability into the STE baseline. The SSVT system also combines individual Soldier and squad training capabilities (STE Squad Capability (SSC), Weapon Skill Development (WSD), Joint Fires Training (JFT), and Use of Force (UoF)), into a single capability.

S/SVT is not a New Start for FY2020. The program was previously funded under PE 0604715A.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
<i>Title:</i> Engineering, Support, Test & Evaluation	-	-	95.085

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Dat	: March 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604121A / Synthetic Training Environment Refinement & Prototyping	Project (Numb SV1 / Soldier/S	e <b>r/Name)</b> quad Virtual Tra	iner
B. Accomplishments/Planned Programs (\$ in Millions)		FY 201	B FY 2019	FY 2020
Description: Will provide Engineering, support, and any related test and eva	aluation for the development of the program.			
<i>FY 2020 Plans:</i> FY 2020 funds the remaining two capability sets of the Squad immersive Virt Display (HUD) 3.0 which comprises the Integrated Visual Augmentation Syst and conduct User Assessments of prototype designs to reduce technical risk processes, and refine requirements. Based on refined requirements and den design of the end-item system can be continued through an OTA.	tual Trainer (SiVT) capability and the Heads Up tem (IVAS) and will continue to develop, demons x, validate designs, validate cost estimates, evalu nonstrated prototype designs, integrated systems	trate, iate s		
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> The increase in FY20 funding is due to the requirement for the accelerated F Secretary of the Army's and Secretary of Defense's guidance, as well as the	Research and Development for IVAS, per the SVT integration.			
	Accomplishments/Planned Programs Sub	totals		95.085
C. Other Preason Eugling Summary (¢ in Millions)		· · · · ·	· · · ·	·

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

N/A

### <u>Remarks</u>

### D. Acquisition Strategy

The Synthetic Training Environment (STE) program will employ an incremental acquisition strategy where the full capability will occur in multiple increments as new capability is developed and delivered. Soldier and Squad Virtual Trainer (S/SVT) program will employ an incremental acquisition strategy where the full capability will occur in multiple increments as new capability is developed and delivered. Initial competitive prototyping development efforts will be conducted through Other Transactional Authority (OTA) awards resulting in system prototypes that reduce program risk and technology maturation risk.

#### **E. Performance Metrics**

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	Appropriation/Budget Activity 2040 / 4						ogram Ele 4121A / S ment Ref	ement (N Synthetic Tinement a	<b>umber/N</b> Training & Prototyp	<b>ame)</b> bing	Project SV1 / So	(Number oldier/Squ	r/ <b>Name)</b> Jad Virtua	l Trainer	
Product Developmer	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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	Aberdeen Proving Grounds : MD	-	-		-		95.085		-		95.085	0.000	95.085	-
		Subtotal	-	-		-		95.085		-		95.085	0.000	95.085	N/A
			Prior Years	FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000 95.085 -				95.085	0.000	95.085	N/A		

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٨rmy	/																			Da	ate:	Mar	ch 20	)19			
Appropriation/Budget Activity 2040 / 4							R- PE Er	- <b>1 Pr</b> E 060 nviro	ogr 0412 nme	r <b>am</b> 21A e <i>nt F</i>	Elen I Syl Refin	nent nthe eme	t (Nu etic Ti ent &	imb Train Pro	er/N ing ototy	l <b>ame</b> ping	e)	P S	roje V1 /	e <b>ct (N</b> Sold	(Number/Name) oldier/Squad Virtual Trainer							
	FY 2018 FY 2									EV (				<b>F</b> V	000			<b>FV</b>				-		00		FV		
Event Name	1	P 1 2	3	4	1	2	3	4	1	2	3	4	1	Γĭ 2	3	4	1	2	3	4	1	2	3	23	1	P Y	3	4
IVAS/HUD 3.0																	•		•			•	•	•				
501																												

hibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Mar	ch 2019
Propriation/Budget Activity R- 40 / 4 PE Er	<b>1 Program Element (Numbe</b> 5 0604121A / Synthetic Trainin avironment Refinement & Prote	Project (Number/Nai SV1 / Soldier/Squad	<b>me)</b> Virtual Trainer	
Sched	lule Details			
	Sta	art	E	nd
Events	Quarter	Year	Quarter	Year
IVAS/HUD 3.0	2	2018	1	2021

Exhibit R-2, RDT&E Budget Iter	n Justificat	i <b>on:</b> PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, To Component Development & Proto	est & Evalua otypes (ACD	ation, Army 0&P)	/ BA 4: Adv	anced	<b>R-1 Progra</b> PE 060418	m Element 2A I Hypers	t (Number/ sonics	Name)				
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	228.000	-	228.000	181.000	137.000	359.000	274.000	0.000	1,179.000
HX1: Land-Based Hypersonic Missile	-	0.000	0.000	228.000	-	228.000	181.000	137.000	359.000	274.000	0.000	1,179.000
A. Mission Description and Bug B. Program Change Summary ( Previous President's Budge Current President's Budge Total Adjustments • Congressional C • Congressional F • Congressional F	dget Item Ji s in Million get et General Red Directed Red Rescissions Adds Directed Tra is nsfer Budget Yea	ustification <u>s)</u> luctions ductions nsfers rs		FY 2018 0.000 0.000 - - - - - - - - - - - - -	FY 201 0.00 0.00 - - - - - - - - - - - - - - -	9 F 0 0 0	Y 2020 Bas 0.00 228.00 228.00	<u>se  </u> 00 00 00	FY 2020 OG	<u>-</u> - -	FY 2020 To 0.0 228.0 228.0	900 900 900
<ul> <li>Adjustments to I</li> </ul>	Budget Yea	rs		-	-		228.00	00		-	228.0	000

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060418	am Elemen 32A / Hypers	<b>t (Number</b> / sonics	Project (N HX1 / Land	Number/Name) nd-Based Hypersonic Missile			
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
HX1: Land-Based Hypersonic Missile	-	0.000	0.000	228.000	-	228.000	181.000	137.000	359.000	274.000	0.000	1,179.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
<u>Note</u> This is a New program beginning <u>A. Mission Description and Bud</u> This Program Element (PE) funds (USASMDC/ARSTRAT).	in FY2020. I <b>get Item Ju</b> s hypersoni	ustification c developm	ent efforts p	erformed b	y the US Ar	rmy Space a	and Missile	Defense Co	ommand/Arı	my Forces t	Strategic Co	mmand

Project HX1: Funds USASMDC/ARSTRAT to prototype a Long Range Hypersonic Weapon (LRHW) System is to provide the Army with a prototype strategic attack weapon system to defeat Anti Access/Area Denial (A2/AD) capabilities, suppress adversary Long Range Fires, and engage other high payoff/time sensitive targets. The LRHW Integrated System contractor will integrate Common Hypersonic Glide Bodies (CHGBs) with 2 stage boosters into canisters to create LRHW All Up Rounds (AUR) as detailed in the following sections and a build a prototype LRHW System. A leave behind prototype LRHW system is expected as an Early Operational Capability (EOC).

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Land Based Hypersonic Missile	-	-	228.000
Description: Funding is provided for planning,.			
<b>FY 2020 Plans:</b> The Army Hypersonic Project Office will work with the Weapon System Integration Contractor to get through Systems Requirements Review and move towards a Preliminary Design Review for the system. Funding will be used to order CHGBs and boosters for integration into All Up Rounds starting in FY21.			
FY 2019 to FY 2020 Increase/Decrease Statement: New program for FY2020			
Accomplishments/Planned Programs Subtotals	-	-	228.000
C. Other Brogram Eunding Summany (\$ in Millions)			

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

N/A

<u>Remarks</u>

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604182A <i>I Hypersonics</i>	Project (Number/Name) HX1 / Land-Based Hypersonic Missile
D. Acquisition Strategy N/A		
<u>E. Performance Metrics</u> N/A		

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2								Date:	March 20	19			
Appropriation/Budge 2040 / 4	t Activity	/				<b>R-1 Pro</b> PE 060	<b>ogram El</b> e 4182A / <i>F</i>	<b>ement (N</b> Hypersoni	umber/N cs	ame)	Project HX1 / L	(Number and-Base	r/Name) ed Hyperso	onic Miss	ile
Management Service	s (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 O(	2020 CO	FY 2020 Total	]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
.Government Personnel and Operations Support	TBD	.SMDC/ARSTRAT Huntsville AL : .	-	-		-		20.000		-		20.000	0.000	20.000	-
		Subtotal	-	-		-		20.000		-		20.000	0.000	20.000	N/A
Product Developmen	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 O(	2020 CO	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
.Contracts for Technology Development, and weapon system design, integration, and prototyping	TBD	.TBD : .	-	-		-		208.000		-		208.000	0.000	208.000	-
		Subtotal	-	-		-		208.000		-		208.000	0.000	208.000	N/A
Support (\$ in Millions	5)			FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 O(	2020 CO	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	.:.	-	-		-		0.000		-		0.000	-	-	-
		Subtotal	-	-		-		0.000		-		0.000	-	-	N/A
Test and Evaluation (	(\$ in Milli	ions)		FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	2020 CO	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	.:.	-	-		-		0.000		-		0.000	-	-	-
		Subtotal	-	-		-		0.000		-		0.000	-	-	N/A
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 se	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		228.000		-		228.000	0.000	228.000	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2	2020 Arm	у				Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4			<b>R-1 Program El</b> PE 0604182A / <i>F</i>	ement (Number/N Hypersonics	lame) Project HX1 / L	(Numbe and-Base	r/ <b>Name)</b> ed Hyperso	onic Miss	sile
	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

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army Date: March 2019									
Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06	<b>Program Elemen</b> 604182A <i>I Hyper</i>	t (Number/Name sonics	Number/Name) nd-Based Hypersonic Missile			
	1						1	1	
Event Name	FY 2018	FY 20	019 3 4	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	
Systems Requirement Review									
Preliminary Design Review				•					
Critical Design Review									
All Up Round Test									
System Flight Test									

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	ch 2019	
ppropriation/Budget Activity 040 / 4	R-1 Program Eleme PE 0604182A / Hyp	r/Name)	<b>Project (Number/Name)</b> HX1 <i>I Land-Based Hypersonic Missile</i>			
	Schedule Details					
		Start			nd	
Events	0	Quarter	Year	Quarter	Year	
Systems Requirement Review		2	2020	4	2020	
Preliminary Design Review		4	2020	1	2022	
Critical Design Review		1	2022	4	2022	
All Up Round Test		4	2022	1	2023	
System Flight Test		1	2023	4	2023	

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army									Date: March 2019			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				<b>R-1 Program Element (Number/Name)</b> PE 0604319A <i>I Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)</i>								
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	10.871	40.979	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	51.850
DU3: IFPC2	-	10.871	40.979	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	51.850
Program MDAP/MAIS Code: Pre												

#### <u>Note</u>

Starting in FY 2017, IFPC Inc 2-I Block 1 system development funding has been realigned from BA4, PE 0604319/DU3 to BA5, PE 0605052/EY7.

In FY 2018 and FY 2019, funding is programmed for Expanded Mission Area Missile (EMAM) interceptor.

EMAM program funding for FY 2020 and out has been transferred to BA5 PE 655052/EY7 (IFPC Increment 2 - Block 1)

#### A. Mission Description and Budget Item Justification

The EMAM program supports the Integrated Air and Missile Defense (IAMD) architecture and provides Indirect Fire Protection Capability Increment 2 (IFPC Inc 2) the kinetic intercept capability to defeat Cruise Missiles (CM), Unmanned Aircraft System (UAS), and Rocket, Artillery, and Mortar (RAM) threats.

The Indirect Fire Protection Capability Increment 2 (IFPC Inc 2) will provide a ground-based weapon system designed to acquire, track, engage, and defeat the Cruise Missiles (CM), Unmanned Aircraft Systems (UAS), and Rockets, Artillery, and Mortar (RAM) threats. The IFPC Inc 2 requirement consists of a launcher, integrated fire control, sensor, and an interceptor to support the Threshold CM and UAS defeat mission and Objective counter-RAM mission with alternative kinetic and non-kinetic defeat solutions. The EMAM program supports IFPC Inc 2 by providing a kinetic interceptor capability against CM, UAS, and enabling an initial counter-Rocket, Artillery, and Mortar (RAM) capability. The IFPC Inc 2 and EMAM systems will be integrated with the Army Integrated Air and Missile Defense (AIAMD) Command and Control (C2) architecture.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 A	Date:	March 2019				
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604319A <i>I Indirect Fire Protection Capability Increment 2-Intercept (IFPC2</i>					
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Previous President's Budget	11.303	51.030	146.731	-	146.731	
Current President's Budget	10.871	40.979	0.000	-	0.000	
Total Adjustments	-0.432	-10.051	-146.731	-	-146.731	
<ul> <li>Congressional General Reductions</li> </ul>	-0.009	-0.051				
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-10.000				
<ul> <li>Congressional Rescissions</li> </ul>	-	-				
<ul> <li>Congressional Adds</li> </ul>	-	-				
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-				
<ul> <li>Reprogrammings</li> </ul>	-	-				
SBIR/STTR Transfer	-0.423	-				
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-146.731	-	-146.731	

### **Change Summary Explanation**

FY 2020 adjustments included a \$22.500 million decrease in the Portfolio Director's Review, a transfer of \$124.228 million to BA5 PE 655052/EY7 (IFPC Increment 2 - Block 1), and a reduction of \$0.003 million to adjust for pay inflation.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 Progra</b> PE 060431 <i>Capability</i>	am Elemen 9A / Indirec Increment 2	<b>t (Number/</b> ct Fire Prote ?-Intercept (I	Name) ction IFPC2)	Project (Number/Name) DU3 / IFPC2				
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
DU3: IFPC2	-	10.871	40.979	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	51.850
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### <u>Note</u>

Starting in FY 2017, IFPC Inc 2-I Block 1 system development funding has been realigned from BA4, PE 0604319/DU3 to BA5, PE 0605052/EY7.

In FY 2018 and FY 2019, funding is programmed for Expanded Mission Area Missile (EMAM) interceptor.

EMAM program funding for FY 2020 and out has been transferred to BA5 PE 655052/EY7 (IFPC Increment 2 - Block 1)

CFT Supported, IFPC Inc 2 - Block 1.

#### A. Mission Description and Budget Item Justification

The EMAM program supports the Integrated Air and Missile Defense (IAMD) architecture and provides Indirect Fire Protection Capability Increment 2 (IFPC Inc 2) the kinetic intercept capability to defeat Cruise Missiles (CM), Unmanned Aircraft System (UAS), and Rocket, Artillery, and Mortar (RAM) threats.

The Indirect Fire Protection Capability Increment 2 (IFPC Inc 2) will provide a ground-based weapon system designed to acquire, track, engage, and defeat the Cruise Missiles (CM), Unmanned Aircraft Systems (UAS), and Rocket, Artillery, and Mortar (RAM) threats. The IFPC Inc 2 requirement consists of a launcher, integrated fire control, sensor, and an interceptor to support the Threshold CM and UAS defeat mission and Objective counter-RAM mission with alternative kinetic and non-kinetic defeat solutions. The EMAM program supports IFPC Inc 2 by providing a kinetic interceptor capability against CM, UAS, and enabling an initial counter-Rocket, Artillery, and Mortar (RAM) capability. The IFPC Inc 2 and EMAM systems will be integrated with the Army Integrated Air and Missile Defense (AIAMD) Command and Control (C2) architecture.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: System Engineering & Program Management (SEPM)	6.071	14.459	-	-	-
<b>Description:</b> Funding is provided for systems engineering, integration, logistics engineering, system test and management efforts.					
<ul> <li>FY 2019 Plans:</li> <li>Continue RDT&amp;E efforts associated with Second interceptor</li> <li>Perform system engineering, integration, logistics engineering, system test and evaluation management, technical configuration control, cost and business management activities</li> </ul>					

PE 0604319A: Indirect Fire Protection Capability Incr... Army
Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/</b> PE 0604319A <i>I Indirect Fire Prote</i> <i>Capability Increment 2-Intercept (</i>	Name) ection (IFPC2)	Project (N DU3 / IFP0	<b>umber/Na</b> n C2	ne)	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<ul> <li>Conduct system technical reviews and program management reviews to inclu Requirement Review (SRR) and Systems Functional Review (SFR) of 3 Vendo - Develop Tailored Acquisition Strategy</li> <li>Verify Technology Readiness</li> <li>Down Selection process from 3 Vendors to 1 Vendor for Material Solution.</li> <li>Conduct Preliminary Design Review (PDR)</li> <li>Perform technical assessments, concept studies, cost reduction, risk reduction for Milestone B Decision</li> <li>Conduct program decision preparation, Milestone B documentation, Source execution activities</li> </ul> FY 2019 to FY 2020 Increase/Decrease Statement: PE 0604319/DU3 has no FY 2020 base dollars budgeted - funding transferred	de Design Review 2, Systems rs on, and required documentation Selection documentation and to BA5 PE 655052/EY7 (IFPC					
Title: Engineering and Technical Support		0.200	1.252	_	_	-
<ul> <li>Description: Funding is provided for engineering and technical support for the software, and integration requirements.</li> <li>FY 2019 Plans: <ul> <li>Continue Second Interceptor engineering and technical support for design of integration requirements</li> <li>Develop Tailored Acquisition Strategy</li> <li>Verify Technology Readiness</li> <li>Down Selection process from 3 Vendors to 1 Vendor for Material Solution.</li> <li>Conduct Preliminary Design Review (PDR)</li> <li>Perform technical assessments, concept studies, cost reduction, risk reduction for Milestone B Decision</li> <li>Conduct program decision preparation, Milestone B documentation, Source execution activities Participate in system technical and program management</li> <li>Preparation of Milestone B Decision Briefings and Documentation.</li> </ul> </li> </ul>	design of system hardware, system hardware, software, and on, and required documentation Selection documentation and reviews					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number</b> PE 0604319A <i>I Indirect Fire Prote</i> <i>Capability Increment 2-Intercept</i>	<b>/Name)</b> ection (IFPC2)	Project (N DU3 / IFPC	umber/Nan 22	ne)	
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
PE 0604319/DU3 has no FY 2020 base dollars budgeted because funding tran (IFPC Increment 2 - Block 1).	nsferred to BA5 PE 655052/EY7					
Title: System/Subsystem Development and Integration		4.191	21.732	-	-	-
<b>Description:</b> Funding is provided for hardware and software integration activit concept studies, and integration and risk reduction.	ies, technical assessments,					
<ul> <li>FY 2019 Plans:</li> <li>Continue Second Interceptor hardware and software integration activities</li> <li>Participate in system technical and program management reviews</li> <li>Perform technical assessments, concept studies, cost reduction, required do component risk reduction</li> <li>Develop Tailored Acquisition Strategy</li> <li>Verify Technology Readiness</li> <li>Down Selection process from 3 Vendors to 1 Vendor for Material Solution.</li> <li>Conduct Preliminary Design Review (PDR)</li> <li>Conduct program decision preparation, Milestone B documentation, Source</li> <li>Preparation of Milestone B Decision Briefings and Documentation.</li> </ul>	ocumentation, integration and Selection documentation.					
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> PE 0604319/DU3 has no FY 2020 base dollars budgeted because funding tran (IFPC Increment 2 - Block 1).	nsferred to BA5 PE 655052/EY7					
Title: System/Subsystem Developmental Testing		0.409	1.713	-	-	-
<b>Description:</b> Funding is provided for developmental testing activities, modelin and cyber security test activities.	g and simulation test activities,					
<ul> <li>FY 2019 Plans:</li> <li>Continue Developmental testing activities</li> <li>Continue Modeling and Simulation test activities</li> <li>Continue Cyber Security test activities</li> <li>Participate in system technical and program management reviews</li> <li>Perform technical assessments, concept studies, cost reduction, required do component risk reduction</li> </ul>	ocumentation, integration and					

PE 0604319A: Indirect Fire Protection Capability Incr... Army

Exhibit R-2A, RDT&E Project Justi	ification: PE	2020 Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> I PE 06 <i>Capat</i>	rogram Eler 04319A / Inc pility Increme	nent (Numb direct Fire Pro ent 2-Intercep	er/Name) otection ot (IFPC2)	Project (N DU3 / IFP0	umber/Na C2	ime)	
B. Accomplishments/Planned Pro	grams (\$ in	<u>Millions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<ul> <li>Develop Tailored Acquisition Strat</li> <li>Verify Technology Readiness</li> <li>Down Selection process from 3 Ve</li> <li>Conduct Preliminary Design Revie</li> <li>Conduct program decision prepara</li> </ul>	egy endors to 1 V ew (PDR) ation, Milesto	/endor for Ma one B docume	iterial Solutic	on. urce Selectio	on documen	tation.					
<b>FY 2019 to FY 2020 Increase/Decr</b> PE 0604319/DU3 has no FY 2020 b (IFPC Increment 2 - Block 1).	ease Staten ase dollars b	nent: budgeted bec	ause funding	g transferred	to BA5 PE 6	655052/EY7					
Title: FY 2019 SBIR/ STTR Transfer	r						-	1.823	-	-	-
Description: FY 2019 SBIR / STTR	Transfer										
<b>FY 2019 Plans:</b> FY 2019 SBIR / STTR Transfer											
FY 2019 to FY 2020 Increase/Decre FY 2019 SBIR / STTR Transfer	ease Staten	nent:									
			Accomplis	hments/Pla	nned Progra	ams Subtota	ls 10.871	40.979	-	-	-
C. Other Program Funding Summa	ary (\$ in Mill	ions)									
			FY 2020	FY 2020	FY 2020					Cost To	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	<u>Base</u>	000	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023	FY 2024	<u>Complete</u>	Total Cost
• C53101: MSE Missile	1,103.040	1,131.276	0.000	736.541	/36.541	/6/.495	749.530	999.731	898.131	793.430	7,179.174
• 0205456A: Lower Tier Air and	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	Continuing	Continuing
• 0604114A: Lower Tier Air	57.437	89.248	427.772	-	427.772	376.738	332.322	241.461	87.500	0.000	1,612.478
Missile Defense (LTAMD) Sensor											
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
0605052A: Indirect Fire	156.361	132.283	243.228	-	243.228	101.000	58.000	45.000	5.000	0.000	740.872
Protection Capability Inc 2 - Block 1 • 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
	n Oon - 1-111	1									
Army	ri Capability	INCT		Page 6	of 11		R-1 Line #	101			591

Exhibit R-2A, RDT&E Project Justif	ication: PB	2020 Army							Date: Ma	rch 2019	
Appropriation/Budget Activity 2040 / 4				<b>R-1 Pr</b> PE 06 <i>Capab</i>	ogram Eler 04319A / Inc bility Increme	Project (I DU3 / IFF	Number/Na 2C2	me)			
C. Other Program Funding Summa	ry (\$ in Milli	ons <u>)</u>		L. L							
			FY 2020	FY 2020	FY 2020					Cost To	
Line Item	FY 2018	<u>FY 2019</u>	Base	000	<u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<b>Complete</b>	<b>Total Cost</b>
C61001: INDIRECT FIRE	50.056	176.922	0.000	9.337	9.337	241.387	446.464	424.568	446.541	Continuing	Continuing
PROTECTION CAPABILITY INC 2-I											_
• E10: Sentinel	31.651	39.289	105.243	-	105.243	103.427	105.394	65.574	69.407	0.000	519.985
<ul> <li>S40: Army Integrated</li> </ul>	339.051	322.263	208.938	-	208.938	130.859	63.738	33.193	94.845	0.000	1,192.887
Air and Missile Defense											
<ul> <li>BZ5075: IAMD Battle</li> </ul>	-	-	29.629	-	29.629	254.834	353.929	417.426	413.775	Continuing	Continuing
Command System											
• 0604741A: Air Defense Command,	190.385	212.373	43.502	-	43.502	24.944	7.068	1.228	3.405	0.000	482.905
Control and Intelligence - Eng Dev											
AD5070: AIR & MSL Defense	132.713	29.913	24.730	14.331	39.061	49.147	106.671	63.143	0.075	0.000	420.723
Planning & Control Svs											

#### **Remarks**

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

#### D. Acquisition Strategy

The EMAM Product Office (PO) will verify technology readiness of missile alternatives in FY 2018 and will select one or more missiles to proceed in FY 2019. The PO will continue missile development, integration, and test to support Milestone B in 1QFY2020. The program will conduct Engineering and Manufacturing Development through the end of FY 2022, Milestone C in 1QFY2023, and Initial Operational Test & Evaluation in FY 2023.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	019	
Appropriation/Budget Activity 2040 / 4							ogram Ele 4319A / II lity Incren	ement (N ndirect Fi nent 2-Int	umber/N re Protec ercept (IF	<b>ame)</b> tion PC2)	Project DU3 / //	(Numbe PC2	r/Name)		
Management Service	s (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	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 Admin (IFPC Base System)	MIPR	Cruise Missile Defense Systems Project Office : Huntsville, Alabama	28.644	-		-		-		-		-	Continuing	Continuing	Continuing
Program Management Admin	Various	Multiple Activities : Redstone Arsenal, Alabama	-	4.471	Oct 2017	5.753	Oct 2018	-		-		-	Continuing	Continuing	Continuing
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.823		-		-		-	0.000	1.823	-
	1	Subtotal	28.644	4.471		7.576		-		-		-	Continuing	Continuing	N/A
Product Developmen	t (\$ in M	illions)		FY2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total	]		1
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering & Integration (IFPC Base System)	MIPR	Cruise Missile Defense Systems Project Office : Huntsville, AL	54.463	-		-		-		-		-	Continuing	Continuing	Continuing
System Engineering & Integration	Various	Multiple Activities : Huntsville, AL	-	1.600	Oct 2017	3.871	Oct 2018	-		-		-	Continuing	Continuing	Continuing
Engineering and Technical Support (IFPC Base System)	MIPR	Multiple Activities : Multiple Locations	140.824	-		-		-		-		-	Continuing	Continuing	Continuing
Engineering and Technical Support	Various	Multiple Activities : Multiple Locations	-	0.200	Oct 2017	1.252	Oct 2018	-		-		-	Continuing	Continuing	Continuing
System/Subsystem Development and Integration (IFPC Base System)	MIPR	Multiple Activities : Multiple Locations	120.035	-		-		-		-		-	Continuing	Continuing	Continuing
System/Subsystem Development and Integration	C/CPFF	TBD : Multiple Locations	-	4.191	Jan 2018	21.732	Feb 2019	-		-		-	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060 <i>Capabi</i>	o <b>gram Ele</b> 4319A / II lity Increm	ement (N ndirect Fi nent 2-Int	l <b>umber/N</b> ire Protect ercept (IF	<b>ame)</b> tion PC2)	Project DU3 / I	: <b>(Numbe</b> i FPC2	r/Name)		
Product Developme	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 1se	FY 2	2020 CO	FY 2020 Total	]		
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	315.322	5.991		26.855		-		-		-	Continuing	Continuing	N/A
Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Log Support	Various	Multiple Activities : Redstone Arsenal, Alabama	-	-		1.934	Oct 2018	-		-		-	0.000	1.934	-
		Subtotal	-	-		1.934		-		-		-	0.000	1.934	N/A
Test and Evaluation	(\$ in Milli	ions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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/Subsystem Developmental Testing	MIPR	Multiple Activities : Multiple Locations	-	0.409	Oct 2017	1.713	Oct 2018	-		-		-	Continuing	Continuing	Continuing
Developmental Testing Support	Various	Multiple Activities : Redstone Arsenal, Alabama	-	-		2.901	Oct 2018	-		-		-	Continuing	Continuing	Continuing
		Subtotal	-	0.409		4.614		-		-		-	Continuing	Continuing	N/A
			Prior Years	FY	2018	FY 2	2019	FY 2 Ba	2020 ise	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	343.966	10.871		40.979		-		-		-	Continuing	Continuing	N/A
Bomarka															

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٩rmy	/																			Dat	te: N	Marc	h 20	19			
Appropriation/Budget Activity 2040 / 4							R P C	<b>R-1 F</b> PE 06 Capa	<b>Prog</b> 6043 <i>bility</i>	<b>ram</b> 319A / <i>Inc</i>	Elen I Ind reme	n <b>en</b> lirec nt 2	t (Nu ct Fir ?-Inte	umt re P erce	<b>per/N</b> rotec pt (II	lame ction FPC2	<b>e)</b> 2)	Pr Dl	r <b>ojec</b> J3 /	<b>:t (N</b> IFP(	umt C2	oer/l	Nan	ıe)				
		FY	201	8		FY	2019	9		FY	2020			FY	202	1		FY	2022	2		FY	202	23		FY	2024	1
Event Name	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
EMAM Program Decision (Design Review 1)				ЕМА	M Pro	gram D	ecision	1																				
EMAM Integration & Testing				Integr	stion (	& Testir	ng																					
EMAM Pre-MS B Activities	Pre-N	/IS B A	ctivities																									

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Ma	arch 2019			
ppropriation/Budget Activity )40 / 4	<b>R-1 Program El</b> PE 0604319A / Capability Incren	lement (Numbe Indirect Fire Pro ment 2-Intercept	r/Name)   tection   (IFPC2)	Project (Number/Na DU3 / IFPC2	ect (Number/Name) / IFPC2			
	Schedule Details							
		0						
<b>F</b> unda		St	art		End			
Events		St Quarter	art Year	Quarter	End Year			
Events EMAM Program Decision (Design Review 1)		St Quarter 1	art Year 2019	Quarter 1	End Year 2019			
Events EMAM Program Decision (Design Review 1) EMAM Integration & Testing		St Quarter 1 4	art Year 2019 2018	Quarter 1 4	End Year 2019 2019			

Exhibit R-2, RDT&E Budget Item		Date: March 2019										
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	anced	R-1 Program Element (Number/Name) PE 0604403A / Future Interceptor										
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	8.000	-	8.000	8.000	8.000	88.918	120.000	Continuing	Continuing
FM3: Future Interceptor	-	0.000	0.000	8.000	-	8.000	8.000	8.000	88.918	120.000	Continuing	Continuing

#### Note

This is a new program beginning in FY2020.

#### A. Mission Description and Budget Item Justification

The Lower Tier Future Interceptor program will provide improved operational effectiveness against evolving air and missile threats within the lower tier portion of the ballistic missile defense battlespace. The future interceptor will increase Air and Missile Defense (AMD) capability through increased velocity, altitude, and maneuverability. The acquisition program will competitively select a future interceptor to complement existing Air and Missile Defense (AMD) capabilities to overmatch evolving threat.

<u>Y 2020 Total</u>
0.000
8.000
8.000
8.000
-

#### **Change Summary Explanation**

This is a new program beginning in FY 2020.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	Army							Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progr</b> PE 060440	<b>am Elemen</b> 03A <i>I Future</i>	t (Number/ Interceptor	Name)	Project (N FM3 / Futu	umber/Nai ire Intercep	<b>ne)</b> tor	
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
FM3: Future Interceptor	-	0.000	0.000	8.000	-	8.000	8.000	8.000	88.918	120.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note Project is a new start beginning in A. Mission Description and Buc Lower Tier Future Interceptor pro- missile defense battlespace. The acquisition program will competit	n FY 2020. <b>Iget Item J</b> u ogram will p future inter ively select	ustification rovide impro rceptor will i a future inte	bved operat ncrease Air erceptor to c	ional effecti and Missile complement	iveness aga e Defense ( <i>i</i> t existing Ai	ainst evolving AMD) capab r and Missile	g air and m bility through e Defense (	issile threat n increased AMD) capa	s within the velocity, all bilities to ov	lower tier p titude, and vermatch ev	portion of the maneuveral volving threa	e ballistic bility. The at.
B. Accomplishments/Planned P	rograms (S	\$ in Million	<u>s)</u>						FY	2018 I	FY 2019	FY 2020
Title: Program Development and	Support									-	-	8.000
<i>Description:</i> Provide program de concept development, modeling & <i>FY 2020 Plans:</i> FY2020 Plans include: -Developing the Analysis of Altern -Working on the Competitive cond -Initiating Modeling & Simulation of	evelopment & simulation natives (Ao cept develop developmer	and suppor a work, and A) pments thro nt for enhan	t for the Lov other related ugh Other ∃ ced system	ver Tier Fut d efforts. Fransaction effectivene	ure Interce Agreemen ess assessn	ptor program ts (OTA). nent.	n, including	technical w	ork,			
FY 2019 to FY 2020 Increase/De New program line beginning in F	e <b>crease Sta</b> 7 2020.	atement:										
					Accomplis	shments/Pla	anned Prog	grams Sub	totals	-	-	8.000
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy To provide improved operational effectiveness, the Army will use the Defense Ordnance Technology Consortium (DOTC) OTA to execute a competitive initial concept development (CD) with multiple contractors. From the CD phase, rapid prototype development approaches will utilize detailed modeling and simulation of the future												
				1 1 1 1								

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 / 4	PE 0604403A I Future Interceptor	FM3 <i>I Future Interceptor</i>
interceptor as well as conduct prototype development of high-risk hardware te will be used to competitively down select to a single vendor.	chnologies. The prototype technologies and o	detailed simulation based interceptor design
E. Performance Metrics		
N/A		

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19		
Appropriation/Budg 2040 / 4	et Activity	/				R-1 Program Element (Number/Name)Project (NPE 0604403A / Future InterceptorFM3 / Fut							r/Name) rceptor			
Management Servic	es (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	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	
PAC-3 Product Office	MIPR	Project Office : Huntsville, AL	-	-		-		0.350	Dec 2019	-		0.350	0.000	0.350	-	
		Subtotal	-	-		-		0.350		-		0.350	0.350 0.000 0.350			
Support (\$ in Millior	ıs)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	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	
SETA	Various	Multiple : Multiple	-	-		-		0.900	Feb 2020	-		0.900	0.000	0.900	-	
US Other Government Agencies (OGA)	MIPR	Various : Huntsville, AL	-	-		-		6.750	Jan 2020	-		6.750	0.000	6.750	-	
		Subtotal	-	-		-		7.650		-		7.650	0.000	7.650	N/A	
Prior Years					FY 2018		2019	FY 2020 Base		FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
	Project Cost Totals -					0.000		8.000		-		8.000	0.000	8.000	N/A	

**Remarks** 



hibit R-4A, RDT&E Schedule Details: PB 2020 Army				Da	ate: March	2019	
propriation/Budget Activity 40 / 4	<b>R-1 Program</b> PE 0604403A	Element (Number I Future Intercepto	r/ <b>Name)</b> or	Project (Num FM3 / Future	(Number/Name) uture Interceptor		
	Schedule Detail	S					
		Sta	art		En	d	
Events		Quarter	Year	Qua	arter	Year	
Materiel Development Decision (MDD)		2	2020	2	2	2020	
Analysis of Alternatives		2	2020	2	2	2021	
Concept Development		2	2020		1	2023	
Lower Tier Future Interceptor CDD		2	2021	2	2	2022	
Competitive RFP		3	2022	2	2	2023	
Contract Award Downselect		2	2023		2	2023	
Milestone A		2	2023		2	2023	
Modeling & Simulation Development	2	2020	4	4	2023		

Exhibit R-2, RDT&E Budget Item	n Justificat	i <b>on:</b> PB 202	20 Army						Date: March 2019				
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACE	ation, Army I 0&P)	BA 4: Adva	anced	R-1 Program Element (Number/Name) PE 0604541A / Unified Network Transport								
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
Total Program Element	-	0.000	0.000	39.600	-	39.600	41.400	41.000	41.050	41.050	Continuing	Continuing	
BT1: Interoperability	-	0.000	0.000	6.900	-	6.900	7.213	7.213	7.213	7.213	Continuing	Continuing	
BT2: Command Post Mobility/ Survivability	-	0.000	0.000	7.400	-	7.400	7.736	7.736	7.736	7.736	Continuing	Continuing	
BT3: Common Operating Environment (COE)	-	0.000	0.000	5.800	-	5.800	6.065	6.065	6.065	6.065	Continuing	Continuing	
BT4: Network Technology Maturation Initiatives (NTMI)	-	0.000	0.000	3.200	-	3.200	3.200	3.200	3.200	3.200	Continuing	Continuing	
BT5: Integrated Tactical Network/Enterprise Network	-	0.000	0.000	16.300	-	16.300	17.186	16.786	16.836	16.836	Continuing	Continuing	

#### Note

Funds supporting CFT Network efforts were previously requested in program Cross Functional Team (CFT) Advanced Development & Prototyping, OSD PE 0604020A.

#### A. Mission Description and Budget Item Justification

The Network Cross-Functional Team (N-CFT) narrows assigned Army capability gaps using Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel and Facilities - Policy (DOTMLPF-P) enhancements to enable overmatch. The N-CFT engages in expert analysis, focused experiments, and technology demonstrations to narrow capability gaps. Subsequent to a materiel development decision, the N-CFT develops and refines capability documentation aligned with the appropriate phase of the program. The N-CFT will inform technology transitions, research and development, and user assessments, and then rapidly transition Operational Requirements into the Army Acquisition System. The N-CFT will integrate and synchronize activities across the Army, tied to Joint requirements, focused to improve speed, capability, and cost of materiel solutions to meet the Chief of Staff of the Army's (CSA's) first order principles, characteristics, and Warfighting requirements.

Unified Network Transport supports the Army's Network Modernization Strategy Line Of Effort (LOE) 1 - Unified Network; LOE 2 - Common Operating Environment (COE); LOE 3 - Interoperability; and LOE 4 - Command Post Mobility and Survivability. Funds will (1) identify and acquire technologies to address identified gaps across the Lines of Effort in the Integrated Tactical Network/Enterprise Network, Tactical Network Transport, Computing Environments, Interoperability and Command Posts, and (2) conduct demonstrations and experimental testing in lab and operational environments on the technologies. Successful solutions identified through the experimentation will be transitioned to Programs of Record for integration and fielding. Funds for experimentation will also support integration with solutions identified in the other Modernization CFT efforts to ensure their network dependencies are addressed.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Arm	у			Date:	March 2019
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army I BA 4: Component Development & Prototypes (ACD&P)	Advanced	<b>R-1 Program El</b> PE 0604541A / U	ement (Number/Name) Jnified Network Transpo	rt	
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	39.600	-	39.600
Total Adjustments	0.000	0.000	39.600	-	39.600
<ul> <li>Congressional General Reductions</li> </ul>	-	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	39.600	-	39.600

# Change Summary Explanation N/A: FY20 New Start Program

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4		<b>R-1 Progra</b> PE 060454	am Elemen 1A / Unified	<b>t (Number</b> / Network T	Name) iransport	Project (Number/Name) BT1 / Interoperability						
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
BT1: Interoperability	-	0.000	0.000	6.900	-	6.900	7.213	7.213	7.213	7.213	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### <u>Note</u>

This is a new start in FY20.

Project BT1 is Interoperability which supports N-CFT LOE 3

Project BT2 is Command Post Mobility/Survivability which supports N-CFT LOE 4

Project BT3 is Common Operating Environment which supports N-CFT LOE 2

Project BT4 is Network Technology Maturation Initiatives which supports N-CFT LOE 1 through 4

Project BT5 is Integrated Tactical Network/Integrated Enterprise Network which supports N-CFT LOE 1

#### A. Mission Description and Budget Item Justification

LOE 3 (Interoperability) enables Unified Action Partner Interoperability through integration into the Joint Information Environment (JIE) and the Mission Partner Environment (MPE). Interoperability is the ability to routinely act together coherently, effectively and efficiently to achieve tactical, operational, and strategic objectives. Interoperability between disparate forces allows coalitions to produce greater combat power than the sum of their parts by leveraging relative strengths while mitigating relative weaknesses.

This funding is used to identify and acquire technologies to enhance or address gaps associated with LOE 3, Interoperability, solutions for experimentation that will incorporate abilities to leverage common commercial standards and/or widely recognized military interoperability standards. This funding will support demonstrations and experimentations, in a relevant operational environment, of key research and development (R&D) and science and technology (S&T) initiatives related to this effort, to include communications, information systems and information management; intelligence, surveillance and reconnaissance; intelligence fusion; digital fires; and sustainment.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: BT1: Interoperability	-	-	6.900
<b>Description:</b> This funding is used to identify and acquire technologies to enhance or address gaps associated with LOE 3, Interoperability, solutions for experimentation that will incorporate abilities to leverage common commercial standards and/ or widely recognized military interoperability standards. This funding will support demonstrations and experimentations, in a relevant operational environment, of key research and development (R&D) and science and technology (S&T) initiatives related to this effort, to include communications, information systems and information management; intelligence, surveillance and reconnaissance; intelligence fusion; digital fires; and sustainment.			
FY 2020 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / Unified Network Transport	Project BT1 / In	(Number/I teroperabil	<b>Name)</b> ity	
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
FY 20 funding initiates assessment of Unified Action Partners (UAPs) to deter requirements by echelon, unit type and partner. Also, this funding initiates idea on Mission Partner Environment (MPE) solutions for experimentation. FY20 fu during JWA 20 and DEFENDER 20. Subsequent funding support enables the enabling technologies to support the Army operating in an MPE; a deployed A tactical network; and implementing solutions to UAP information exchange ga Technologies with successful results will be transitioned in FY21-25 to a rapid	mine levels of interoperability and integrate ntifying multiple classification levels and acces unding supports joint interoperability assessme Army to identify potential solutions for the follo army solution to extend episodic MPEs into the ps (data, message and waveform Interoperabi I acquisition initiative or into an existing PoR st	s nt owing: lity). rategy.			
FY 2019 to FY 2020 Increase/Decrease Statement: N/A FY20 New Start					
	Accomplishments/Planned Programs Sub	ototals	-	-	6.900
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Appropriation/Budget Activity         R-1 Program Element (Number/Name) BT 1 Interoperability         Cost Cast On the cost One cost	Exhibit R-3, RDT&E F	Project C								Date:	March 20	19				
Management Services (\$ in Millions)       FY 2019       FY 2020 Base       FY 2020 FY 2020 Coc       FY 2020 Total	Appropriation/Budge 2040 / 4	et Activity	y				<b>R-1 Pro</b> PE 060	<b>ogram El</b> 4541A / L	ement (N Jnified Ne	umber/N etwork Tra	<b>ame)</b> ansport	Project BT1 / Ir	<b>(Numbe</b> nteroperat	r/ <b>Name)</b> pility		
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Management Service	es (\$ in M	lillions)		FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 OC	2020 CO	FY 2020 Total	]		
Product Management Office Support         TBD         TBD         TBD         TBD         TBD         TBD         Subtotal         -         -         0.500         0.500         -         0.500         0.000         0.500	Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal       -       -       0       0       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500       0.000       0.500	Product Management Office Support	TBD	TBD : TBD	-	-		-		0.500		-		0.500	0.000	0.500	-
Product Development (\$ in Millions)         FY 2018         FY 2019         FY 2020 Base         FY 2020 OCO         FY 2020 Total         FY 2020 Total           Contract Method Cost Category Item         Performing TBD         Prior BD         Cost Cost         Award Date         Cost Cost         Award Date         Cost Cost         Award Date         Cost Cost         Award Date         Cost Cost         Award Date         Cost Cost         Award Asso         Cost Cost         Award Cost         Award Asso         Cost Cost         Award Cost         Cost Cost         Award Date         Cost Cost         Prior         Cost Cost         Cost Cost         Prior         Cost         Award Date         Cost         Award Date         Cost         Cost Cost         Cost Cost         Cost Date         Cost         Cost Date         Cost Cost         Cost			Subtotal	-	-		-		0.500		-		0.500	0.000	0.500	N/A
Cost Category Item         Contract & Type         Performing Activity & Location         Prior Years         Cost Cost         Award Date         Cost Cost         Award Date         Award Cost         Award Atom         Cost         Award Date         Cost         Award Atom         Cost         Award Date         Cost         Award Atom         Cost         Prior         Prior         Cost         Award Award         Cost         Award Date         Cost         Award Award         Cost         Award Atom         Cost         Cost <td>Product Developmer</td> <td>nt (\$ in M</td> <td>illions)</td> <td></td> <td>FY</td> <td>2018</td> <td>FY 2</td> <td>2019</td> <td>FY 2 Ba</td> <td>2020 se</td> <td>FY 2 O(</td> <td>2020 CO</td> <td>FY 2020 Total</td> <td></td> <td></td> <td></td>	Product Developmer	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 O(	2020 CO	FY 2020 Total			
TEM         TBD         TBD         TBD         TBD         TBD         .        <	Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal         -         -         4.500         -         4.500         0.000         4.500         NA           Support (\$ in Millions)         FY 2018         FY 2019         FY 2020         FY 2020         FY 2020         FY 2020         FY 2020         FY 2020         Target         Target           Cost Category Item         Contract Method & Type         Performing Activity & Location         Prior Years         Cost         Award Date         Cost         Award Date         Cost         Award Date         Cost         Award Date         Cost	TEM	TBD	TBD : TBD	-	-		-		4.500		-		4.500	0.000	4.500	-
Support (\$ in Millions)       FY 2018       FY 2019       FY 2020 Base       FY 2020 OCO       FY 2020 Total       FY 2020 Total $cost Category Item       Method& Type       PerformingActivity & Location       PriorYears       Cost       AwardDate       Cost       FY 2019       FY 2020       FY 2020       FY 2020       FY 2020       Total       Cost       Value ofCost       Cost       FY 2019       FY 2020       FY 2020       FY 2020       FY 2020       Cost       Cost       Cost       Value ofCost       Cost       Cost       Cost       Cost       Cost       Cost       Cost       Cost       Cos$			Subtotal	-	-		-		4.500		-		4.500	0.000	4.500	N/A
Contract Method & Type         Performing Activity & Location         Prior Years         Cost         Award Date         Cost         Award Date         Award Cost         Award Date         Award Cost         Award Date         Award Cost         Award Date         Cost         Cost         Cost         Target Value of Cost         Value of Cost           Interoperability Engineering and Technical Support         TBD         TBD         TBD         TBD         -         -         -         0.900         -         0.900         0.000         0.90	Support (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 O(	2020 CO	FY 2020 Total			
Interoperability Engineering and Technical Support TBD : TBD TBD : TBD	Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal         -         -         0.900         -         0.900         0.000         0.900         N/A           Test and Evaluation (\$ in Millions)         FY 2018         FY 2019         FY 2019         FY 2020 Base         FY 2020 OCO         FY 2020 Total         FY 2020 Total         FY 2020 Total         FY 2020 Cost         FY 2020 OCO         FY 2020 Total         FY 2020 Cost         FY 202	Interoperability Engineering and Technical Support	TBD	TBD : TBD	-	-		-		0.900		-		0.900	0.000	0.900	-
Test and Evaluation (\$ in Millions)         FY 2018         FY 2019         FY 2020 oco         FY 2010 oco         Target Value of Cost           Oco         Distant         Cost Total         Cost Total         Cost Total         Target Value of Cost           Interoperability Test and Evaluation         TBD         TBD         Cost         <th colspan="</td> <td></td> <td>1</td> <td>Subtotal</td> <td>-</td> <td>-</td> <td></td> <td>-</td> <td></td> <td>0.900</td> <td></td> <td>-</td> <td></td> <td>0.900</td> <td>0.000</td> <td>0.900</td> <td>N/A</td>		1	Subtotal	-	-		-		0.900		-		0.900	0.000	0.900	N/A
Contract Method & TypePerforming Activity & LocationPrior YearsAward CostAward DateAward CostAward DateAward CostAward DateAward CostAward CostTaget Value of ContractInteroperability Test and EvaluationTBDTBD1.000-1.0000.0001.0001.000-Interoperability Test and EvaluationTBDTBD01.000-1.0000.0001.0000.0001.000-Interoperability Test and EvaluationTBDTBD0000.0001.000Interoperability Test and EvaluationTBDTBD0000.0001.000-Interoperability Test and EvaluationTBDTBD0000.0001.000-Interoperability Test and EvaluationTBDTBD00000.0001.0000.0001.000Interoperability Test and EvaluationTBDTBD1.0000-1.0000.0001.0000.0001.0000.0001.0000.0000000000000000000000000000000 <td>Test and Evaluation</td> <td>(\$ in Milli</td> <td>ions)</td> <td></td> <td>FY</td> <td>2018</td> <td>FY 2</td> <td>2019</td> <td>FY 2 Ba</td> <td>2020 se</td> <td>FY 2 O</td> <td>2020 CO</td> <td>FY 2020 Total</td> <td></td> <td></td> <td></td>	Test and Evaluation	(\$ in Milli	ions)		FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2 O	2020 CO	FY 2020 Total			
Interoperability Test and Evaluation         TBD         TBD         TBD         -         -         1.000         -         1.000         0.000         1.000         -         -           Subtotal         -         -         -         1.000         -         1.000         -         1.000         0.000         1.000         N/A           Fride         Prior Years         FY 2018         FY 2019         FY 2020 Base         FY 2020 OCO         FY 2020 Total         Cost To Complete         Total Cost         Target Yalue of Contract           Project Cost Totals         -         -         0.000         6.900         -         6.900         0.000         6.900         N/A	Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal       -       -       1.000       -       1.000       0.000       1.000       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       -       -       0.000       6.900       -       6.900       0.000       6.900       N/A	Interoperability Test and Evaluation	TBD	TBD : TBD	-	-		-		1.000		-		1.000	0.000	1.000	-
Prior Years     FY 2018     FY 2019     FY 2020 Base     FY 2020 OCO     FY 2020 Total     FY 2020 Cost To Complete     FY 2020 Cost To Cost To Cost To Cost Total     Target Value of Cost Total       Project Cost Totals     -     -     0.000     6.900     -     6.900     0.000     6.900     N/A			Subtotal	-	-		-		1.000		-		1.000	0.000	1.000	N/A
Project Cost Totals         -         -         0.000         6.900         -         6.900         0.000         6.900         N/A	Prior Years			FY	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
· · · · · · · · · · · · · · · · · · ·		Project Cost Totals -					0.000		6.900		-		6.900	0.000	6.900	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB	2020 Arm	у		Date:	Date: March 2019					
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program El</b> PE 0604541A / U	ement (Number/N Unified Network Tra	l <b>ame)</b> ansport	Project (I BT1 / Inte	Numbei eroperat	<b>lumber/Name)</b> roperability				
	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2 OC	020 :O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army						Date: March 20	19
Appropriation/Budget Activity 2040 / 4			<b>R-1 P</b> PE 06	Program Elemen 604541A / Unified	t (Number/Nam d Network Transp	e) Project (I port BT1 / Inte	Number/Name) properability	
	1	1			1		1	1 1
Event Name	FY 2018	FY 20	19	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
TEM (Technical Exchange Meeting) - Emerging Technology Pro	jects			Capability Gap Reduction	and Enhancement Develo	oment Effort		
JWA 20				1				
				Joint Warfighter As	sessment			
Defender 20					versice			
PE 0604541A: Unified Network Transport		UN	CLAS	SSIFIED				

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Marc	ch 2019			
ppropriation/Budget Activity 040 / 4	<b>R-1 Program Element (Number/</b> PE 0604541A / Unified Network 7	am Element (Number/Name)Project (Number/Name)\$1A I Unified Network TransportBT1 I Interoperability					
S	Schedule Details						
	Sta	rt	E	nd			
Events	Sta Quarter	rt Year	E Quarter	nd Year			
<b>Events</b> TEM (Technical Exchange Meeting) - Emerging Technology Projects	Quarter 1	rt Year 2020	E Quarter 4	nd Year 2025			
<b>Events</b> TEM (Technical Exchange Meeting) - Emerging Technology Projects JWA 20	StarQuarter13	rt Year 2020 2020	Quarter43	nd Year 2025 2020			

#### <u>Note</u>

TEM projects are continuous activities; N-CFT will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid SW/HW enhancements for PORs.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name)Project (NPE 0604541A / Unified Network TransportBT2 / Corr					Number/Name) nmand Post Mobility/Survivability					
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
BT2: Command Post Mobility/ Survivability	-	0.000	0.000	7.400	-	7.400	7.736	7.736	7.736	7.736	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

This is a new start in FY20.

Project BT1 is Interoperability which supports N-CFT LOE 3

Project BT2 is Command Post Mobility/Survivability which supports N-CFT LOE 4

Project BT3 is Common Operating Environment which supports N-CFT LOE 2

Project BT4 is Network Technology Maturation Initiatives which supports N-CFT LOE 1 through 4

Project BT5 is Integrated Tactical Network/Integrated Enterprise Network which supports N-CFT LOE 1

#### A. Mission Description and Budget Item Justification

LOE4, Command Posts (CPs), establishes capabilities that enable the ability to employ CPs for operations from early entry to major combat operations. This LOE includes the ability to develop and disseminate a common operating picture, conduct planning and collaboration, synchronize operations, and modify and reduce the electronic and physical signatures. Solutions to solve current issues of lengthy set-up and tear-down times, survivability, mobility, suitability and physical size are also resolved in this LOE. A key deliverable is an integrated body of requirements that meet operational needs in all aspects of CP operations.

This funding is used to identify and acquire technologies for experimentation that enhance or address gaps associated with LOE 4, Command Post, in the overall Integrated Tactical Network. The Command Post LOE will focus on developing and obtaining approval of requirements for integrated command posts, then delivering these integrated command post designs to Army units. LOE 4 addresses the operational requirement of a Deployable, Integrated, and Mobile Command Post and integrates Knowledge Management.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: BT2 Command Post Mobility and Survivability	-	-	7.400
<b>Description:</b> This funding is used to identify and acquire technologies for experimentation that enhance or address gaps associated with LOE 4, Command Post, in the overall Integrated Tactical Network. The Command Post LOE will focus on developing and obtaining approval of requirements for integrated command posts, then delivering these integrated command post designs to Army units. LOE 4 addresses the operational requirement of Deployable, Integrated, and Mobile Command Post and integrates Knowledge Management.			
FY 2020 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / Unified Network Transport	Proje BT2 /	ct (Number/I Command P	<b>Name)</b> ost Mobility/S	urvivability
B. Accomplishments/Planned Programs (\$ in Millions)		[	FY 2018	FY 2019	FY 2020
FY20 funding initiates survivable command post solutions that enable dispersed and extensible CP decoys for deception. Also, subsequent funding will support solutions for the following: Expeditionary tactical servers, integrated roll-on/roll- software to provision and manage command post; enhanced hardware operatin availability of cross domain solution; technology enhancements addressing gap Requirement capabilities, and the development and delivery of Integrated CP I Technologies with successful results will be transitioned in FY21-25 into an exist	d CP footprint, reduced CP EM vulnerability, experimentation that identifies potential off kits, automated management and monitoring at multiple classification levels pending os discovered through the delivery of CP Direct Designs that provide agility, mobility, and prote- sting PoR strategy for integration and fielding.	ng cted ection.			
FY 2019 to FY 2020 Increase/Decrease Statement: N/A FY20 New Start					
	Accomplishments/Planned Programs Sub	ototals	-	-	7.400
N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 060	<b>ogram El</b> 94541A / (	ement (N Unified Ne	lumber/N etwork Tra	<b>ame)</b> ansport	Project BT2 / C	t <b>(Numbe</b> Command	r/ <b>Name)</b> Post Mobi	ility/Survi	ivability
Management Service	es (\$ in M	lillions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	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 Office Support	TBD	TBD : TBD	-	-		-		0.600		-		0.600	0.000	0.600	-
		Subtotal	-	-		-		0.600		-		0.600	0.000	0.600	N/A
Product Developmer	nt (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	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
TEM	TBD	TBD : TBD	-	-		-		5.000		-		5.000	0.000	5.000	-
		Subtotal	-	-		-		5.000		-		5.000	0.000	5.000	N/A
Support (\$ in Million	s)			FY	2018	FY	2019	FY 2 Ba	2020 ase	FY O	2020 CO	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
CP Engineering/Technical Support	TBD	TBD : TBD	-	-		-		1.000		-		1.000	0.000	1.000	-
		Subtotal	-	-		-		1.000		-		1.000	0.000	1.000	N/A
Test and Evaluation	(\$ in Milli	ions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	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
CP Test and Evaluation	TBD	TBD : TBD	-	-		-		0.800		-		0.800	0.000	0.800	-
		Subtotal	-	-		-		0.800		-		0.800	0.000	0.800	N/A
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 ase	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	-		0.000		7.400		-		7.400	0.000	7.400	N/A
Remarks															

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Army						Date: March 20	19
Appropriation/Budget Activity 2040 / 4			<b>R-1 Pro</b> PE 060	o <b>gram Elemen</b> 94541A <i>I Unified</i>	<b>t (Number/Name</b> d Network Transp	e) Project (N ort BT2 / Con	lumber/Name) hmand Post Mobi	ility/Survivability
Event Name	FY 2018	FY 20	19	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Node to Node Connectivity Solutions	1 2 3 4	1 2 3	4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
CP Antenna Remoting								
Integrated CP Decoy Platform								
TEM (Technical Exchange Meeting) - Emerging Technology Pro	ojects							

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Ma	rch 2019
Appropriation/Budget Activity I 2040 / 4	R-1 Program Element (Number PE 0604541A / Unified Network	e <b>r/Name)</b> Transport	Project (Number/Na BT2 / Command Pos	<b>me)</b> t Mobility/Survivability
Sche	edule Details			
	Si	art		End
Events	Quarter	Year	Quarter	Year
Node to Node Connectivity Solutions	3	2020	4	2022
CP Antenna Remoting	1	2020	4	2021
Integrated CP Decoy Platform	2	2020	4	2022
TEM (Technical Exchange Meeting) - Emerging Technology Projects	1	2020	4	2025

#### Note

TEM projects are continuous activities; N-CFT will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid SW/HW enhancements for PORs.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					<b>R-1 Progra</b> PE 060454	am Elemen 1A / Unified	t (Number/ d Network T	Name) iransport	Project (N BT3 / Com (COE)	umber/Nan mon Opera	ne) ting Environ	nment
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
BT3: Common Operating Environment (COE)	-	0.000	0.000	5.800	-	5.800	6.065	6.065	6.065	6.065	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

This is a new start in FY20.

Project BT1 is Interoperability which supports N-CFT LOE 3

Project BT2 is Command Post Mobility/Survivability which supports N-CFT LOE 4

Project BT3 is Common Operating Environment which supports N-CFT LOE 2

Project BT4 is Network Technology Maturation Initiatives which supports N-CFT LOE 1 through 4

Project BT5 is Integrated Tactical Network/Integrated Enterprise Network which supports N-CFT LOE 1

#### A. Mission Description and Budget Item Justification

LOE 2, Common Operating Environment (COE), creates an approved set of standards, computing technologies, integrated data and databases, common graphics and a unified set of mission command applications. It allows warfighters to adapt and configure the network as conditions change.

Funding enhances Common Operating Environment Interoperability by enabling integration into the Joint Information Environment (JIE) and the Mission Partner Environment (MPE). N-CFT COE enhancements will demonstrate a simple and intuitive single mission command suite (single common operating picture of common unified data and geospatial standards) installed, operated and maintained by soldiers, and standardized mission command applications and knowledge management capabilities that support leaders and Soldiers across echelons to enable all warfighting functions.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: BT3 Common Operating Environment	-	-	5.800
<b>Description:</b> This funding is used to identify and acquire technologies to enhance or address gaps associated with LOE 2, Common Operating Environment, in the overall Integrated Network. This LOE creates an approved set of standards, computing technologies, integrated data and databases and common graphics and a unified set of mission command applications. It will also support collaboration using a common picture with joint and coalition mission partners. This LOE delivers an integrated body of requirements that meet operational needs. The decisive action within this LOE is informing the next version of COE in FY21.			
FY 2020 Plans: FY20 funding supports assessment and experimentation of potential solutions for the following: distributed computing, using cloud			
technologies in a tactical space, machine learning, a modular & dockable computing infrastructure, and cyber hardening through			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A <i>I Unified Network Transport</i>	Projec BT3 / (COE)	ct (Number/I Common Op	Name) erating Enviro	onment
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
Tactical Endpoint Security. Technologies with successful results will be transit into an existing PoR strategy.	ioned in FY21/22 to a rapid acquisition initiativ	e or			
FY 2019 to FY 2020 Increase/Decrease Statement: N/A FY20 New Start					
	Accomplishments/Planned Programs Sub	ototals	-	-	5.800
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A					

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	.020 Ann	y								Bato.		10	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 060	<b>ogram El</b> 4541A / L	ement (N Jnified Ne	umber/Na twork Tra	<b>ame)</b> Insport	Project BT3 / C (COE)	(Number ommon C	·/ <b>Name)</b> )perating E	Environm	ent
Management Service	es (\$ in M	lillions)	ľ	FY	2018	FY	2019	FY 2 Ba	:020 se	FY 2	2020 CO	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 Office Support	TBD	TBD : TBD	-	-		-		0.500		-		0.500	0.000	0.500	-
		Subtotal	-	-		-		0.500		-		0.500	0.000	0.500	N/A
Product Developme	nt (\$ in Mi	illions)		FY	2018	FY :	2019	FY 2 Ba	:020 se	FY 2 O(	2020 CO	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
TEM	TBD	TBD : TBD	_	-		-		4.000		-		4.000	0.000	4.000	-
	_	Subtotal	_	-		-		4.000		-		4.000	0.000	4.000	N/A
Support (\$ in Million	is)			FY	2018	FY	2019	FY 2 Ba	:020 se	FY 2 OC	2020 CO	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
COE Engineering/ Technical Support	TBD													,	
		TBD : TBD	-	-		-		0.500		-		0.500	0.000	0.500	-
		TBD : TBD Subtotal	-	-		-		0.500 0.500		-		0.500	0.000	0.500	- N/A
Test and Evaluation	(\$ in Milli	TBD : TBD Subtotal ons)	-	- - FY :	2018	- - FY :	2019	0.500 0.500 FY 2 Ba	020 se	- - FY 2 00	2020	0.500 0.500 FY 2020 Total	0.000	0.500	- N/A
Test and Evaluation	(\$ in Milli Contract Method & Type	TBD : TBD Subtotal ONS) Performing Activity & Location	- - Prior Years	- - FY 2	2018 Award Date	- - FY 2 Cost	2019 Award Date	0.500 0.500 FY 2 Ba Cost	020 se Award Date	- FY 2 OC	2020 CO Award Date	0.500 0.500 FY 2020 Total Cost	0.000 0.000 Cost To Complete	0.500 0.500 Total Cost	- N/A Target Value of Contract
Test and Evaluation Cost Category Item COE Test and Evaluation	(\$ in Milli Contract Method & Type TBD	TBD : TBD Subtotal ONS) Performing Activity & Location TBD : TBD	- Prior Years	- - FY : Cost	2018 Award Date	- FY 2 Cost	2019 Award Date	0.500 0.500 FY 2 Ba Cost 0.800	020 se Award Date	- FY 2 OC Cost	2020 CO Award Date	0.500 0.500 FY 2020 Total Cost 0.800	0.000 0.000 Cost To Complete 0.000	0.500 0.500 Total Cost 0.800	- N/A Target Value of Contract
Test and Evaluation Cost Category Item COE Test and Evaluation	(\$ in Milli Contract Method & Type TBD	TBD : TBD Subtotal ONS) Performing Activity & Location TBD : TBD Subtotal	- Prior Years -	- - FY : Cost - -	2018 Award Date	- - FY 2 Cost -	2019 Award Date	0.500 0.500 FY 2 Ba Cost 0.800 0.800	020 se Award Date	- FY 2 OC Cost -	2020 CO Award Date	0.500 0.500 FY 2020 Total Cost 0.800 0.800	0.000 0.000 Cost To Complete 0.000 0.000	0.500 0.500 Total Cost 0.800 0.800	Target Value of Contract - N/A
Test and Evaluation Cost Category Item COE Test and Evaluation	(\$ in Milli Contract Method & Type TBD	TBD : TBD Subtotal ions) Performing Activity & Location TBD : TBD Subtotal	Prior Years - Prior Years	- - - - - - - - -	2018 Award Date 2018	- FY 2 Cost - -	2019 Award Date 2019	0.500 0.500 FY 2 Ba Cost 0.800 0.800 FY 2 Ba	020 se Award Date 020 se	- FY 2 OC Cost - - FY 2 OC	2020 CO Award Date 2020 CO	0.500 0.500 FY 2020 Total 0.800 0.800 FY 2020 Total	0.000 0.000 Cost To Complete 0.000 0.000 Cost To Complete	0.500 0.500 Total Cost 0.800 0.800 Total Cost	Target Value of Contract - N/A Target Value of Contract
Test and Evaluation Cost Category Item COE Test and Evaluation	(\$ in Milli Contract Method & Type TBD	TBD : TBD Subtotal ions) Performing Activity & Location TBD : TBD Subtotal Project Cost Totals	Prior Years - Prior Years -	- - FY: Cost - - FY: -	2018 Award Date	- FY 2 Cost - - FY 2 0.000	2019 Award Date 2019	0.500 0.500 FY 2 Ba 0.800 0.800 FY 2 Ba 5.800	020 se Award Date	- FY 2 OC Cost - - FY 2 OC	2020 CO Award Date 2020 CO	0.500 0.500 FY 2020 Total Cost 0.800 0.800 FY 2020 Total 5.800	0.000 0.000 0.000 Cost To Complete 0.000 0.000	0.500 0.500 Total Cost 0.800 0.800 0.800 Total Cost 5.800	Target Value of Contract - N/A Target Value of Contract

Exhibit R-3, RDT&E Project Cost Analysis: PB	2020 Arm	у				Date:	March 20	19	
Appropriation/Budget Activity 2040 / 4			<b>R-1 Program El</b> PE 0604541A /	ement (Number/N Unified Network Tra	lame) Projec ansport BT3 / C (COE)	t <b>(Numbe</b> Common C	<b>r/Name)</b> Operating I	Environn	nent
	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

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	۱rm	/																				Date	e: M	larch	1 20´	19			
Appropriation/Budget Activity 2040 / 4							F P	<b>R-1 P</b> PE 06	<b>Prog</b> 6045	ram 541A	Elei (1 Ur	men nified	t (N d Ne	uml etwo	<b>ber</b> / ork 7	Nam Trans	e) port	F E (	Proj 3T3 (CO)	ect / Co E)	(Ni omr	u <b>mb</b> mon	er/N Ope	<b>lam</b> e eratii	₽) ng E	Inviro	onm	ent	
Event Name		FY	201	8		FY	2019	9		FY	202	0		FY	( 20)	21		F١	Y 20	22			FY	2023	3		FY	2024	4
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	3 4	4	1	2	3	4	1	2	3	4
GRiD Tactical																					Ir	ntegra	te mat	uring C	3eoIN	T Trade	ercraft	and m	nulti-INT
E2E GeoINT																					P	rototy	pe E2	E forwa	ard sol	lution			
TEM (Technical Exchange Meeting) - Emerging Technology Pro	jects																												
													1				1				I				1				]

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army			[	Date: March	2019
ppropriation/Budget Activity 040 / 4	<b>R-1 Program Element (Number</b> PE 0604541A <i>I Unified Network</i>	r/ <b>Name)</b> Transport	Project (Nu BT3 / Comm (COE)	mber/Name non Operatii	<b>e)</b> ng Environment
Scl	nedule Details				
			1		
	Sta	art		En	d
Events	Sta Quarter	art Year	Qu	Enduarter	d Year
Events GRiD Tactical	Sta Quarter 1	Art Year 2023	Qu	En uarter 4	d Year 2024
Events GRiD Tactical E2E GeoINT	Sta Quarter 1 1 1	art Year 2023 2023	Qu	Encuarter 4 4	d Year 2024 2024

#### <u>Note</u>

TEM projects are continuous activities; N-CFT will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid SW/HW enhancements for PORs.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
ppropriation/Budget Activity 040 / 4				<b>R-1 Progra</b> PE 060454	am Element 1A / Unified	t <b>(Number</b> /I I Network Ti	Name) ransport	Project (Number/Name) BT4 / Network Technology Maturation Initiatives (NTMI)				
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
BT4: Network Technology Maturation Initiatives (NTMI)	-	0.000	0.000	3.200	-	3.200	3.200	3.200	3.200	3.200	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

This is a new start in FY20.

Project BT1 is Interoperability which supports N-CFT LOE 3

Project BT2 is Command Post Mobility/Survivability which supports N-CFT LOE 4

Project BT3 is Common Operating Environment which supports N-CFT LOE 2

Project BT4 is Network Technology Maturation Initiatives which supports N-CFT LOE 1 through 4

Project BT5 is Integrated Tactical Network/Integrated Enterprise Network which supports N-CFT LOE 1

#### A. Mission Description and Budget Item Justification

This funding is used to acquire and transition DARPA and SCO RDT&E efforts. This funding will be used to evaluate and transition DARPA SHARE and SCO's LTE programs (including future OSD RDT&E initiatives and projects). In addition, this funding provides support required to conduct technical exchanges that provide opportunities to identify and acquire technologies for demonstrations, experimentations and prototyping. Funding provides engineering and programmatic support required for execution of lab-based and operational field experimentation and assessment.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: BT4: Network Technology Maturation Initiatives (NTMI)	-	-	3.200
<b>Description:</b> This funding will be used to continuously identify, prioritize, mature, demonstrate, and insert emerging technologies to enhance operational capability through our Market Research and Concept Capability Development activities. Funding provides engineering and programmatic support required for execution of lab-based and field experimentation. In addition, this funding is used to acquire and transition of DARPA and SCO RDT&E efforts.			
<b>FY 2020 Plans:</b> This funding provides support required to identify successful solutions for transition into the tactical network through programs of record. FY20 funding supports lab-based and field experimentation of commercial solutions and solutions derived from OSD RDT&E programs (DARPA Share and SCO LTE programs).			
FY 2019 to FY 2020 Increase/Decrease Statement:			

Appropriation/Budget Activity       R-1 Program Element (Number/Name)       Project (Number/Name)       BT4 / Network Technology Maturation         2040 / 4       PE 0604541A / Unified Network Transport       BT4 / Network Technology Maturation       BT4 / Network Technology Maturation         B. Accomplishments/Planned Programs (\$ in Millions)       FY 2018       FY 2019       FY 2020         N/A FY20 New Start       Accomplishments/Planned Programs Subtotals       -       3.200         C. Other Program Funding Summary (\$ in Millions)       N/A       Remarks       -       3.200         D. Acquisition Strategy       N/A       -       -       -       -         E. Performance Metrics       -	Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019				
B. Accomplishments/Planned Programs (\$ in Millions)       FY 2018       FY 2019       FY 2020         N/A FY20 New Start       Image: Complishments/Planned Programs Subtotals       Image: Complishments/Planned Programs Subtotals <td< th=""><th>Appropriation/Budget Activity 2040 / 4</th><th><b>R-1 Program Element (Number/Name)</b> PE 0604541A <i>I Unified Network Transport</i></th><th colspan="6"><b>Project (Number/Name)</b> BT4 / Network Technology Maturation Initiatives (NTMI)</th></td<>	Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A <i>I Unified Network Transport</i>	<b>Project (Number/Name)</b> BT4 / Network Technology Maturation Initiatives (NTMI)					
N/A FY20 New Start       Accomplishments/Planned Programs Subtotals       -       3.200         C. Other Program Funding Summary (\$ in Millions)       N/A       -       3.200         N/A       Remarks       -       -       -         D. Acquisition Strategy       N/A       -       -       -         E. Performance Metrics       -       -       -       -	B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020		
Accomplishments/Planned Programs Subtotals 3.200 C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics	N/A FY20 New Start							
C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics		Accomplishments/Planned Programs Sub	totals	-	-	3.200		
N/A	C. Other Program Funding Summary (\$ in Millions) N/A Remarks D. Acquisition Strategy N/A E. Performance Metrics N/A							

Exhibit R-3, RDT&E I	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19									
Appropriation/Budget Activity 2040 / 4							ogram Ele 14541A / L	e <b>ment (N</b> Jnified Ne	umber/N etwork Tra	<b>ame)</b> Insport	<b>Project (Number/Name)</b> BT4 I Network Technology Maturation Initiatives (NTMI)												
Management Services (\$ in Millions)				FY	2018	FY 2019		FY 2020 Base		FY	FY 2020 OCO												
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract								
Project Management Office Support	TBD	TBD : TBD	-	-		-		0.250		-		0.250	0.000	0.250	-								
		Subtotal	-	-		-		0.250		-		0.250	0.000	0.250	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								
NTMI Engineering/ Technical Support	TBD	TBD : TBD	-	-		-		2.500		-		2.500	0.000	2.500	-								
		Subtotal	-	-		-		2.500		-		2.500	0.000	2.500	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								
NTMI Test and Evaluation	TBD	TBD : TBD	-	-		-		0.450		-		0.450	0.000	0.450	-								
	-	Subtotal	-	-		-		0.450		-		0.450	0.000	0.450	N/A								
			Prior Years	FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract								
		Project Cost Totals	-	-		0.000		3.200		-		3.200	0.000	3.200	N/A								
<u>Remarks</u>																							
Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army															D	Date: March 2019							
--	-----------	----------	-------	---	------	--	---------	----	---------	---	----	------	---	---	------	------------------	---	----	-----	---	---	------	-----
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name)Project (Number/Name)PE 0604541A / Unified Network TransportBT4 / Network Technology MaturationInitiatives (NTMI)								1									
Event News		FY 20	)18		FY 2	019		FY	2020		FY	2021		F	FY 2	022		F١	202	3		FY 2	024
Event Name	1	2 3	3 4	1	2	3 4	1	2	3 4	1	2	3	4	1	2	3 4	1	2	3	4	1	2	3 4
SCO LTE Program									2 0T														
DARPA SHARE							1 21																
TEM (Technical Exchange Meeting) - Emerging Technology Pro	ojects Si	upport (	(Lab)																				
													I										

XNIDIT R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Marc	h 2019
ppropriation/Budget ActivityR-1 Pro040 / 4PE 060	gram Element (Number 4541A / Unified Network	r/ <b>Name)</b> Transport	Project (Number/Nam BT4 / Network Technol Initiatives (NTMI)	ne) logy Maturation
Schedule	Details			
	Sta	art	Er	nd
Events	Sta Quarter	art Year	Er Quarter	nd Year
Events SCO LTE Program	Sta Quarter 4	Art Year 2020	Er Quarter 4	nd Year 2020
Events SCO LTE Program DARPA SHARE	Sta Quarter 4 4	art Year 2020 2019	Er Quarter 4 4	nd Year 2020 2019

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019													
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)Project (NPE 0604541A / Unified Network TransportBT5 / Internet Network				Project (N BT5 / Integ Network	Number/Name) egrated Tactical Network/Enterprise			
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	
BT5: Integrated Tactical Network/Enterprise Network	-	0.000	0.000	16.300	-	16.300	17.186	16.786	16.836	16.836	Continuing	Continuing	
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-			

#### Note

This is a new start in FY20.

Project BT1 is Interoperability which supports N-CFT LOE 3

Project BT2 is Command Post Mobility/Survivability which supports N-CFT LOE 4

Project BT3 is Common Operating Environment which supports N-CFT LOE 2

Project BT4 is Network Technology Maturation Initiatives which supports N-CFT LOE 1 through 4

Project BT5 is Integrated Tactical Network/Integrated Enterprise Network which supports N-CFT LOE 1

#### A. Mission Description and Budget Item Justification

Unified Network, enables a converged Mission Command Network that operates seamlessly worldwide and in any environment. This effort has three components: Integrated Tactical Network, Network Enablers and Integrated Enterprise Network. It 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 Army network will provide resiliency through path diversity and dynamic routing to ensure tactical units can communicate in hostile environments. It will provide multiple ways to communicate and give commanders the ability to choose their communications methods and tools during operations. It fully incorporates cyber and electronic warfare capabilities that support the employment of the network as a weapon system.

This funding is used to identify and acquire technologies to enhance or address gaps associated with LOE 1, Unified Network, for experimentation and demonstration in the overall Integrated Network. The Unified Network LOE enables a converged Mission Command Network that operates seamlessly worldwide and in any environment. It will increase bandwidth and range; improve mobility and network security; and harden the network. This will require the creation of a standards-based network architecture that effectively integrates enterprise and deployed network capabilities across domains and environments, and features a unified transport layer that permits "plug and play" for specific network capabilities. LOE 1 addresses the following operational requirements: Converged Mission Command Network, Network Augmentation / Extension, and Synthetic Training Environment.

LOE 1 enhancements include Aerial Tier (WGS Ka Band Surrogate), CEMA resiliency, and cyber hardened communications.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Project BT5: Integrated Tactical Network/Integrated Enterprise Network	-	-	16.300

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019									
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / Unified Network Transport	Project (Number/ BT5 / Integrated To Network	<b>Project (Number/Name)</b> 3T5 / Integrated Tactical Network/Enterprise Network						
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020					
<b>Description:</b> This funding is used to identify and acquire technologies to enhand Unified Network, for experimentation and demonstration in the overall Integrate converged Mission Command Network that operates seamlessly worldwide and of a standards-based network architecture that effectively integrates enterprise and environments, and features a unified transport layer that permits "plug and addresses the following operational requirements: Converged Mission Commant and Synthetic Training Environment.	nce or address gaps associated with LOE 1, ed Network. The Unified Network LOE enables d in any environment. This will require the creat and deployed network capabilities across dor play" for specific network capabilities. LOE 1 nd Network, Network Augmentation / Extension	a htion nains n,							
<b>FY 2020 Plans:</b> FY20 funding supports identifying solutions for network fail-over in a contested Contingency & Emergency) and demonstrate rapid restoration capability for a context network which supports BLOS communications between Division, Brigade, Ba altitude balloon satellite surrogates. Restoring the NCW network provides resili Also, this funding supports demonstration and acquisition plans for experimenta Accelerate Next Generation Tactical radio, Air to ground integration, Secure LT and Tactical Network Operations (NetOps), Cyber Electromagnetic Activities (Context) Management (IdAM).Technology enhancements will provided Integrated Multi- Sight Backhaul Radios, Line Of Sight Communications Range Extension, Elect Network Gateways,Tactical NetOps Tools, Distributed Computing Tools, and H Technologies with successful results will be transitioned in FY21-25 to a rapid a strategies.	environment to enable PACE (Primary, Altern denied WGS NCW tactical communications ttalion and Company echelons with high ency to communications, including LRPF. ation of potential solutions for the following: E capabilities for mounted/ dismounted soldie CEMA) and Tactical Identity and Access Transport Capabilities, High Capacity Line of ronic Protection of Tactical Communications, ligh Capacity Transport for Heavy Mobile Platt acquisition initiative or into an existing PoR	ate rs, orms.							
FY 2019 to FY 2020 Increase/Decrease Statement: N/A FY20 New Start Program									
	Accomplishments/Planned Programs Sub	totals -	_	16.300					
<u>C. Other Program Funding Summary (\$ in Millions)</u> N/A <u>Remarks</u> <u>D. Acquisition Strategy</u> N/A									

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army	Date: March 2019					
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604541A / Unified Network Transport	Project (Number/Name) BT5 / Integrated Tactical Network/Enterprise Network				
E. Performance Metrics	I					
N/A						

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	У								Date:	March 20	19	
Appropriation/Budge 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 060	<b>ogram El</b> 04541A / (	ement (N Jnified Ne	umber/N etwork Tra	<b>ame)</b> Insport	Project BT5 / In Networl	(Number tegrated k	'/ <b>Name)</b> Tactical Ne	etwork/Ei	nterprise
Management Servic	es (\$ in M	lillions)		FY	2018	FY	2019	FY 2 Ba	2020 se	FY 2	2020 CO	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 Office Support	TBD	TBD : TBD	-	-		-		1.000		-		1.000	0.000	1.000	-
		Subtotal	-	-		-		1.000		-		1.000	0.000	1.000	N/A
Product Developme	nt (\$ in Mi	illions)		FY	2018	FY	2019	FY 2 Ba	2020 se	FY 2 O	2020 CO	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
TEM Development	TBD	TBD : TBD	-	-		-		10.800		-		10.800	0.000	10.800	-
		Subtotal	-	-		-		10.800		-		10.800	0.000	10.800	N/A
Support (\$ in Million	ıs)			FY	2018	FY	2019	FY 2 Ba	2020 se	FY 2 O	2020 CO	FY 2020 Total			
	Contract								Award					Total	Target Value of
Cost Category Item	Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Date	Cost	Award Date	Cost	Cost To Complete	Cost	Contract
Cost Category Item TEM Engineering Technical Support	Method & Type TBD	Performing Activity & Location TBD : TBD	Prior Years -	Cost -	Award Date	Cost -	Award Date	<b>Cost</b> 2.000	Date	Cost -	Award Date	<b>Cost</b> 2.000	Cost To Complete	2.000	Contract
Cost Category Item TEM Engineering Technical Support	Method & Type TBD	Performing Activity & Location TBD : TBD Subtotal	Prior Years -	Cost - -	Award Date	Cost -	Award Date	Cost 2.000 2.000	Date	Cost -	Award Date	Cost 2.000 2.000	Cost To Complete 0.000 0.000	2.000 2.000	Contract - N/A
Cost Category Item TEM Engineering Technical Support Test and Evaluation	Method & Type TBD (\$ in Milli	Performing Activity & Location TBD : TBD Subtotal	Prior Years - -	Cost - - FY	Award Date 2018	Cost - -	Award Date 2019	Cost 2.000 2.000 FY 2 Ba	Date Date	Cost - - FY 2	Award Date 2020 CO	Cost 2.000 2.000 FY 2020 Total	Cost To Complete 0.000 0.000	2.000	Contract - N/A
Cost Category Item TEM Engineering Technical Support Test and Evaluation Cost Category Item	Method & Type TBD (\$ in Milli Contract Method & Type	Performing Activity & Location TBD : TBD Subtotal ONS) Performing Activity & Location	Prior Years - - Prior Years	Cost - FY Cost	Award Date 2018 Award Date	Cost - FY Cost	Award Date 2019 Award Date	Cost 2.000 2.000 FY 2 Ba Cost	Award Date 2020 Se Award Date	Cost - FY 2 OC	Award Date 2020 CO Award Date	Cost           2.000           2.000           FY 2020           Total           Cost	Cost To Complete 0.000 0.000 Cost To Complete	Total Cost 2.000 2.000 Total Cost	Contract - N/A Target Value of Contract
Cost Category Item TEM Engineering Technical Support Test and Evaluation Cost Category Item Test and Evaluation	Method & Type TBD (\$ in Milli Contract Method & Type TBD	Performing Activity & Location TBD : TBD Subtotal ons) Performing Activity & Location TBD : TBD	Prior Years - - Prior Years -	Cost - - FY Cost	Award Date 2018 Award Date	Cost - FY 2 Cost	Award Date 2019 Award Date	Cost 2.000 2.000 FY 2 Ba Cost 2.500	Award 2020 se Award Date	Cost - - FY 2 00 Cost	Award Date 2020 CO Award Date	Cost 2.000 2.000 FY 2020 Total Cost 2.500	Cost To Complete 0.000 0.000 Cost To Complete 0.000	Total           Cost           2.000           2.000           2.000           2.000           2.000           2.000	Contract - N/A Target Value of Contract
Cost Category Item TEM Engineering Technical Support Test and Evaluation Cost Category Item Test and Evaluation	Method & Type TBD (\$ in Milli Contract Method & Type TBD	Performing Activity & Location TBD : TBD Subtotal ons) Performing Activity & Location TBD : TBD Subtotal	Prior Years - - Prior Years - -	Cost - FY Cost -	Award Date 2018 Award Date	Cost - - FY Cost - -	Award Date 2019 Award Date	Cost 2.000 2.000 FY 2 Ba Cost 2.500 2.500	Award Date 2020 se Award Date	Cost - - - - - - - - - -	Award Date 2020 CO Award Date	Cost           2.000           2.000           FY 2020           Total           Cost           2.500	Cost To           Complete           0.000           0.000           Cost To           Complete           0.000	Total           2.000           2.000           2.000           2.000           2.000           2.000           2.000           2.000           2.000           2.000           2.000           2.500	Contract - N/A Target Value of Contract - N/A
Cost Category Item TEM Engineering Technical Support Test and Evaluation Cost Category Item Test and Evaluation	Method & Type TBD (\$ in Milli Contract Method & Type TBD	Performing Activity & Location TBD : TBD Subtotal ONS) Performing Activity & Location TBD : TBD Subtotal	Prior Years - - - - - - - - - - - - -	Cost - FY Cost - FY	Award Date 2018 Award Date 2018	Cost - - - - - - - - - -	Award Date 2019 Award Date 2019	Cost 2.000 2.000 FY 2 Ba Cost 2.500 2.500 2.500	Award Date 2020 Se Award Date 2020 Se	Cost - - - - - - - - - - - - - - - - - - -	Award Date 2020 CO Award Date 2020 CO	Cost 2.000 2.000 FY 2020 Total Cost 2.500 2.500 FY 2020 Total	Cost To Complete 0.000 0.000 Cost To Complete 0.000 0.000	Total           2.000           2.000           2.000           2.000           2.000           2.000           2.000           Total           Cost           2.500           2.500           Cost           Cost	Contract Contract N/A Target Value of Contract - N/A Target Value of Contract
Cost Category Item TEM Engineering Technical Support Test and Evaluation Cost Category Item Test and Evaluation	Method & Type TBD (\$ in Milli Contract Method & Type TBD	Performing Activity & Location TBD : TBD Subtotal ons) Performing Activity & Location TBD : TBD Subtotal Project Cost Totals	Prior Years - - - - - - - - - - - - - - -	Cost - FY Cost - FY	Award Date 2018 Award Date 2018	Cost - - - - - - - - - - - - -	Award Date 2019 Award Date 2019	Cost 2.000 2.000 FY 2 Ba 2.500 2.500 FY 2 Ba 16.300	Award Date 2020 Se Award Date 2020 Se	Cost - - - - - - - - - - - - - - - - - - -	Award Date 2020 CO Award Date 2020 CO	Cost 2.000 2.000 FY 2020 Total 2.500 2.500 FY 2020 Total 16.300	Cost To           Complete           0.000           0.000           Cost To           Complete           0.000           Cost To           Cost To           Cost To           Cost To           0.000	Total           2.000           2.000           2.000           2.000           2.000           2.000           2.000           2.500           2.500           2.500           Total           Cost           16.300	Target Value of Contract Value of Contract Target Value of Contract N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2					Date:	March 20	19			
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program El</b> PE 0604541A /	ement (Number/I Unified Network Tr	<b>Name)</b> ransport	Project (Number/Name) BT5 / Integrated Tactical Network/Enterprise Network						
	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2 OC	:020 :O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A					Date: March 2019						
Appropriation/Budget Activity 2040 / 4		F	<b>R-1 Pro</b> PE 060	<b>gram Elemer</b> 4541A <i>I Unifie</i>	Number/Name) egrated Tactical Network/Enterprise						
Event Name	FY 2018	FY 201	9	FY 2020	FY 2021		FY 2022	F١	( 2023	F	Y 2024
Event Name	1 2 3 4	1 2 3	4 1	2 3 4	1 2 3 4	1	2 3 4	1 2	3 4	1 2	3 4
Tactical IDaM											
Protected Comms for MUM-T											
Unified NetOps											
Network Centric WF Resilient					Challenge Based	Event					
Next Gen HF											
Spectrum Obfuscation											
Protected SATCOM											
Cyber SU											
WGS Ka Band Surrogate											
GRiD Tactical											
Aerial Tier Networking											
TEM (Technical Exchange Meeting) - Emerging Technology Pro	jects										
					1			1			

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Marc	h 2019			
ppropriation/Budget Activity )40 / 4	<b>R-1 Program</b> I PE 0604541A	Element (Number/Name)         Project (Number/Name)           A I Unified Network Transport         BT5 I Integrated Tactical Network           Network         Network					
	Schedule Details	3					
		St	art	Er	ıd		
Events		Quarter	Year	Quarter	Year		
Tactical IDaM		1	2020	4	2020		
Protected Comms for MUM-T		2	2020	4	2020		
Unified NetOps		2	2020	1	2021		
Network Centric WF Resilient		2	2021	4	2021		
Next Gen HF		2	2021	4	2023		
Spectrum Obfuscation		3	2021	4	2021		
Protected SATCOM		3	2021	3	2022		
Cyber SU		3	2021	1	2022		
WGS Ka Band Surrogate		2	2022	1	2023		
GRiD Tactical		3	2022	1	2023		
Aerial Tier Networking		3	2023	4	2025		
TEM (Technical Exchange Meeting) - Emerging Technology Projects	1	2020	4	2025			

#### <u>Note</u>

TEM projects are continuous activities; N-CFT will reach out to industry partners in order to assess and demonstrate the latest emerging technologies which will reduce capability gaps and provide rapid SW/HW enhancements for PORs.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army											Date: March 2019			
Appropriation/Budget Activity 2040: Research, Development, Component Development & Prot	ranced	R-1 Program Element (Number/Name) PE 0604644A / Mobile Medium Range Missile												
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost		
Total Program Element	-	0.000	0.000	20.000	-	20.000	90.000	190.000	300.000	300.000	0.000	900.000		
MR1: Mobile Medium Range Missile	-	0.000	0.000	20.000	-	20.000	90.000	190.000	300.000	300.000	0.000	900.000		
<b>A. Mission Description and Bu</b> Mobile Medium Range Missile p dis-integrate, and exploit in the	<b>idget Item</b> provides the strategic an	Justification Joint Force ad deep mane	Commande euver areas	er a lower co . It mitigates	ost strategic s Extremely	; capability tl ' High Risk (	hat can atta EHR) capal	ck specific bility gap.	threat vulne	erabilities in	order to pen	etrate,		
B. Program Change Summary	(\$ in Millio	ons)		<u>FY 2018</u>	FY 201	<u>19</u> F	Y 2020 Bas	<u>se</u>	FY 2020 O	<u>00</u>	FY 2020 Tot	<u>.al</u>		
Previous President's Budget 0.000					0.00	00 00	0.00 20.00	00 00		-	0.00 20.00	)0 )0		
Total Adjustments	0.000	0.00	00	20.00	00		-	20.00	00					

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<ul> <li>Reprogrammings</li> </ul>	-	-	
<ul> <li>SBIR/STTR Transfer</li> </ul>	-	-	
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	20.000

#### **Change Summary Explanation**

FY 2020 funding increase due to initial funding for new start program.

Congressional General Reductions

Congressional Directed Reductions

Congressional Directed Transfers

Congressional Rescissions

Congressional Adds

20.000

Exhibit R-2A, RDT&E Project J	ustification	PB 2020 A	rmy							Date: Mar	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 060464 <i>Missile</i>	<b>am Elemen</b> 14A <i>I Mobile</i>	<b>t (Number</b> / Medium R	Project (N MR1 / Mob	oject (Number/Name) 11 / Mobile Medium Range Missile			
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
MR1: <i>Mobile Medium Range</i> <i>Missile</i>	-	0.000	0.000	20.000	-	20.000	90.000	190.000	300.000	300.000	0.000	900.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
A. Mission Description and Bud Mobile Medium Range Missile pr dis-integrate, and exploit in the s	a new start dget Item Ju rovides the c trategic and	ustification Joint Force ( deep mane	Commande euver areas.	r a lower co . It mitigates	ost strategic s Extremely	capability t High Risk (	hat can atta EHR) capal	ck specific bility gap.	threat vulne	erabilities in	order to pe	netrate,
B. Accomplishments/Planned F	Programs (	5 in Millions	<u>s)</u>						FY	2018 F	Y 2019	FY 2020
Intre: IM/RK       -       -       20.00         Description: Develop the Army's next generation medium range strike missile capability. Mobile Medium Range Missile provides field artillery units with an extended range capability supporting strategic forces in full, limited or expeditionary operations.       -       -       20.00         FY 2020 Plans:       Supports acquisition strategy development, system requirements/specification definition/development, transitioned technology/ component maturation assessment, and contract strategy development.       -       -       20.00												
Funding for this new start begins	in FY 2020.	itement.										
					Accomplis	shments/Pl	anned Prog	grams Sub	totals	-	-	20.000
C. Other Program Funding Sun N/A Remarks D. Acquisition Strategy Leverage non-traditional contrac specific threat vulnerabilities in o	nmary (\$ in ting strategy rder to pene	<u>Millions)</u> v to transitio etrate, dis-in	n/develop/n tegrate, and	nature curre d exploit in t	ent and nea the strategic	r-term supp c and deep	ort efforts to maneuver a	o provide Jo ireas.	int Force C	ommanders	s capabilitie	s to attack

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604644A / Mobile Medium Range Missile	<b>Project (Number/Name)</b> MR1 <i>I Mobile Medium Range Missile</i>				
E. Performance Metrics						
N/A						
PE 0604644A: Mobile Medium Range Missile	UNCLASSIFIED					

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	19		
Appropriation/Budg 2040 / 4	Appropriation/Budget Activity 2040 / 4							<b>R-1 Program Element (Number/Name)</b> PE 0604644A <i>I Mobile Medium Range</i> <i>Missile</i>					<b>Project (Number/Name)</b> MR1 <i>I Mobile Medium Range Missile</i>			
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	Award Cost Date		Award Cost Date		Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Government Program Management	TBD	TBD : TBD	-	-		-		6.176	Oct 2019	-		6.176	0.000	6.176	-	
Subtotal		-	-		-		6.176		-		6.176	0.000	6.176	N/A		
Support (\$ in Millior	ıs)			FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
Support Contract	TBD	TBD : TBD	-	-		-		13.824	Oct 2019	-		13.824	0.000	13.824	-	
		Subtotal	-	-		-		13.824		-		13.824	0.000	13.824	N/A	
Prior Years		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		20.000		-		20.000	0.000	20.000	N/A	

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A		Date: March 2019					
Appropriation/Budget Activity 2040 / 4		<b>F</b> 	<b>R-1 Program Elemen</b> PE 0604644A <i>I Mobile</i> Missile	Number/Name) bile Medium Range Missile			
Event Name	FY 2018	FY 201	9 FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Transition (Current and Planned Technologies)	1 2 3 4	1 2 3	4 1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4	1 2 3 4
Assessment							
TM/RR							
MDD (MS A)				<b>A</b>			
Mission Command Development							
IDR					2		
Component Maturation							
PDR							3

hibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Mar	ch 2019			
propriation/Budget Activity 40 / 4	<b>R-1 Program</b> PE 0604644A <i>Missile</i>	Element (Numbe I Mobile Medium	er/Name) Range	Project (Number/Name) MR1 / Mobile Medium Range Missile			
	Schedule Details	S					
		St	tart	End			
Events		Quarter	Year	Quarter	Year		
Transition (Current and Planned Technologies)		1	2020	4	2022		
Assessment		2	2020	4	2020		
TM/RR		1	2021	4	2024		
MDD (MS A)		3	2021	3	2021		
Mission Command Development		3	2021	4	2024		
IDR		4	2022	4	2022		
Component Maturation		4	2021	4	2024		
PDR		4	2024	4	2024		

Exhibit R-2, RDT&E Budget Iten	Date: March 2019											
Appropriation/Budget Activity           2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced           Component Development & Prototypes (ACD&P)					<b>R-1 Program Element (Number/Name)</b> PE 0604785A <i>I Integrated Base Defense (Budget Activity 4)</i>							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	0.000	0.000	2.000	2.000	2.020	2.040	2.040	2.081	0.000	10.181
DS4: Integrated Base Defense	-	0.000	0.000	0.000	2.000	2.000	2.020	2.040	2.040	2.081	0.000	10.181

#### A. Mission Description and Budget Item Justification

Integrated Base Defense (IBD) provides integration of software and analytical capability to support the integration of systems in the field. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base, and Installation Protection framework focused on system engineering and software development.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is an integrated suite of systems developed in response to CENTCOM JUONS CC-0540. CVBIED provides an early VBIED detection capability prior to vehicles reaching entry into Forward Operating Bases. Additional sensor systems are being integrated into the current Force Protection infrastructure as part of CVBIED.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is not a new start, the program was moved from Program Element 0605033A in FY18 and 0205402A in FY19.

Request for FY2020 OCO is \$2.000M to support continued integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540.

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	FY 2020 OCO	FY 2020 Total
Previous President's Budget	0.000	0.000	0.000	-	0.000
Current President's Budget	0.000	0.000	0.000	2.000	2.000
Total Adjustments	0.000	0.000	0.000	2.000	2.000
Congressional General Reductions	-	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
Congressional Adds	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
Reprogrammings	-	-			
SBIR/STTR Transfer	-	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	0.000	2.000	2.000

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army	Date: March 2019
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604785A I Integrated Base Defense (Budget Activity 4)
<u>Change Summary Explanation</u> Counter Vehicle Borne Improvised Explosive Device (CVBIED) is not a 0205402A in FY19.	new start, the program was moved from Program Element 0605033A in FY18 and

Exhibit R-2A, RDT&E Project Ju		Date: March 2019										
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 060478 <i>(Budget Ac</i>	am Elemen 85A / Integra activity 4)	<b>t (Number</b> / ated Base D	umber/Name) grated Base Defense							
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
DS4: Integrated Base Defense	-	0.000	0.000	0.000	2.000	2.000	2.020	2.040	2.040	2.081	0.000	10.181
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### Note

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is not a new start, the program was moved from Program Element 0605033A in FY18 and 0205402A in FY19.

#### A. Mission Description and Budget Item Justification

Integrated Base Defense (IBD) provides integration of software and analytical capability to support the integration of systems in the field. IBD employs an enterprise approach to enable IBD capabilities across the operational spectrum by leveraging interoperability efforts in support of the Integrated Unit, Base, and Installation Protection framework focused on system engineering and software development.

Counter Vehicle Borne Improvised Explosive Device (CVBIED) is an integrated suite of systems developed in response to CENTCOM JUONS CC-0540. CVBIED provides an early VBIED detection capability prior to vehicles reaching entry into Forward Operating Bases. Additional sensor systems are being integrated into the current Force Protection infrastructure as part of CVBIED.

Request for FY2020 OCO is \$2.000M to support continued integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: CVBIED Design and Build	-	-	0.000	2.000	2.000
<b>Description:</b> Effort continues the design and integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540					
<i>FY 2020 Base Plans:</i> Funding support continued integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540.					
<b>FY 2020 OCO Plans:</b> Funding support continued integration of CVBIED technologies into the current Force Protection infrastructure to address capabilities gaps within JUONS CC-0540.					
FY 2019 to FY 2020 Increase/Decrease Statement:					

PE 0604785A: Integrated Base Defense (Budget Activity... Army

Exhibit R-2A, RDT&E Project Justif	fication: PB		Date: March 2019								
Appropriation/Budget Activity 2040 / 4	<b>R-1 P</b> I PE 06 <i>(Budge</i> )	r <b>ogram Eler</b> 04785A / Int et Activity 4)	nent (Numbe egrated Base	er/Name) e Defense	<b>Project (Number/Name)</b> DS4 / Integrated Base Defense						
B. Accomplishments/Planned Prog	<u>ırams (\$ in N</u>	<u>Aillions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The Counter Vehicle Borne Improvise 0605033A in FY18 and Program Eler	ed Explosive ment 020540	Device (CV 2A EF2 in F	BIED) progra Y19.	am was fund	led in Progra	am Element					
			Accomplis	hments/Plar	nned Progra	ims Subtota	ls -	-	0.000	2.000	2.000
C. Other Program Funding Summa	ry (\$ in Milli	ons)									
			<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2020</u>					<u>Cost To</u>	
Line Item	<u>FY 2018</u>	<u>FY 2019</u>	<b>Base</b>	000	<u>Total</u>	<u>FY 2021</u>	FY 2022	<u>FY 2023</u>	<u>FY 2024</u>	<u>Complete</u>	Total Cost
<ul> <li>0205402A: Integrated Base</li> </ul>	-	8.000	0.000	-	0.000	-	-	-	-	0.000	8.000
Defense - Operational System Dev											
• 0605033A: Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)	20.661	5.169	3.847	-	3.847	5.981	-	-	-	0.000	35.658
Remarks											

#### D. Acquisition Strategy

The IBD acquisition strategy is to leverage existing IBD-related government organizations and to competitively award multiple contracts in support of IBD objectives for the development of holistic IBD architectures and products to support interoperability of fielded and emerging IBD-related systems. JUONS CC-0540 (CVBIED) equipment is comprised of a combination of Commercial and Government Off the Shelf items integrated to meet the requirements of JUONS CC-0540 (CVBIED).

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	020 Arm	у								Date:	March 20	)19		
Appropriation/Budge 2040 / 4	t Activity	1				<b>R-1 Program Element (Number/Name)</b> PE 0604785A <i>I Integrated Base Defense</i> <i>(Budget Activity 4)</i>						Project (Number/Name) DS4 / Integrated Base Defense				
Product Developmen	nt (\$ in M	illions)		FY 2018		FY 2	2019	FY 2020 Base		FY 2 O	2020 CO	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	
JUONS CC-0540 System Integration	MIPR	AMRDEC : Huntsville, AL	-	-		-		0.000		0.379	Jan 2020	0.379	Continuing	Continuing	Continuing	
JUONS CC-0540 Hyper spectral Sensor Development Support	MIPR	RDECOM CERDEC : Fort Belvoir, VA	-	-		-		0.000		0.203	Jan 2020	0.203	Continuing	Continuing	Continuing	
JUONS CC-0540 Wide Area Motion Imagery Sensor Development	MIPR	NAVAIR : Patuxent River, MD	-	-		-		0.000		0.608	Jan 2020	0.608	Continuing	Continuing	Continuing	
		Subtotal	-	-		-		0.000		1.190		1.190	Continuing	Continuing	N/A	
Test and Evaluation (	(\$ in Milli	ons)		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	ATEC : Aberdeen Proving Ground, MD	-	-		-		0.000		0.810	Jan 2020	0.810	Continuing	Continuing	Continuing	
		Subtotal	-	-		-		0.000		0.810		0.810	Continuing	Continuing	N/A	
Prior Years		Prior Years	FY 2018		FY 2	2019	FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract		
	Project Cost Totals -					0.000		0.000		2.000		2.000	Continuing	Continuing	N/A	

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	٨rmy	'																		Da	te:	Mare	ch 20	19			
Appropriation/Budget Activity 2040 / 4							F (	<b>R-1 F</b> PE 0 ( <i>Bud</i> )	<b>Prog</b> 604 get /	<b>yram</b> 785/ A <i>ctiv</i>	Ele I In Vity 4	emen ntegra 1)	i <b>t (Νι</b> ated	umbo Base	er/Na e Dei	ame fens	e) Se	Pro DS	o <b>ject</b> ( 4 / Int	Num egrat	ber ed l	/ <b>Nar</b> Base	ne) e Defe	ense			
		<b>F</b> 1	004	•		FV	004	•		FV				EV	0004					_	-						
Event Name	1	2	201	4	1	2	201	9	1	2	202	4	1	2	3	4	1	2	3 4	1	2	r 20/ 3	23	1	2	3	4
Development, Test and Integration	1	2	3	4	1	2	3	4		2 Nevelop	3	Test a	1 hd Intes	gration	3	4		2	3 4		2	3	4	1	2	3	4

			Date: March	า 2019
<b>R-1 Program</b> PE 0604785/ <i>(Budget Activ</i> )	n Element (Number/ A I Integrated Base D vity 4)	<b>Name)</b> Defense	Project (Number/Name DS4 / Integrated Base I	<b>e)</b> Defense
Schedule Deta	ils			
	Star	rt	En	d
	Quarter	Year	Quarter	Year
	1	2020	2	2022
	R-1 Program PE 0604785 <i>J</i> ( <i>Budget Activ</i> ) Schedule Deta	R-1 Program Element (Number/ PE 0604785A / Integrated Base D (Budget Activity 4)         Schedule Details         Schedule Details         Quarter         1	R-1 Program Element (Number/Name) PE 0604785A / Integrated Base Defense (Budget Activity 4)Schedule DetailsStart Quarter12020	R-1 Program Element (Number/Name)       Project (Number/Name)         PE 0604785A I Integrated Base Defense (Budget Activity 4)       Project (Number/Name)         Schedule Details       Start       En         Quarter       Year       Quarter         1       2020       2

Exhibit R-2, RDT&E Budget Item	n Justificat	t <b>ion:</b> PB 202	20 Army							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040: Research, Development, Te Component Development & Proto	est & Evalua types (ACE	ation, Army I 0&P)	/ BA 4: Adva	anced	<b>R-1 Progra</b> PE 030525	am Elemen 51A / Cybers	t (Number/l space Opera	Name) ations Force	es and Forc	e Support		
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	56.071	52.817	52.102	-	52.102	53.578	54.697	55.463	56.018	0.000	380.746
FA8: Cyberspace Operations Forces and Force Support	-	56.071	52.817	52.102	-	52.102	53.578	54.697	55.463	56.018	0.000	380.746

#### A. Mission Description and Budget Item Justification

Persistent Cyber Training Environment (PCTE) will provide the Department of Defense (DoD) cyber forces with a standardized training capability with access to existing Cyber Training Ranges (CTR) and available training resources and content. The current environment does not have the capacity to maintain a persistent environment and is primarily used for major exercises (i.e. Cyber Flag). The service cyber components have established their own training environments but do not have standardized capabilities or content. PCTE system approaches are aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (OUSD AT&L) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) was designated as the DoD Acquisition Lead for the PCTE. Program is directed by the 2016 National Defense Authorization Act, Section 1645.

FY 2020 will focus on the requirements of the PCTE fielded capabilities, the build out of Technical Operations Management, and the extension of the PCTE to the National Guard and Reserve Cyber Mission Force teams.

<u> 3. Program Change Summary (\$ in Millions)</u>	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	56.492	65.817	65.102	-	65.102
Current President's Budget	56.071	52.817	52.102	-	52.102
Total Adjustments	-0.421	-13.000	-13.000	-	-13.000
<ul> <li>Congressional General Reductions</li> </ul>	-0.009	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-13.000			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
<ul> <li>Reprogrammings</li> </ul>	-	-			
<ul> <li>SBIR/STTR Transfer</li> </ul>	-0.412	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	-13.000	-	-13.000

#### **Change Summary Explanation**

FY 2018 Congressional Rescission of \$5.676M.

FY 2020 decrease reflects Cyber Operational Risk Assessment-Programs (CORA-P) funding realignment to program element 0606942A project FL2.

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 030525 Forces and	am Elemen 51A / Cybers d Force Sup	<b>t (Number/</b> space Oper port	Name) ations	Project (N FA8 / Cybe Force Sup	umber/Nan erspace Ope port	ne) erations For	ces and
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
FA8: Cyberspace Operations Forces and Force Support	-	56.071	52.817	52.102	-	52.102	53.578	54.697	55.463	56.018	0.000	380.746
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

Persistent Cyber Training Environment (PCTE) will provide the Department of Defense (DoD) cyber forces with a standardized training capability with access to existing Cyber Training Ranges (CTR) and available training resources and content. The current environment does not have the capacity to maintain a persistent environment and is primarily used for major exercises (i.e. Cyber Flag). The service cyber components have established their own training environments but do not have standardized capabilities or content. PCTE system approaches are aligned to the outputs of the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics (OUSD AT&L) and Chairman of the Joint Chiefs of Staff (CJCS) J6 led, "Cyber Range Evaluation of Alternatives (EOA) Findings and Issue Paper Deliberations," dated 17 November 2015. The Program Executive Office for Simulation, Training, and Instrumentation (PEO STRI) was designated as the DoD Acquisition Lead for the PCTE. Program is directed by the 2016 National Defense Authorization Act, Section 1645.

FY2020 will focus on the requirements of the PCTE fielded capabilities, the build out of Technical Operations Management, and the extension of the PCTE to the National Guard and Reserve CMF teams.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Event Management for Persistent Cyber Training Environment (PCTE)	18.600	23.400	25.600
<b>Description:</b> Develop event scheduling, allocation, and management function for PCTE, to include event design, planning and execution, supported by standardized training assessment tools and capabilities.			
FY 2019 Plans: Event management capabilities will continue to build on previous year's efforts by introducing new capability and continuing to refine those already integrated based on Cyber Mission Forces' (CMF) evaluations. The Program Management Office will continue development, integration, and evaluation of prototype applications that will satisfy the PCTE requirement gaps and meet the IOC definition. This includes training package development, event scheduling and event execution. Through this, Cyber Mission Forces will be provided the ability to plan, design, execute and assess training.			
<b>FY 2020 Plans:</b> The expansion of the fielded PCTE capabilities will include the ability to have an automated opposition force that is reactive to the trainee and the capability of using near real-time intelligence to update training scenarios, Tactics, Techniques, and Procedures (TTPs). Will also provide the material solution to support the Technical Operations Management (TOM) capability.			
FY 2019 to FY 2020 Increase/Decrease Statement:			

PE 0305251A: *Cyberspace Operations Forces and Force S...* Army

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date:	March 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / Cyberspace Operations Forces and Force Support	Project (Numbe FA8 / Cyberspac Force Support	r/ <b>Name)</b> e Operations Fo	orces and
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
The increase for Event Management is due to the implementation of the m Management capability.	naterial solution for the Technical Operations			
Title: Environment Operations and Management for Persistent Cyber Trai	ning Environment (PCTE)	14.13	0 13.400	13.400
<b>Description:</b> Develop PCTE with realistic vignettes/scenarios as part of a that includes certification and real-world mission rehearsals.	system (syllabus) of individual and collective train	ing		
<b>FY 2019 Plans:</b> Continue building emulated environments and the hybrid cloud environme group, and force level training events. The emulated environments include as well as the ability to replicate Industrial Control Systems (ICS) and Sup environments. These environments provide the "maneuver" space and tra Fund the virtual connections with the PCTE in order for the CMF trainee to the training event. This will also include the ability to sanitize the environm student has a neutral environment. This will include the ability to use curre environments remain current and relevant providing a realistic training environment	Int with the participating cyber ranges to support te es the emulation of blue, red, green, and gray netw ervisory Control and Data Acquisition (SCADA) ining grounds for Cyber Mission Forces (CMF). To choose the maneuver environment while establis ent at the completion of training so that the next ent threat information and intelligence to ensure that vironment.	am/ orks hing it the		
<i>FY 2020 Plans:</i> Will continue to build and host persistent virtual environments that DoD Cy terrain. These high fidelity virtual environments allow realistic and relevan network or system environments. FY 2020 also continues to add more blu System (ICS), and Supervisory Control and Data Acquisitions (SCADA) vir events. Additional environments will be created based on priority per the virtuelepresence, battlefield systems (blue and red), and commercial mobile.	/ber Mission Forces use as their training maneuve It training on demand that are representative of act e environments, red environments, Industrial Con rtualizations to support multiple simultaneous train validated Initial Capability Document (ICD) that inc	r ual trol ing lude		
Title: Physical and Virtual Connectivity for the Persistent Cyber Training E	nvironment (PCTE)	13.68	3 10.500	10.600
<b>Description:</b> On-Demand reliable, secure physical and virtual global accellocated. A core cyber exercise network and event management platform with Multinational, and State distributed systems.	ess from wherever participants are geographically vith access to the full suite of DoD, Service, Interac	jency,		
<b>FY 2019 Plans:</b> Continue to build and refine on the initial connectivity established in prior y environment and expanding to access multiple training facilities within one	vears to include establishing a robust hybrid cloud geographic location. Current connections to the (	CMF		

		Date: N	larch 2019	
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0305251A / Cyberspace Operations Forces and Force Support	Project (Number/I FA8 / Cyberspace Force Support	<b>Vame)</b> Operations Fo	orces and
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020
sites will be optimized to reduce latency and efficiency on the existing providing network nodes at training sites and cyber ranges directly sup	persistent backbone transport bandwidth. This will inc porting PCTE.	lude		
<b>FY 2020 Plans:</b> Connectivity will continue to extend the PCTE capabilities to more region the PCTE services to the National Guard and Reserve Cyber Mission F commercial cloud capabilities, and expansion onto DoD enterprise transervices.	onal or base training facilities. This also includes exten Forces (CMF) teams, expansion to Government or Isport capabilities to improve the reach of selected PC	ding TE		
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY 2020 increase is due to the requirements to extend PCTE capabiliti	es to all available training facilities within the base.			
Title: Government Program Management for Persistent Cyber Training	g Environment (PCTE)	2.300	-	-
Description: Program management, engineering and technical oversig	ght, contract support and travel for the PCTE program.			
Title: Persistent Cyber Training Environment (PCTE) Test and Evaluat	ion	1.682	5.517	2.502
<b>Description:</b> Persistent Cyber Training Environment (PCTE) integration validation and verifications (V&V), limited user assessments (LUA), and	on, development, and operational testing that will includ d testing in association with cyber training exercises.	le		
<b>FY 2019 Plans:</b> Continue to complete multi-levels of evaluation and testing on individua This includes integration testing, field evaluations, and operational test to release of capability drops assuring capabilities perform as expected	al products, integrated capabilities, and capability drop ing. Execute formal validation and verifications events d.	s. prior		
<b>FY 2020 Plans:</b> Testing will continue in FY 2020 through integration testing, validation a serving as PCTE operational testing. Testing is essential in FY 2020 to exisitng PCTE platform and training capabilities. Testing will also focus the team/group and force levels.	and verifications, limited user assessments, and exerc o ensure that any fielded capability drop does not brea o more on the ability to conduct multiple training events	ises k the and		
FY 2019 to FY 2020 Increase/Decrease Statement: The reduction in funding is due to anticipated learning curve efficiencie	S.			
Title: FY 2018 Congressional Rescission		5.676	-	-
Description: FY 2018 Congressional Rescission				
	Accomplishments/Planned Programs Sub	totals 56.071	52.817	52.102

PE 0305251A: Cyberspace Operations Forces and Force S... Army

Exhibit R-2A, RDT&E Project Just	ification: PB	2020 Army							Date: Mai	rch 2019	
Appropriation/Budget Activity 2040 / 4				R-1 PI PE 03 <i>Forces</i>	r <b>ogram Elen</b> 05251A / Cy s and Force .	n <b>ent (Numb</b> berspace Oµ Support	er/Name) perations	Project (N FA8 / Cyb Force Sup	lumber/Na erspace Op port	<b>me)</b> perations Fo	rces and
C. Other Program Funding Summ	ary (\$ in Milli	ons <u>)</u>	FY 2020	FY 2020	FY 2020					Cost To	
Line Item • B65010: Persistent Cyber Training Environment	<u>FY 2018</u> 4.000	<u>FY 2019</u> 3.000	<b>Base</b> 3.000	<u>000</u> -	<u>Total</u> 3.000	<u>FY 2021</u> 3.000	<u>FY 2022</u> 3.000	<u>FY 2023</u> 3.000	FY 2024 3.030	<u>Complete</u> 0.000	<u>Total Cost</u> 22.030

#### Remarks

B65010-OPA2

#### D. Acquisition Strategy

The Persistent Cyber Training Environment (PCTE) program will employ an incremental acquisition strategy. The strategy leverages the use of existing cyber contract and Other Transaction Authority (OTA) vehicles to provide specified capabilities that will be integrated into a cohesive training platform. PCTE will provide iterative capability in prototypes provided to the Cyber Mission Forces (CMF) in drops that either improve or add features. These capability drops will be based on requirements contained and further developed as part of the PCTE Information System Capability Development Document (IS CDD).

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project C	cost Analysis: PB 2	020 Arm	у								Date:	March 20	019	
Appropriation/Budget Activit 2040 / 4	у				R-1 Pro PE 030 Forces	<b>gram Ele</b> 5251A / C and Force	ment (N yberspace Support	umber/Na ce Operati t	<b>ame)</b> ions	<b>Project</b> FA8 / C Force S	<b>(Number</b> yberspace Support	r/ <b>Name)</b> e Operatio	ons Force	es and
Management Services (\$ in M	lillions)		FY	2018	FY 2	:019	FY 2 Ba	2020 Ise	FY 2 O	2020 CO	FY 2020 Total			
Contract Method Cost Category Item & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Program Management TBD	Various : Various	-	2.300		-		-		-		-	Continuing	Continuing	Continuing
	Subtotal	-	2.300		-		-		-		-	Continuing	Continuing	N/A
Product Development (\$ in N	lillions)		FY	2018	FY 2	019	FY 2 Ba	2020 Ise	FY 2	2020 CO	FY 2020 Total			
Contract Method Cost Category Item & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PCTE Development and Option/ Integration CPFF	Various : Various	29.336	52.088	May 2018	47.300	Feb 2019	49.602	Feb 2020	-		49.602	Continuing	Continuing	Continuing
	Subtotal	29.336	52.088		47.300		49.602		-		49.602	Continuing	Continuing	N/A
Remarks PCTE will utilize existing contracts in or Test and Evaluation (\$ in Mill	order to provide the best	capabilities	available w	vithin the ma	rket until the	e base contr	act is awar FY 2 Ba	ded in FY20 2020 Ise	20. FY 2 O(	2020 CO	FY 2020 Total			
Contract Method Cost Category Item & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
PCTE Government Test and Evaluation Various	Various : Various	-	1.683	Mar 2018	5.517	Mar 2019	2.500	Mar 2020	-		2.500	Continuing	Continuing	Continuing
	Subtotal	-	1.683		5.517		2.500		-		2.500	Continuing	Continuing	N/A
Remarks Validation and Verification tests will be PCTE will host limited excursions duri	e conducted with every can ng cyber exercises in ord	apability dro er to provid	op utilizing ( le an opera	Cyber Missio tional evalua	n Force op ation ultimat	erators and i ely building	representat up to hostir	tives from the	e Operation prce level e	nal Test Au xercise eve	thority.	Cost To	Total	Target
	Project Cast Tatala	Years	<b>FY</b>	2018	FY 2	019	52 102	ISE	00	CO	Total	Continuing	Continuing	Contract
	FIUJECI COST IOTAIS	29.330	50.071	1	52.01/		37 107		-	1	1 12 102	· • • • • • • • • • • • • • • • • • • •	• • • • • • • • • • • • • • • • • • • •	IN/A

#### Remarks

PE 0305251A: Cyberspace Operations Forces and Force S... Army

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Exhibit R-4, RDT&E Schedule Profile: PB	2020 Army								Date: March 20	019
Appropriation/Budget Activity 2040 / 4			<b>R-1 Pro</b> PE 0308 Forces a	<b>gram E</b> 5251A / and Fore	lemen Cyber ce Sup	nt (Number/Nam space Operation oport	<b>e)</b> S	Project (N FA8 / Cyb Force Sup	<b>lumber/Name)</b> erspace Operatio oport	ons Forces and
Event Name	FY 2018	FY 201	9	FY 20	)20	FY 2021		FY 2022	FY 2023	FY 2024
Event Management		1   Z   3	4 1	_	5   4	1 Z 3 4		2 3 4	1 2 3 4	1 Z 3 4
Environment	Environment									
Connectivity	Connectivity									
Training Sites	Training Sites									
Test and Evaluation	Test and Evalu	ation								

				E ato: maroi	12010
propriation/Budget Activity 40 / 4	<b>R-1 Program</b> PE 0305251A <i>Forces and Fe</i>	Element (Number I Cyberspace Ope prce Support	r/ <b>Name)</b> rations	Project (Number/Nam FA8 / Cyberspace Oper Force Support	<b>e)</b> rations Forces ar
	Schedule Detail	s			
		Sta	irt	En	d
Events		Quarter	Year	Quarter	Year
Events Events		Quarter 1	<b>Year</b> 2017	Quarter 4	<b>Year</b> 2024
Events Event Management Environment		Quarter 1 1	Year 2017 2017	Quarter44	Year 2024 2024
Events Event Management Environment Connectivity		Quarter 1 1 1 1	Year 2017 2017 2017	Quarter 4 4 4 4	Year 2024 2024 2024
Events         Event Management         Environment         Connectivity         Training Sites		Quarter 1 1 1 1 1 1 1 1 1 1	Year 2017 2017 2017 2017	Quarter           4           4           4           4           4           4           4           4	Year 2024 2024 2024 2024 2024

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 I BA 4: Advanced Component Development & Prototypes (ACD&P)				PE 1206120A I Assured Positioning, Navigation and Timing (PNT)								
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	0.000	128.640	192.562	-	192.562	221.875	118.051	46.720	10.918	Continuing	Continuing
FJ8: Assured Positioning, Navigation and Timing (PNT)	-	0.000	58.985	42.379	-	42.379	38.130	25.180	0.000	0.000	0.000	164.674
FJ9: Dismounted A-PNT	-	0.000	15.969	32.360	-	32.360	13.350	0.000	0.000	0.000	0.000	61.679
FK1: Pseudolites	-	0.000	20.776	42.452	-	42.452	79.379	24.649	0.000	0.000	0.000	167.256
FK2: Mounted A-PNT	-	0.000	22.788	66.471	-	66.471	82.965	61.969	44.020	10.918	Continuing	Continuing
FK3: Anti-Jam Antenna	-	0.000	10.122	8.900	_	8.900	8.051	6.253	2.700	0.000	0.000	36.026

#### A. Mission Description and Budget Item Justification

Mission Command Network Modernization Implementation Plan - Line of Effort 1, 17 Apr 2018.

Assured Positioning, Navigation and Timing (A-PNT) will provide the Army's ground maneuver forces access to trusted PNT information under conditions where spacebased PNT Global Positioning System (GPS) may be limited or denied. Joint Requirements Oversight Council Memo (JROCM) 049-10, dated 05 Apr 2010, approved the Positioning, Navigation and Timing Assurance Initial Capabilities Document and designated the Army as the Lead Component for Assured PNT. The Material Development Decision (MDD) was approved on 30 Jul 2013. The Assured PNT draft Capabilities Development Document was validated by the Army Requirements Oversight Council (AROC) on 28 Jul 2014. The Assured PNT Cross Functional Team is drafting individual requirements for each product. The Mounted A-PNT System (MAPS) Directed Requirement was approved 13 Jan 2019.

Positioning, Navigation and Timing (PNT) is a critical enabler of many Army systems. The current Global Positioning System (GPS) capability is a fixed frequency system vulnerable to current and emerging threats, and field conditions (e.g. urban, dense vegetation), which means Warfighter assured access to and integrity of the PNT signal is not guaranteed. This situation degrades mission performance to an unacceptable level. Therefore, current Army systems cannot operate in an electronically contested or degraded environment at the required PNT Assurance Levels with GPS alone.

A-PNT consists of five projects; (FJ8) Assured PNT, (FJ9) Dismounted A-PNT System (DAPS), (FK1) Pseudolite, (FK2) Mounted A-PNT System (MAPS), and (FK3) Anti-Jam Antenna System (AJAS). These A-PNT projects support access to and integrity of PNT information. Project Manager (PM) PNT manages these five project (Assured PNT, DAPS, Pseudolite, MAPS, and AJAS) constructed to investigate, prototype, experiment, model, asses, develop, test, modify, field, and sustain A-PNT solutions.

Assured Positioning, Navigation and Timing (A-PNT) consists of:

(FJ8) - The Assured PNT project funding line is for: PNT System of Systems Architecture (SOSA) Testing to validate performance of end-to-end system performance; Resiliency and Software Assurance Measures (RSAM) upgrades to legacy GPS systems. In addition, this line supports the development of complementary and

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019	
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)	R-1 Program Element (No PE 1206120A / Assured P	umber/Name) ositioning, Navigation and Timing (PNT)	
adjacent A-PNT technologies as well as Enterprise Enablers including the Al integrated into future products, strategies, concepts of operation, architecture	ternative Navigation (ALT NA es, and platforms to assure PI	V) signal Enterprise Build-out. These technologies will be NT.	9
(FJ9) - The Dismounted A-PNT System (DAPS) provides assured PNT data systems). DAPS is a Size, Weight, and Power, optimized military GPS, fused	to Soldier borne equipment (e d with other sensors.	e.g. Nett Warrior, and other Soldier architecture compliant	t
(FK1) - The Pseudolite project was terminated by the Army on 12 Feb 2019 within the existing PE 1206120A. The requirements addressed by the Pseud support the broader mission of Alternative PNT & Area Protection to mitigate to transition the effort of Alternative PNT & Area Protection. These technology provide Radio Frequency (RF) and non-RF threat mitigation.	after the Fiscal Year 2020 sul dolite solution are still valid ca threats in Multi-Domain Oper gies provide agile and adaptiv	omission lock. Therefore, the Army will realign FK1 fundin pability gaps. Pseudolite funding and activities will pivot t ations (MDO). For FY21 a new project line will be establi e mechanisms for integrating sensors, signals and softwa	ng to ished are to
(FK2) - The Mounted A-PNT System (MAPS) provides assured PNT data un RF sensors with GPS. It distributes assured PNT data to tactical command,	der conditions where space-b communication and control sy	ased PNT (e.g. GPS) may be limited or denied by fusing ystems on Army tactical and combat vehicles.	non-
(FK3) - The Anti-Jam Antenna System (AJAS) provides protection against ja and assured PNT in challenged environments on Army tactical and combat v	mming threats. The AJAS is t vehicles.	ightly coupled with the MAPS to provide GPS signal prote	ection
FY 2020 Base funds in the total amount of \$192.562 million are provided to a for \$42.379 million for PNT System of Systems Architecture (SOSA) Testing and continued development of Assured PNT Enterprise Enablers. The FJ9 fu the DAPS. The FK1 funding line accounts for \$42.452 million to continue to f accelerating the Mounted A-PNT System (MAPS), and aligning to Army Mod FK2 (\$24.313) million. The FK2 funding line accounts for \$66.471 million to a and command, control and communication systems. The FK3 funding line ac fielded with MAPS on selected combat vehicles and command, control, and	continue the development of th , Resiliency and Software Ass unding line accounts for \$32.3 fulfill the assured PNT information priorities. As a resist continue integration, training a counts for \$8.900 million to control of the terms.	ne Assured PNT program. The FJ8 funding line accounts urance Modification (RSAM), ALT NAV Enterprise Build-o 60 million to continue prototype development and testing tion gap by pivoting to Alternative PNT & Area Protection ult, this funding will be realigned to FJ8 (\$18.139 million) a nd Soldier assessment of MAPS on selected combat veh pontinue integration, training and Soldier Assessment of A	out for , and iicles JAS,
PE 1206120A: Assured Positioning, Navigation and Timi U Army	NCLASSIFIED Page 2 of 35	R-1 Line #107	656

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Arr	ny			Date:	March 2019			
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4 Component Development & Prototypes (ACD&P)	1: Advanced	<b>R-1 Program Element (Number/Name)</b> PE 1206120A <i>I Assured Positioning, Navigation and Timing (PNT)</i>						
B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total			
Previous President's Budget	0.000	146.300	80.864	-	80.864			
Current President's Budget	0.000	128.640	192.562	-	192.562			
Total Adjustments	0.000	-17.660	111.698	-	111.698			
<ul> <li>Congressional General Reductions</li> </ul>	-	-0.160						
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-17.500						
<ul> <li>Congressional Rescissions</li> </ul>	-	-						
<ul> <li>Congressional Adds</li> </ul>	-	-						
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-						
Reprogrammings	-	-						
SBIR/STTR Transfer	-	-						
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	111.698	-	111.698			

#### **Change Summary Explanation**

The \$111.698 million increase is primarily driven in support of the implementation of the Army's Network modernization priority. The program plans on executing and accelerating the building and delivery of Dismounted Assured Positioning, Navigation and Timing System and Mounted Assured Positioning, Navigation and Timing System prototypes, conduct laboratory testing, and conduct a series of tests and assessments.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army									Date: Marc	h 2019		
Appropriation/Budget Activity 2040 / 4	ExpR-1 Program Element (Number/Name) PE 1206120A / Assured Positioning, Navigation and Timing (PNT)Project (Number/Name) FJ8 / Assured Positioning, 					<b>ne)</b> hing, Naviga	tion and					
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
FJ8: Assured Positioning, Navigation and Timing (PNT)	-	0.000	58.985	42.379	-	42.379	38.130	25.180	0.000	0.000	0.000	164.674
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

Mission Command Network Modernization Implementation Plan - Line of Effort 1, 17 Apr 2018.

The Assured PNT project line is comprised of: PNT System of Systems Architecture (SOSA) Testing to validate performance of end-to-end system performance; Resiliency and Software Assurance Measures (RSAM) upgrades to legacy GPS systems. In addition, this line supports the development of complementary and adjacent Alternative PNT & Area Protection technologies that include Enterprise Enablers such as the Alternative Navigation (ALT NAV) signal Enterprise Build-out.

The Alternative PNT & Area Protection technologies will be developed in order to demonstrate ALT NAV, emerging situational awareness capabilities and net-enabled GPS solutions to provide Radio Frequency (RF) and non-RF threat mitigation. These solutions will leverage commercial capabilities, existing contracts, industry, academia, and the warfighter in an iterative process that will be integrated into future products, strategies, concepts of operation, architectures, and platforms to assure PNT.

FY 2020 base funds in the amount of \$42.379 million are to support PNT System of Systems Architecture (SoSA) Testing, enhancements to Army PNT receivers and capabilities, prototype development, and support for Enterprise Enabler development. RSAM will support continued software development against emerging threats for DAGR, GB-GRAM and MicroGRAM. The PNT SoSA Testing will allow for Army systems to test developed RSAM software and enable actions to be taken to ensure full operational capability of Army Forces through RSAM fielded software. In addition, FY2020 Base funds under PE 1206120A (project FK1) in the amount of \$18.139 million are to be realigned to support to Army's Modernization Enterprise Enabler priorities.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
<i>Title:</i> PNT System of System (SOSA) Testing and Resiliency and Software Assurance Measures (RSAM)	-	37.834	21.992	-	21.992
Description: The effort supports SOSA testing, RSAM and other Army PNT capabilities.					
<b>FY 2019 Plans:</b> FY 2019 base funds support testing and RSAM software development for Ground Based GPS Receiver Applications Module (GB-GRAM).					
PNT SOSA testing and RSAM will complete software development Update 1 for Defense Advanced GPS Receiver (DAGR) and continue software development for GB-GRAM/MicroGRAM, to include engineering build					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 1206120A / Assured Positioning,	FJ8 I Assu	red Positioning, Navigation and
	Navigation and Timing (PNT)	Timing (PN	IT)

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
testing, formal qualification testing, and risk mitigation efforts for platforms utilizing DAGR and GB-GRAM. In addition, DAGR RSAM integration testing efforts will be performed in associated with relevant platforms.					
Each Army Modernization Priority has PNT dependencies. As a modernization enabler, PNT is essential to future readiness. PM PNT will address current and future development gaps in readiness within Army Modernization Priority systems. PNT gaps will be addressed to improve readiness of Army Priority Systems in a GPS challenged environment. This includes RSAM upgrades to NavStrike 3.3 software to improve performance of Long Range Precision Fires (LRPF) as the top Army Modernization Priority.					
<b>FY 2020 Base Plans:</b> FY 2020 base funds support continued Update 2 software development against emerging threats for Defense Advanced GPS Receiver (DAGR) and Ground Based GPS Receiver Application Module (GB-GRAM/ MicroGRAM).					
PNT Systems of Systems (SOSA) testing and Resiliency and Software Assurance Measures (RSAM) will complete software development Update 1 for GB-GRAM and continue software development for MicroGRAM, to include engineering build testing, formal qualification testing, and risk mitigation efforts for platforms utilizing Defense Advanced GPS Receiver (DAGR) and GB-GRAM. In addition, DAGR RSAM and GB-GRAM RSAM integration testing efforts will be performed in association with relevant platforms.					
<i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> SOSA Testing and RSAM decreased from \$37.834M in FY 2019 to \$21.992M in FY 2020 due to reduced integration requirements in FY 2020.					
Title: Assured Positioning, Navigation and Timing (PNT) Enterprise Enablers	-	21.151	20.387	-	20.387
<b>Description:</b> Enterprise Enablers provide enhanced PNT capability across an operational enterprise. These materiel solutions may augment or replace GPS by providing complementary PNT information. As complementary PNT providers, Enterprise Enablers build resiliency and robustness by diversifying PNT sources to ensure Soldiers have the right PNT information to drive mission success.					
<i>FY 2019 Plans:</i> FY2019 Base funds will provide an Enterprise Build-out that enables Alternative Navigation (ALT NAV) capabilities which provide positioning, navigation and timing data in a denied or degraded environment.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army									Date: March 2019			
Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name)Project (PE 1206120A / Assured Positioning,FJ8 / AssNavigation and Timing (PNT)Timing (F					(Number/Name) sured Positioning, Navigation and PNT)			
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	
Activities to support this effort include: network integration, installation and testing of the assured timing/location modular enterprise capability for ALT NAV.												
FY 2020 Base Plans: FY 2020 Base funds will continue th demonstrations of ALT NAV, emerge solutions will leverage commercial of iterative process, that will be integra and platforms to assure PNT. Other spectrum modification for PNT solut Radio Frequency (RF) signals of op	e											
FY 2019 to FY 2020 Increase/Decrease Statement: Assured PNT Enterprise Enablers slightly decreased by \$0.764 million, funding remains stable.												
			Accomplis	hments/Plar	nned Progra	ams Subtota	ls -	58.985	42.379		42.379	
C. Other Program Funding Summ	<u>ary (\$ in Milli</u>	<u>ons)</u>	<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2020</u>					<u>Cost To</u>		
Line Item • K49010: Mounted/ Dismounted Receivers Bemarka	<u>FY 2018</u> -	<u>FY 2019</u> -	<u>Base</u> 1.980	<u>000</u> -	<u>Total</u> 1.980	<u>FY 2021</u> 3.047	<u>FY 2022</u> 3.495	<u>FY 2023</u> 7.082	<u>FY 2024</u> 2.373	Complete Continuing	Total Cost Continuing	

#### **Remarks**

K49010: Mounted/Dismounted Receivers is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

#### D. Acquisition Strategy

The planned acquisition strategy for Positioning, Navigation and Timing (PNT) System of Systems Architecture (SOSA) testing and Resiliency and Software Assurance Measures (RSAM) implementation is to award sole source contracts to the original equipment manufacturers and leverage the Communications Electronics Research Development Engineering Center (CERDEC) to develop and evaluate solutions to enhance the resiliency of Global Positioning System (GPS)-dependent systems operating in evolving contested environments. PNT SOSA testing and RSAM implementation will complete software development for Defense Advanced GPS Receiver (DAGR), Ground Based GPS Receiver Applications Module (GB-GRAM), and MicroGRAM to include engineering build testing and formal qualification testing, as well as integration and integration testing, for platforms utilizing DAGR, GB-GRAM and MicroGRAM engineering builds.
Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (N	umber/Name)
2040 / 4	PE 1206120A / Assured Positioning,	FJ8 / Assu	red Positioning, Navigation and
	Navigation and Timing (PNT)	Timing (PN	IT)

The Assured PNT Enterprise Enablers project will conduct market research, prototyping, experimentation, and technical demonstrations of Alternative Navigation (ALT NAV), emerging situational awareness capabilities and net-enabled GPS solutions. These solutions will leverage commercial capabilities, existing contracts, industry, academia, and the warfighter in an iterative process, that will be integrated into future products, strategies, concepts of operation, architectures, and platforms to assure PNT.

The Assured PNT Enterprise Build-out will conduct network integration, installation and testing of the assured timing/location modular enterprise capability for ALT NAV. ALT NAV provides positioning, navigation and timing data in a denied or degraded environment. Enterprise Buildout will be completed to enable ALT NAV capabilities.

### E. Performance Metrics

N/A

khibit R-3, RDT&E F	Project C	ost Analysis: PB 20	020 Arm	У								Date:	March 20	)19	
opropriation/Budget Activity 140 / 4						R-1 Pro PE 120 Navigat	ogram Ele 6120A / A tion and T	ement (N Assured F Timing (Pl	l <b>umber/N</b> Positioning NT)	ame) <sup>1,</sup>	Project FJ8 / As Timing	(Number ssured Po (PNT)	r/ <b>Name)</b> sitioning,	Navigatio	on and
anagement Service	es (\$ in M	lillions)		FY	2018	FY 2019		FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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
oject Management	Allot	PM PNT : Various	-	-		3.549	Jan 2019	2.506	Jan 2020	-		2.506	Continuing	Continuing	-
		Subtotal	-	-		3.549		2.506		-		2.506	Continuing	Continuing	N/A
roduct Developmer	nt (\$ in M	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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
SAM - DAGR Software	SS/CPFF	Rockwell Collins : Cedar Rapids, IA	-	-		0.590	Mar 2019	4.902	Dec 2019	-		4.902	Continuing	Continuing	-
SAM - G-GRAM oftware Development	SS/CPIF	GCC Technologies : Oakland, MD	-	-		5.114	Jun 2019	2.276	Feb 2020	-		2.276	Continuing	Continuing	-
sured PNT Enterprise	C/FFP	Various : Various	-	-		-		20.387	Dec 2019	-		20.387	Continuing	Continuing	-
sured PNT Enterprise	MIPR	Various : Various	-	-		19.018	Feb 2019	-		-		-	0.000	19.018	-
my Modernization iorities	MIPR	Various : Various	-	-		2.321	Feb 2019	-		-		-	0.000	2.321	-
′ 2019 SBIR / STTR ansfer	TBD	TBD : TBD	-	-		2.162		-		-		-	0.000	2.162	-
		Subtotal	-	-		29.205		27.565		-		27.565	Continuing	Continuing	N/A
upport (\$ in Million	s)			FY	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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
igineering and Technical ontracting Services	C/FFP	DCS Corp : APG, MD	-	-		2.892	Jan 2019	2.978	Jan 2020	-		2.978	Continuing	Continuing	-
igineering and Technical overnment Services	MIPR	C4ISR : Various	-	-		0.222	Jan 2019	0.225	Jan 2020	-		0.225	Continuing	Continuing	-
Ittware Development sured PNT Enterprise ablers sured PNT Enterprise ildout my Modernization iorities ' 2019 SBIR / STTR ansfer upport (\$ in Million: Cost Category Item igineering and Technical ontracting Services ingineering and Technical overnment Services	C/FFP MIPR MIPR TBD S) Contract Method & Type C/FFP MIPR	Oakland, MD         Various : Various         Various : Various         Various : Various         TBD : TBD         Subtotal         Performing         Activity & Location         DCS Corp : APG,         MD         C4ISR : Various	- - - - - - - Years - -	- - - - - FY : Cost - -	2018 Award Date		Feb 2019 Feb 2019 2019 Award Date Jan 2019 Jan 2019	20.387 - - 27.565 FY 2 Ba Cost 2.978 0.225	Dec 2019 Dec	- - - - - - - - - 00 00 00 00 00 00 00 0	2020 CO Award Date	20.387 - - 27.565 FY 2020 Total Cost 2.978 0.225	Continuing 0.000 0.000 0.000 Continuing Cost To Complete Continuing	Continuing 19.018 2.321 2.162 Continuing Total Cost Continuing Continuing	\

Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	020 Arm	у								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	t Activity	,				<b>R-1 Pro</b> PE 120 <i>Naviga</i> t	ogram Ele 6120A / A tion and T	ement (N Issured F Timing (Pl	<b>umber/N</b> a Positioning VT)	<b>ame)</b> 1,	<b>Project (Number/Name)</b> FJ8 / Assured Positioning, Navigati Timing (PNT)				on and
Support (\$ in Millions	s)			FY 2	2018	FY 2019		FY 2020 Base		FY 2 O(	2020 CO	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
Assured PNT Enterprise Enablers Contractor Engineering Support	Various	DCS Corporation : APG, MD	-	-		0.328	Feb 2019	-		-		-	0.000	0.328	-
		Subtotal	-	-		3.442		3.203		-		3.203	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)			FY 2	2018	FY 2	2019	FY 2 Ba	2020 se	FY 2	2020 CO	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
SOSA Testing/RSAM - Government Eng Support	MIPR	Various : Various	-	-		1.031	Jan 2019	2.669	Jan 2020	-		2.669	Continuing	Continuing	-
SOSA Testing/RSAM - Contractor Eng Support	C/CPFF	Various : Various	-	-		1.521	Jan 2019	1.864	Jan 2020	-		1.864	Continuing	Continuing	-
Platform Integration Testing	C/Various	Various : Various	-	-		18.874	Mar 2019	4.279	Mar 2020	-		4.279	Continuing	Continuing	-
SOSA Testing/RSAM Test Equipment	C/Various	Various : Various	-	-		0.336	Jun 2019	0.293	Jun 2020	-		0.293	Continuing	Continuing	-
Assured PNT Enterprise Buildout Test Support	C/Various	Various : Various	-	-		1.027	Feb 2019	-		-		-	0.000	1.027	-
		Subtotal	-	-		22.789		9.105		-		9.105	Continuing	Continuing	N/A
Prior Years			FY 2018		FY 2019		FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
Project Cost Totals					58.985         42.379         -         42.379         Continuing				Continuing	Continuing	N/A				

**Remarks** 



Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019				
Appropriation/Budget ActivityR-12040 / 4PENav	Program Element (Number/N 1206120A / Assured Positionin rigation and Timing (PNT)	Name) F ng, F 7	<b>Project (Number/Name)</b> FJ8 / Assured Positioning, Navigation at Timing (PNT)			
Schedu	le Details					
	Star	t	E	nd		
Events	Quarter	Year	Quarter	Year		
PNT System of Sytems Architecture (SOSA) Testing	1	2019	4	2022		
RSAM - DAGR Software Development and Testing	1	2019	4	2022		
RSAM DAGR Update 1 Software Release	3	2020	3	2020		
RSAM DAGR Update 2 Software Release	2	2023	2	2023		
RSAM - GB-GRAM/MicroGRAM Software Development and Testing	1	2019	4	2022		
RSAM GB-GRAM Update 1 Software Release	3	2020	3	2020		
RSAM MicroGRAM Update 1 Software Release	1	2021	1	2021		
RSAM GB-GRAM Update 2 Software Release	2	2023	2	2023		
Platform Integration Testing	1	2019	4	2022		
Army Enterprise Enablers	1	2019	4	2022		

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army												Date: March 2019		
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 120612 Navigation	am Elemen 20A / Assure and Timing	t <b>(Number/</b> d Positionii (PNT)	Name) ng,	<b>Project (N</b> FJ9 / Dism	umber/Name) ounted A-PNT				
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		
FJ9: Dismounted A-PNT	-	0.000	15.969	32.360	-	32.360	13.350	0.000	0.000	0.000	0.000	61.679		
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-				

#### A. Mission Description and Budget Item Justification

Mission Command Network Modernization Implementation Plan - Line of Effort 1, 17 Apr 2018.

The Dismounted Assured PNT (A-PNT) System (DAPS) acquires, protects, and distributes secure PNT to the Dismounted Soldier. DAPS will be used in conjunction with the PEO Soldier Nett Warrior System Ensemble (e.g., Nett Warrior and other Soldier architecture compliant systems). DAPS is planned to be a size, weight and power (SWaP) optimized form-factor that paces the threats and includes development and integration of Global Positioning System (GPS) and non-GPS sensors. DAPS includes receiver software capable of acquiring alternative PNT signals resulting in additional integrity for military GPS in denied environments and includes a Selective, Availability, Anti-Spoof module (SAASM) and or Military-Code (M-Code) receiver solution with other future technologies.

FY 2020 Base funds in the amount of \$32.360 million are provided to deliver DAPS prototypes, conduct product verification testing as well as a series of testing events to include performance and reliability. In parallel to these activities, ongoing integration with the Nett Warrior End User Device will occur.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
<i>Title:</i> Dismounted A-PNT System (DAPS)	-	15.969	32.360	-	32.360
<b>Description:</b> This effort supports the development and delivery of DAPS prototypes for integration, evaluation and performance testing.					
<i>FY 2019 Plans:</i> FY2019 Base funds will support hardware and software prototype evaluations to include design reviews, test planning and Nett Warrior hardware and software integration. In addition, the funding will also support the development of the Dismounted system with the size, weight, and power optimized for a multi-sensor navigation prototype. Begin Integration of the Integrated Visual Augmentation System (IVAS) and Heads Up Display (HUD) 3.0 architecture.					
<b>FY 2020 Base Plans:</b> FY20 Base funds will deliver Dismounted A-PNT prototypes, conduct laboratory, performance and reliability tests. Safety Release and New Equipment Training will be completed. Nett Warrior Hardware and Software integration will be completed followed by final testing in FY21. Other efforts include: requirement/design trade					

Exhibit R-2A, RDT&E Project Just	ification: PB		Date: March 2019								
Appropriation/Budget Activity 2040 / 4	n <b>ent (Numbe</b> sured Position ning (PNT)	r <b>/Name)</b> ning,	Project (N FJ9 / Dism	umber/Nar ounted A-F	ne) PNT						
<b>B. Accomplishments/Planned Pro</b>	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total						
studies and early prototyping for use and HUD 3.0 architecture efforts will											
FY 2019 to FY 2020 Increase/Decr Increase of \$16.391 million is driven modernization priorities.	ease Statem	e <i>nt:</i> the implem	entation and	acceleration	of the Army	Network					
			Accomplish	nments/Plar	nned Progra	ims Subtotal	s -	15.969	32.360	-	32.360
C. Other Program Funding Summ	ary (\$ in Milli	ons)									
Line Item         FY 2018         FY 2019         Base         OCO         Total         FY 2021         FY           • K49020: Dismounted Hub         -         -         -         2.000         -         2.000         2.000         7000         2.000         70000         7000         7000 <td< td=""><td><u>FY 2023</u> 2.000</td><td><u>FY 2024</u> 2.000</td><td>Cost To Complete Continuing</td><td><u>Total Cost</u> Continuing</td></td<>								<u>FY 2023</u> 2.000	<u>FY 2024</u> 2.000	Cost To Complete Continuing	<u>Total Cost</u> Continuing

K49020 / Dismounted Hub is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

#### D. Acquisition Strategy

The goal of the Dismounted A-PNT program is to provide the Soldier conducting operations outside of vehicles unhindered access to trusted PNT under conditions where space based PNT may be limited or denied, as well as a means to maintain accurate position, velocity, and time information in Global Positioning System (GPS) challenged or degraded/denied environments. The Dismounted A-PNT capability will provide improved performance and reliability, availability, and maintainability over the currently fielded Defense Advanced GPS Receiver.

The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing competitive Other Transaction Authority (OTA)'s to obtain prototypes. The Government will conduct laboratory and performance testing. The findings from these efforts will provide technology viability and allow for the transition to limited production. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 2	)19	
Appropriation/Budg 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 120 <i>Naviga</i>	ogram Ele 6120A / A tion and 7	ement (N Assured F Timing (Pl	lumber/N Positioning NT)	<b>ame)</b> g,	Project FJ9 / Di	(Number ismounted	r/Name) d A-PNT		
Management Servic	es (\$ in M	lillions)		FY	2018	FY 2019		FY 2 Ba	2020 ase	FY 2 O(	2020 CO	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 - Contractor	C/CPFF	Various : Various	-	-		1.107	Dec 2018	1.530	Dec 2019	-		1.530	Continuing	Continuing	-
		Subtotal	-	-		1.107		1.530		-		1.530	Continuing	Continuing	N/A
Remarks Product Developme	nt (\$ in M	illions)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2 OC	2020 CO	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 A- PNT Prototyping & Development Vendor 1	C/FFP	TBD : TBD	-	-	Duto	4.906	Feb 2019	2.326	Nov 2019	-	Duto	2.326	0.000	7.232	-
Dismounted A- PNT Prototyping & Development Vendor 2	C/FFP	TBD : TBD	-	-		2.906	Feb 2019	1.324	Nov 2019	-		1.324	0.000	4.230	-
Dismounted A-PNT Protoyping & Delivery	C/FFP	TBD : TBD	-	-		-		7.058	Feb 2020	-		7.058	Continuing	Continuing	-
Development of a Dismounted M-Code capable prototype	MIPR	TBD : TBD	-	-		1.800	Jun 2019	4.460	Feb 2020	-		4.460	Continuing	Continuing	-
Development of a small SWAP-C multi sensor navigation prototype	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	-		0.896	Dec 2018	-		-		-	0.000	0.896	-
Engineering and Technical Product Development	MIPR	C5ISR : Various	-	-		0.293	Dec 2018	3.377	Dec 2019	-		3.377	Continuing	Continuing	-
Nett Warrior Integration	MIPR	TBD : TBD	-	-		0.846	Feb 2019	1.698	Feb 2020	-		1.698	Continuing	Continuing	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.584		-		-		-	0.000	0.584	-
		Subtotal	-	-		12.231		20.243		-		20.243	Continuing	Continuing	N/A

PE 1206120A: Assured Positioning, Navigation and Timi... Army

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Exhibit R-3, RDT&E P	roject Co	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	)19	
Appropriation/Budget 2040 / 4	t Activity					<b>R-1 Pro</b> PE 120 <i>Naviga</i>	ogram Ele 6120A I A tion and T	ement (N Issured F Timing (Pl	l <b>umber/N</b> a Positioning NT)	ame) <sup>I,</sup>	<b>Project</b> FJ9 / Di	: (Numbe ismounted	r/ <b>Name)</b> d A-PNT		
Support (\$ in Millions	)			FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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 and Technical Services - Government	Various	C5ISR : Various	-	-		0.702	Nov 2018	0.856	Nov 2019	-		0.856	Continuing	Continuing	-
Engineering and Technical Services - Contractor	C/CPFF	DCS Corporation : APG, MD	-	-		0.796	Jan 2019	0.924	Nov 2019	-		0.924	Continuing	Continuing	-
		Subtotal	-	-		1.498		1.780		-		1.780	Continuing	Continuing	N/A
Test and Evaluation (	\$ in Milli	ons)		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	C/Various	Various : Various	-	-		1.133	Dec 2018	8.807	Dec 2019	-		8.807	Continuing	Continuing	-
		Subtotal	-	-		1.133		8.807		-		8.807	Continuing	Continuing	N/A
Prior Years				FY	2018	FY	2019	FY 2 Ba	2020 1se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals						15.969 32.360				-		32.360	Continuing	Continuing	N/A

**Remarks** 



khibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date	e: March 2019
ppropriation/Budget Activity )40 / 4	<b>R-1 Program E</b> PE 1206120A / <i>Navigation and</i>	Element (Number Assured Position Timing (PNT)	/ <b>Name)</b> ing,	Project (Numb FJ9 / Dismount	er/Name) ed A-PNT
	Schedule Details	;			
	[	Sta	rt		End
Events		Quarter	Year	Quart	ter Ye:
Dismounted A-PNT M-Code / SWAP-C Prototypes		1	2019	2	202
Dismounted A-PNT Prototype Acquisition Decision		2	2019	2	20
Dismounted A-PNT Prototyping & Delivery		2	2019	2	202
Dismounted A-PNT Prototype Testing		1	2020	1	202
Dismounted A-PNT Nett Warrior Integration		2	2019	1	202
Dismounted A-PNT Production Decision Milestone		2	2021	2	202
Dismounted A-PNT Production		3	2021	4	202
Dismounted A-PNT Fielding		1	2022	2	202

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	ch 2019	
Appropriation/Budget Activity 2040 / 4					R-1 Progra PE 120612 Navigation	am Elemen 20A / Assure and Timing	<b>t (Number/</b> ed Positionii (PNT)	<b>Project (N</b> FK1 / Pseι	lumber/Name) udolites			
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
FK1: Pseudolites	-	0.000	20.776	42.452	-	42.452	79.379	24.649	0.000	0.000	0.000	167.256
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

Mission Command Network Modernization Implementation Plan - Line of Effort 1, 17 Apr 2018.

The Pseudolite project was terminated by the Army on 12 Feb 2019 after the Fiscal Year 2020 submission lock. Therefore, the Army will realign FK1 funding within the existing PE 1206120A. The requirements addressed by the Pseudolite solution are still valid capability gaps. Pseudolite funding and activities will pivot to support the broader mission of Alternative PNT & Area Protection to mitigate threats in Multi-Domain Operations (MDO). For FY21 a new project line will be established to transition the effort of Alternative PNT & Area Protection. These technologies provide agile and adaptive mechanisms for integrating sensors, signals and software to provide Radio Frequency (RF) and non-RF threat mitigation.

FY 2020 Base funds in the amount of \$42.452 million will continue to fulfill the assured PNT information gap by pivoting to Alternative PNT & Area Protection, accelerating the Mounted A-PNT System (MAPS), and aligning to Army Modernization priorities. As a result, this funding will be realigned to FJ8 (\$18.139 million) and FK2 (\$24.313 million).

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
Title: Alternative PNT & Area Protection	-	20.776	42.452	-	42.452
Description: Pseudolites transitioning to Alternative PNT & Area Protection					
<b>FY 2019 Plans:</b> FY 2019 Base funds will complete smart shutdown of the Pseudolite program and refocus a material solution approach for requirements associated with Alternative PNT & Area Protection. A new project line is requested to support this transition.					
<i>FY 2020 Base Plans:</i> FY2020 Base funds will continue to fulfill the assured PNT information gap by pivoting to Alternative PNT & Area Protection, accelerating the Mounted A-PNT System (MAPS), and aligning to Army Modernization priorities. As a result, this funding will be realigned to FJ8 (\$18.139 million) and FK2 (\$24.313 million).					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Jus	stification: PB	2020 Army						Date: March 2019			
Appropriation/Budget Activity 2040 / 4				<b>R-1 P</b> PE 12 <i>Navig</i> a	r <b>ogram Ele</b> n 06120A / As ation and Tin	nent (Numbe sured Positio ning (PNT)	er/Name) ning,	Project (Number/Name) FK1 / Pseudolites			
B. Accomplishments/Planned Pr	ograms (\$ in N	<u>lillions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Increase in the amount of \$21.676 Network modernization priorities.	million is driver	ıy									
			Accomplis	hments/Pla	nned Progra	ims Subtota	ls -	20.776	42.452	-	42.452
C. Other Program Funding Summ	nary (\$ in Milli	ons)									
		-	<u>FY 2020</u>	<u>FY 2020</u>	<u>FY 2020</u>					Cost To	
Line Item	<u>FY 2018</u>	FY 2019	Base	000	<u>Total</u>	FY 2021	<u>FY 2022</u>	FY 2023	<u>FY 2024</u>	<b>Complete</b>	<b>Total Cost</b>
<ul> <li>K49050: Pseudolite Capability A-PNT</li> </ul>	-	-	2.000	5.439	7.439	8.558	2.000	1.912	1.945	Continuing	Continuing
<u>Remarks</u>											

K49050 / Pseudolite Capability A-PNT is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing.

#### D. Acquisition Strategy

The Pseudolite project was terminated by the Army on 12 Feb 2019 after the Fiscal Year 2020 submission lock. Therefore, the Army will realign FK1 funding within the existing PE 1206120A. The requirements addressed by the Pseudolite solution are still valid capability gaps. Pseudolite funding and activities will pivot to support the broader mission of Alternative PNT & Area Protection to mitigate threats in Multi-Domain Operations (MDO). For FY21 a new project line will be established to transition the effort of Alternative PNT & Area Protection. These technologies provide agile and adaptive mechanisms for integrating sensors, signals and software to provide Radio Frequency (RF) and non-RF threat mitigation.

The Project Manager, Positioning, Navigation and Timing (PM PNT) will complete smart shutdown of the Pseudolite program and refocus a material solution approach for requirements associated with Alternative PNT & Area Protection.

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E F	Project Co	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	019	
Appropriation/Budge 2040 / 4	et Activity	,				<b>R-1 Pro</b> PE 120 <i>Naviga</i>	ogram Ele 6120A / A tion and T	ement (N Assured F Timing (Pl	umber/N Positioning NT)	ame) <sub>],</sub>	Project FK1 / P	(Numbe seudolites	r/ <b>Name)</b> S		
Management Service	es (\$ in M	illions)		FY 2	2018	FY :	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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 - Contractor	C/CPFF	Various : Various	-	-		1.428	Dec 2018	-		-		-	0.000	1.428	-
		Subtotal	-	-		1.428		-		-		-	0.000	1.428	N/A
Product Developmer	nt (\$ in Mi	illions)		FY 2018		FY	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	FY 2020 Total	]		
Cost Category Item	Contract Method & Type	ntract ethod Performing Prior Type Activity & Location Years Co		Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Technical Product Support	MIPR	C5ISR : Various	-	-		1.804	Nov 2018	-		-		-	0.000	1.804	-
Alternative PNT & Area Protection Command & Control (C2)	C/Various	Various : Various	-	-		1.350	Jan 2019	-		-		-	0.000	1.350	-
Situational Awareness Development	C/Various	Various : Various	-	-		2.250	Feb 2019	-		-		-	0.000	2.250	-
Spectrum Modification for PNT Solutions (ALT PNT Banding)	C/Various	Various : Various	-	-		1.522	Feb 2019	-		-		-	0.000	1.522	-
RF Signals of Opportunity for PNT	C/Various	Various : Various	-	-		0.878	Feb 2019	-		-		-	0.000	0.878	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.263		-		-		-	0.000	1.263	-
Realignment to FK2 Client and Platform Integration	C/Various	Variuos : Various	-	-		-		24.313	Nov 2019	-		24.313	Continuing	Continuing	-
Realignment to FJ8 Alternative Navigation	C/Various	Variuos : Variuos	-	-		-		6.720	Dec 2019	-		6.720	Continuing	Continuing	-
Realignment to FJ8 Navigation Warfare (NAVWAR) & GPS	C/Various	Variuos : Variuos	-	-		-		3.373	Dec 2019	-		3.373	Continuing	Continuing	-
Realignment to FJ8 Alternative PNT Modeling & Simulation	C/Various	Variuos : Variuos	-	-		-		3.846	Dec 2019	-		3.846	Continuing	Continuing	-

Exhibit R-3, RDT&E P	Project Co	ost Analysis: PB 2	020 Arm	у								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activity	,				<b>R-1 Pro</b> PE 120 <i>Naviga</i>	ogram Ele 6120A / A tion and T	ement (N Assured F Timing (Pl	l <b>umber/N</b> a Positioning NT)	ame) <sup>I,</sup>	Project FK1 / P	(Number seudolites	/Name)		
Product Developmer	nt (\$ in Mi	illions)		FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		9.067		38.252		-		38.252	Continuing	Continuing	N/A
Support (\$ in Million	s)			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 and Technical Services - Government	MIPR	C5ISR : Various	-	-		1.299	Nov 2018	-		-		-	0.000	1.299	-
Engineering and Technical Services - Contractor	C/CPFF	DCS Corporation : APG, MD	-	-		2.989	Jan 2019	-		-		-	0.000	2.989	-
	<u> </u>	Subtotal	-	-		4.288		-		-		-	0.000	4.288	N/A
Test and Evaluation	(\$ in Milli	ons)		FY	2018	FY	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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
Alternative PNT & Area Protection Demonstration / Planning	MIPR	Various : Various	-	-		5.993	Mar 2019	-		-		-	0.000	5.993	-
Realignment to FJ8 Testing of Alternative PNT Technologies	C/Various	Variuos : Variuos	-	_		-		4.200	Feb 2020	-		4.200	Continuing	Continuing	-
		Subtotal	-	-		5.993		4.200		-		4.200	Continuing	Continuing	N/A
Prior Years				FY 2018		FY 2019		FY 2020 Base		FY 2	2020	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
	Project Cost Totals -					20.776		42.452				42.452	Continuing	Continuing	N/A
Remarks															

The Mounted Client and Platform Integration is required for 81 Platforms and 27 Client PMs.

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	vrmy					Date: March 20	19
Appropriation/Budget Activity 2040 / 4		<b>R-1 F</b> PE 1 <i>Navi</i> g	Program Elemen 206120A / Assurd gation and Timing	n <b>t (Number/Name</b> ed Positioning, g (PNT)	e) Project (N FK1 / Pse	lumber/Name) udolites	
				1		1	
Event Name	FY 2018	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024
Pseudolite (PL) Prototype Smart Shutdown and Transition	1 2 3 4	Smart Shutdown & Trans	tion		1 Z 3 4		

nibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Marc	ch 2019				
oropriation/Budget Activity 0 / 4	<b>R-1 Program</b> PE 1206120A Navigation ar	Program Element (Number/Name)Project (Number/Name)1206120A I Assured Positioning, vigation and Timing (PNT)FK1 I Pseudolites							
	Schedule Detai	ls							
		Sta	rt	E	nd				
Events		Quarter	Year	Quarter	Year				
			0040						

Exhibit R-2A, RDT&E Project Ju	nibit R-2A, RDT&E Project Justification: PB 2020 Army												
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 120612 Navigation	am Elemen 20A / Assure and Timing	<b>t (Number/</b> ed Positionii 1 (PNT)	Project (N FK2 / Mou	Number/Name) unted A-PNT							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2023	FY 2024	Cost To Complete	Total Cost		
FK2: Mounted A-PNT	66.471	-	66.471	82.965	61.969	44.020	10.918	Continuing	Continuing				
Quantity of RDT&E Articles	-	-	-	-	-	-	-						

#### A. Mission Description and Budget Item Justification

Mission Command Network Modernization Implementation Plan - Line of Effort 1, 17 Apr 2018.

The Mounted Assured Positioning, Navigation, and Timing (PNT) System (MAPS) provides assured PNT data, is a key enabler, and a cross cutting capability for Army ground maneuver forces to execute their mission in support of the Network Enabling Function. Army ground maneuver Forces require access to assured PNT under conditions where space-based PNT (e.g. Global Positioning System (GPS)) may be limited or denied by fusing non-Radio Frequency (RF) sensors with GPS. It distributes assured PNT data to tactical command, communication and control systems on Army tactical and combat vehicles. The current GPS capability is a fixed frequency system which is vulnerable to current and emerging threats and field condition.

The MAPS is a scalable, upgradable system mounted on Army ground force platforms. It fuses GPS with complimentary navigation and timing technologies to provide assured PNT to client systems and platforms. The MAPS distributes PNT data to multiple systems directly and via the network, reducing the dependency on multiple GPS receiver devices on a single platform. In order to achieve performance requirements in the highest threat level conditions, an Anti-Jam Antenna will be integrated with the MAPS. These two products each provide a degree of A-PNT protection. Integrated together, however, these two products will close the capability gap and achieve the desired performance.

FY 2020 Base funds, in the amount of \$66.471 million, are provided for integration, installation, training and Soldier assessment of MAPS on selected combat vehicles and command, control and communication systems. Integration activities are required for 81 unique platforms and 27 client systems based on the current basis of issue (BOI). In addition, FY2020 Base funds under PE 1206120A (project FK1) in the amount of \$24.313 million are to be realigned to support MAPS acceleration and to align MAPS to Army Modernization priorities.

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
<i>Title:</i> Mounted A-PNT System (MAPS)	-	22.788	66.471	-	66.471
<b>Description:</b> This effort supports the delivery of MAPS prototypes for platform integration, performance and reliability testing, technical evaluation, and operational assessment.					
FY 2019 Plans:					

Exhibit R-2A, RDT&E Project Justi	fication: PB	2020 Army							Date: Mar	rch 2019	
Appropriation/Budget Activity 2040 / 4	nent (Numbe sured Positior ning (PNT)	r/Name) hing,									
B. Accomplishments/Planned Proc	grams (\$ in I	<u>/lillions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY2019 Base funds will complete MA integration lab. The funds initiate deli	APS prototyp										
<b>FY 2020 Base Plans:</b> FY2020 Base funds will support integ combat vehicles and command, cont	gration, instal rol and comr										
FY 2019 to FY 2020 Increase/Decree Increase in the amount of \$43.683 m Network modernization priorities.	ease Statem illion is drive	<b>ent:</b> n in support	of the impler	mentation ar	nd accelerati	on of the Army	/				
			Accomplisi	nments/Plar	nned Progra	ms Subtotal	s -	22.788	66.471	-	66.471
C. Other Program Funding Summa	ry (\$ in Milli	ons <u>)</u>									
		51/ 00/0	FY 2020	FY 2020	FY 2020				E)/ 000/	Cost To	T. ( .) 0 (
• K49030: Mounted Hub A-PNT	• K49030: Mounted Hub A-PNT 29.950 6.339 36.289 29.946									Continuing	Continuing
Remarks											
K49030 / Mounted Hub A-PNT is an	OPA subset	of Line Item	Number 98	97K49000 /	Assured Po	sitionina. Navi	dation and T	Timina			

#### D. Acquisition Strategy

The goal of the Mounted Assured Positioning, Navigation and Timing (PNT) System (MAPS) program is to deliver distributed assured PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization. The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing a competitive Other Transaction Agreement (OTA) to obtain prototypes. The Government will conduct Electromagnetic Interference and Environmental Testing, as well as performance testing in the System Integration Lab (SIL), anechoic chamber testing and a Military Feasibility Assessment (MFA). The findings from these tests and assessment efforts will determine whether or not to begin platform integration. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

#### E. Performance Metrics

N/A

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	t Activity	1				<b>R-1 Program Element (Number/Name)</b> PE 1206120A <i>I Assured Positioning,</i> <i>Navigation and Timing (PNT)</i>						(Number	r/ <b>Name)</b> -PNT		
Management Service	es (\$ in M	illions)		FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	2020 CO	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 - Contractor	C/CPFF	Various : Various	-	-		1.446	Dec 2018	2.130	Dec 2019	-		2.130	Continuing	Continuing	-
		Subtotal	-	-		1.446		2.130		-		2.130	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2 Ba	FY 2020 FY 2 Base OC		020 FY 2020 CO Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Mounted/AJAS Prototype Development Contract	C/FFP	TBD : TBD	-	-		10.509	Jun 2019	-		-		-	0.000	10.509	-
Engineering and Technical Product Development	MIPR	C5ISR : APG, MD	-	-		1.534	Dec 2018	1.086	Dec 2019	-		1.086	Continuing	Continuing	-
Client and Platform Integration	MIPR	PEO CS&CSS : Various	-	-		-		47.425	Nov 2019	-		47.425	Continuing	Continuing	-
Client Software Development (JBCP)	MIPR	AMRDEC/S3I : APG, MD	-	-		0.967	Jan 2019	-		-		-	0.000	0.967	-
Technical Manuals & Support Equipment	MIPR	C5ISR : APG, MD	-	-		-		2.997	Dec 2019	-		2.997	0.000	2.997	-
FY2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.835		-		-		-	0.000	0.835	-
	nster Subtotal							51.508		-		51.508	Continuing	Continuing	N/A

#### Remarks

Client and Platform Integration is required for 81 Platforms and 27 Client PMs.

On schedule to award the competitive firm fixed price Mounted/AJAS prototype development contract. Expenditures for this contract will align with milestone payments to the vendor as deliverables are completed.

Exhibit R-3, RDT&E P	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	)19	
Appropriation/Budge 2040 / 4	et Activity	/				<b>R-1 Pro</b> PE 120 <i>Naviga</i>	ogram Ele 6120A / A tion and T	ement (N Assured F Timing (Pl	<b>umber/N</b> Positioning NT)	<b>ame)</b> 1,	Project FK2 / N	(Number Nounted A	r/ <b>Name)</b> -PNT		
Support (\$ in Million	s)			FY	2018	FY	2019	FY 2 Ba	2020 Ise	FY 2 O	2020 CO	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 and Technical Services - Government	MIPR	C5ISR : Various	-	-		0.187	Dec 2018	1.038	Nov 2019	-		1.038	Continuing	Continuing	-
Engineering and Technical Services - Contractor	C/CPFF	C5ISR : Various	-	-		2.029	Dec 2018	4.729	Nov 2019	-		4.729	Continuing	Continuing	-
		Subtotal	-	-		2.216		5.767		-		5.767	Continuing	Continuing	N/A
Test and Evaluation	est and Evaluation (\$ in Millions)			FY	2018	FY 2019		FY 2 Ba	2020 Ise	FY 2	2020 CO	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
Performance Testing	MIPR	C5ISR : Various	-	-		1.330	May 2019	2.355	Nov 2019	-		2.355	Continuing	Continuing	-
Reliability Testing	MIPR	C5ISR : Various	-	-		-		1.571	Feb 2020	-		1.571	Continuing	Continuing	-
Field Testing	MIPR	Army Test and Evaluation Command (ATEC) : White Sands Missile Range (WSMR)	-	-		0.551	Feb 2019	-		-		-	0.000	0.551	-
Military Feasibility Assessment (MFA)	MIPR	Various : TBD	-	-		-		2.355	Mar 2020	-		2.355	Continuing	Continuing	-
Systems Engineering and Integration Testing & Support	MIPR	CERDEC Command Power and Integration Directorate : APG, MD	-	-		3.400	Jan 2019	0.785	Dec 2019	-		0.785	0.000	4.185	-
	1	Subtotal	-	-		5.281		7.066		-		7.066	Continuing	Continuing	N/A
Prior Years		Prior Years	FY	2018	FY	2019	FY : Ba	2020 ISe	FY 2 OC	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract	
		Project Cost Totals	-	-		22.788		66.471		-		66.471	Continuing	Continuing	N/A
<u>Remarks</u>															



Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: Mar	rch 2019
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Num</b> PE 1206120A <i>I Assured Post</i> <i>Navigation and Timing (PNT)</i>	ber/Name) tioning,	Project (Number/Na FK2 / Mounted A-PN	me) T
S	Schedule Details			
		Start	E	End
Events	Quarter	Year	Quarter	Year
Mounted A-PNT Risk Reduction Activities	1	2019	1	2022
Mounted A-PNT Prototyping and Testing - Phase I	1	2019	3	2019
Mounted A-PNT Performance Testing	3	2019	2	2020
Mounted A-PNT Test and Integration - Phase II	3	2019	4	2020
Client and Platform Integration (81 Platforms & 27 Client PMs)	3	2019	2	2022
Military Feasibility Assessment (MFA)	2	2020	3	2020
Mounted A-PNT Production Decision	4	2020	4	2020
Production Award	1	2021	1	2021
MAPS Technology Insertion Development	2	2023	4	2025

Exhibit R-2A, RDT&E Project Ju	khibit R-2A, RDT&E Project Justification: PB 2020 Army         D												
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 120612 Navigation	am Elemen 20A / Assure and Timing	<b>t (Number/</b> ed Positionii (PNT)	Project (N FK3 / Anti-	lumber/Name) -Jam Antenna							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2023	FY 2024	Cost To Complete	Total Cost		
FK3: Anti-Jam Antenna	8.900	-	8.900	8.051	6.253	2.700	0.000	0.000	36.026				
Quantity of RDT&E Articles	-	-	-	-	-	-	-						

#### A. Mission Description and Budget Item Justification

Mission Command Network Modernization Implementation Plan - Line of Effort 1, 17 Apr 2018.

The Anti-Jam Antenna System (AJAS) provides point protection by steering electronic nulls at interference sources or beams at valid signal sources. This enables continuous Global Positioning System (GPS) signal acquisition and tracking in a navigation warfare (jamming) environment. The AJAS is tightly coupled with the Mounted Assured Positioning, Navigation and Timing System (MAPS) to provide GPS signal protection and assured PNT in challenged environments on Army tactical and combat vehicles. The AJAS integration with the MAPS will achieve performance requirements in the highest threat level conditions. These two products each provide a degree of A-PNT protection. Integrated together, however, these two products will close the capability gap and achieve the desired performance.

FY 2020 Base funds in the amount of \$8.900 million provide integration, installation, training and Soldier assessment of AJAS fielded with MAPS on selected combat vehicles and command, control and communication systems. Integration activities are required for 81 unique platforms and 27 client systems based on the current basis of issue (BOI).

B. Accomplishments/Planned Programs (\$ in Millions)			FY 2020	FY 2020	FY 2020
	FY 2018	FY 2019	Base	000	Total
<i>Title:</i> Anti-Jam Antenna System	-	10.122	8.900	-	8.900
<b>Description:</b> This effort supports the delivery of MAPS prototypes for platform integration, performance and reliability testing, technical evaluation, and operational assessment.					
<b>FY 2019 Plans:</b> FY 2019 Base funds will complete AJAS prototyping and client system integration lab (SIL) testing. Funds will initiate delivery of AJAS prototypes to be used for test and characterization, as well as continue the manufacturing and development of the AJAS prototypes.					
<b>FY 2020 Base Plans:</b> FY2020 Base funds will support integration, installation, training and Soldier Assessment of AJAS fielded with MAPS, on selected combat vehicles and command, control and communication systems.					
FY 2019 to FY 2020 Increase/Decrease Statement:					

Exhibit R-2A, RDT&E Project Justifi		Date: March 2019									
Appropriation/Budget Activity 2040 / 4				R-1 Pi PE 12 Naviga	r <b>ogram Eler</b> 06120A / As ation and Tir	nent (Numbe sured Positior ning (PNT)	Project (N FK3 / Anti-	umber/Nar Jam Anten	ne) na		
B. Accomplishments/Planned Prog	<u>rams (\$ in l</u>	<u> Millions)</u>					FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
The Anti-Jam Antenna System (AJAS 2020 due to the incorporation of the A Navigation and Timing System (MAPS	) funding lir nti-Jam Anf 6) draft Cap	e decreased enna Syster abilities Dev	d from \$10.12 m (AJAS) into velopment Do	22M in FY 20 o the Mounte ocument (CD	019 to \$8.90 ed Assured F 0D).	0M in FY Positioning,					
			Accomplis	hments/Plar	nned Progra	ms Subtotal	s -	10.122	8.900	-	8.900
C. Other Program Funding Summar	y (\$ in Milli	ions)	FY 2020	FY 2020	FY 2020					<u>Cost To</u>	
Line Item • K49040: Anti-Jam Antenna A-PNT Remarks	<u>FY 2018</u> -	<u>FY 2019</u> -	<u>Base</u> 5.144	000	<u>Total</u> 5.144	<b>FY 2021</b> 10.460	FY 2022 23.083	<u>FY 2023</u> 24.486	<u>FY 2024</u> 24.855	Complete Continuing	Total Cost Continuing

K49040 / Anti-Jam Antenna A-PNT is an OPA subset of Line Item Number 9897K49000 / Assured Positioning, Navigation and Timing

#### D. Acquisition Strategy

The goal of the Anti-Jam Antenna System (AJAS) program is to deliver distributed A-PNT capabilities to mounted platforms over time in an iterative, affordable manner that allows for future modernization. The first iteration of capabilities will employ tailored processes to identify and close key technology gaps. Technologies available from Industry today will be evaluated for performance and operational suitability and equipped to select critical units. This will be implemented by utilizing a competitive Other Transaction Agreement (OTA) to obtain prototypes. The Government will conduct partial Electromagnetic Interference and Environmental Testing, as well as performance testing in the System Integration Lab (SIL), anechoic chamber testing and a Military Feasibility Assessment. The findings from these test and assessment efforts will determine whether or not to proceed to platform integration. Providing initial equipment to specified units will result in an assessment to determine production and fielding readiness of the capability.

### E. Performance Metrics

N/A

Exhibit R-3, RDT&E	Project C	ost Analysis: PB 2	2020 Arm	у								Date:	March 20	019	
Appropriation/Budge 2040 / 4	et Activity	1				<b>R-1 Pro</b> PE 120 <i>Naviga</i> t	ogram Ele 6120A / A tion and 7	ement (N Assured F Timing (Pl	Project (Number/Name) FK3 / Anti-Jam Antenna						
Management Service	es (\$ in M	illions)		FY :	FY 2018		FY 2019		FY 2020 Base		2020 CO	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 - Contractor	C/CPFF	Various : Various	-	-		0.710	Oct 2018	0.285	Dec 2019	-		0.285	0.000	0.995	-
		Subtotal	-	-		0.710		0.285		-		0.285	0.000	0.995	N/A
Product Development (\$ in Millions)			FY	2018	FY 2	2019	FY 2 Ba	2020 ase	FY 2	2020 CO	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 of the Systems Engineering and Integration Lab	MIPR	CERDEC Command Power and Integration Lab : APG, MD	-	-		-		0.276	Dec 2019	-		0.276	0.000	0.276	-
Platform Integration	MIPR	PEO CS&CSS : Warren, MI	-	-		2.058	Dec 2018	-		-		-	Continuing	Continuing	-
Engineering and Technical Product Development	MIPR	C5ISR : APG,MD	-	-		0.200	Dec 2018	-		-		-	Continuing	Continuing	-
Mounted and AJAS Prototype Development Contract	C/FFP	TBD : TBD	-	-		4.098	Jun 2019	-		-		-	Continuing	Continuing	-
Client Software Development (JBCP)	MIPR	AMERDEC/S3I Directorate : APG,MD	-	-		-		3.331	Nov 2019	-		3.331	Continuing	Continuing	-
Technical Manuals & Support Equipment	MIPR	C5ISR : APG,MD	-	-		-		2.993	Dec 2019	-		2.993	0.000	2.993	-
FY2019 SBIR /STTR Transfer	TBD	TBD : TBD	-	-		0.371		-		-		-	0.000	0.371	-
		Subtotal	-	-		6.727		6.600		-		6.600	Continuing	Continuing	N/A

#### Remarks

Platform Integration is required for 81 Platforms and 27 Client PMs.

On schedule to award the competitive firm fixed price Mounted/AJAS prototype development contract. Expenditures for this contract will align with milestone payments to the vendor as deliverables are completed.

PE 1206120A: Assured Positioning, Navigation and Timi... Army

Exhibit R-3, RDT&E Project Cost An	nalysis: PB 20	20 Army	/								Date:	March 20	)19	
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name)ProjectPE 1206120A / Assured Positioning, Navigation and Timing (PNT)FK3 / J						(Number nti-Jam A	r/ <b>Name)</b> ntenna		
Support (\$ in Millions)			FY 2	2018	FY 2019		FY 2020 Base		FY 2 OC	020 CO	FY 2020 Total			
Contract Method Pe Cost Category Item & Type Activit	erforming ty & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering and Technical Services - Government MIPR C5ISR	: Various	-	-		0.130	Oct 2018	0.130	Nov 2019	-		0.130	Continuing	Continuing	-
Engineering and Technical Services - Contractor	: Various	-	-		1.612	Oct 2018	1.885	Nov 2019	-		1.885	0.000	3.497	-
	Subtotal	-	-		1.742		2.015		-		2.015	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)		ſ	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	020 :O	FY 2020 Total			
Contract Method Pe Cost Category Item & Type Activit	erforming ty & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Live Sky Demo and Antenna Anechoic Chamber Test CERDI Comm MIPR and Int Directo MD	EC - and Power tegration brate : APG,	-	-		0.478	May 2019	-		-		-	Continuing	Continuing	-
Anti-Jam Antenna Integrity/ Performance Testing MIPR APG,M	EC STCD : 1D	-	-		0.337	May 2019	-		-		-	0.000	0.337	-
TNT Prototype testing MIPR CERDI	EC STCD : MD	-	-		0.128	May 2019	-		-		-	0.000	0.128	-
	Subtotal	-	-		0.943		-		-		-	Continuing	Continuing	N/A
		Prior Years	FY 2	2018	FY 2	2019	FY 2 Ba	2020 Ise	FY 2 OC	020 :O	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Proje	ct Cost Totals	-	-		10.122		8.900		-		8.900	Continuing	Continuing	N/A

**Remarks** 

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army													Dat	<b>e:</b> M	arch	201	9							
Appropriation/Budget Activity 2040 / 4	ppropriation/Budget Activity 040 / 4							R-1 Program Element (Number/Name)Project (IPE 1206120A / Assured Positioning, Navigation and Timing (PNT)FK3 / Ant								<b>ct (N</b> Anti-	(Number/Name) nti-Jam Antenna							
Event Name		F	Y 2	018		FY :	2019		FY	2020		FY	2021		FY 202	2		FY 2	2023		F	Y 20	024	
Anti-Jam Antenna Risk Reduction Activities	1	2	2	3 4	1 Rick D	2	3 4	1	2	3 4	1	2	3 4	1	2 3	4	1	2	3	4	1	2   :	3 4	1
Anti-Jam Antenna Prototyping and Testing - Phase I					F	rototypi	ing and Te	esting																
Chamber Testing						ļ	Anechoic	Chambe	er Testin	2														
TNT Prototype Testing						ļ	TNT Proto	type Te	sting															
Integrity/Performance Testing							Integrity/P	erforma	nce Test	ing														
Performance Testing							EMI, E	ENV & F	Perf Test	ing														
Anti-Jam Antenna Test and Integration - Phase II							Test s	ind Inte	gration															
Client and Platform Integration (81 Platforms and 27 Client PMs	5)						Integr	ation (8	1 Platfor	ms and 27	Glient P	°Ms)												
Military Feasibility Assessment (MFA)									M	Ā														
Anti-Jam Antenna Production Decision										Produ	1 uction D	ecision												
Production Award										Pr	2 oduction	n Award												
MAPS Technology Insertion Development																		MAPS//	AJ Tech	nolog	y Inserti	on Dev	elopme	ent

xhibit R-4A, RDT&E Schedule Details: PB 2020 Army				Date: Mar	ch 2019	
ppropriation/Budget Activity D40 / 4	<b>R-1 Program E</b> PE 1206120A <i>I</i> <i>Navigation and</i>	lement (Numbe Assured Position Timing (PNT)	Project (Number/Na FK3 / Anti-Jam Anten	t <b>(Number/Name)</b> Inti-Jam Antenna		
	Schedule Details					
	Γ	St	art	E	ind	
Events		Quarter	Year	Quarter	Year	
Anti-Jam Antenna Risk Reduction Activities		1	2019	1	2022	
Anti-Jam Antenna Prototyping and Testing - Phase I		1	2019	3	2019	
Chamber Testing		3	2019	4	2019	
TNT Prototype Testing		3	2019	4	2019	
Integrity/Performance Testing		3	2019	4	2019	
Performance Testing		3	2019	2	2020	
Anti-Jam Antenna Test and Integration - Phase II		3	2019	4	2020	
Client and Platform Integration (81 Platforms and 27 Client PMs)		3	2019	2	2022	
Military Feasibility Assessment (MFA)		2	2020	3	2020	
Anti-Jam Antenna Production Decision		4	2020	4	2020	
Production Award		1	2021	1	2021	
MAPS Technology Insertion Development		2	2023	4	2025	

Exhibit R-2, RDT&E Budget Item	n Justificat	i <b>on:</b> PB 202							Date: Marc	ch 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)				anced	R-1 Program Element (Number/Name) PE 1206308A / Army Space Systems Integration							
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	-	30.121	38.307	104.996	-	104.996	23.168	18.653	17.373	18.396	Continuing	Continuing
FE5: Space And Missile Defense Integration	-	15.655	17.213	104.996	-	104.996	23.168	18.653	17.373	18.396	Continuing	Continuing
FE6: Army Space System Enhancement/Integration	-	14.466	21.094	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	35.560

#### A. Mission Description and Budget Item Justification

This Program Element (PE) funds space systems integration efforts performed by the US Army Space and Missile Defense Command/Army Forces Strategic Command (USASMDC/ARSTRAT) and the Program Executive Office for Intelligence, Electronic Warfare (PEO IEW&S).

Project FE5: Funds USASMDC/ARSTRAT to integrate warfighting concepts and technologies, validate concepts, and identify capabilities needed to implement the validated concepts, and develop DOTMLPF solutions to realize those space and high altitude related capabilities. Provide engineering support to the Joint Friendly Force Tracking (J-FFT) Mission Management Center (MMC) through an associated test-bed for both operational and developmental injection and integration of real-time J-FFT information into the Common Operating Picture (COP) for Combatant Commanders (COCOMs), Joint Task Forces (JTFs), and Coalition Partners. The MMC injects real-time J-FFT information into the COP for COCOMs, JTFs and Coalition partners. USSTRATCOM, in accordance with CJCSI 3910.01 (reference V.4.) is designated one of three coordinating agencies for J-FFT within DoD. CJCSI 3910.01 directs eight Force Modernization tasks to USSTRATCOM. USSTRATCOM SI 534-5 (reference V.6.) and annually published USSTRATCOM operations orders have designated USASMDC/ARSTRAT as the lead USSTRATCOM component command for Friendly Force Tracking (FFT).

Project FE6: Details of this program are reported in accordance with Title 10, United States Code, Section 119 (a)(1).

B. Program Change Summary (\$ in Millions)	<u>FY 2018</u>	<u>FY 2019</u>	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	20.432	38.319	22.277	-	22.277
Current President's Budget	30.121	38.307	104.996	-	104.996
Total Adjustments	9.689	-0.012	82.719	-	82.719
<ul> <li>Congressional General Reductions</li> </ul>	-0.006	-0.012			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	10.000	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
<ul> <li>Reprogrammings</li> </ul>	-	-			
SBIR/STTR Transfer	-0.305	-			
<ul> <li>Adjustments to Budget Years</li> </ul>	-	-	82.719	-	82.719
PE 1206308A: Army Space Systems Integration	UNC	CLASSIFIED			
Army	P	Page 1 of 15	R-1 Lir	ne #108	690

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 I BA 4: Advanced	PE 1206308A / Army Space Systems Integration	
Component Development & Prototypes (ACD&P)		

### Change Summary Explanation

FY 2020 funding increase supports the Low Earth Orbit strategy as well as efforts to address Narrowband Consolidated SATCOM System Expert (C-SSE) enterprise level capability to monitor, detect, and assess UHF SATCOM interference.

Exhibit R-2A, RDT&E Project Ju		Date: Marc	h 2019									
Appropriation/Budget Activity 2040 / 4		R-1 Progra PE 120630 Integration	am Elemen 98A / Army S	<b>t (Number</b> /I Space Syste	<b>lumber/Name)</b> ce And Missile Defense า							
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
FE5: Space And Missile Defense Integration	-	15.655	17.213	104.996	-	104.996	23.168	18.653	17.373	18.396	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

#### A. Mission Description and Budget Item Justification

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

Project FE5 funds USASMDC/ARSTRAT efforts to develop, analyze and mature warfighting concepts, and conduct warfighting experiments for space and high altitude capabilities. USASMDC/ARSTRAT is the proponent for space/high altitude capabilities and is responsible for determining and integrating DOTMLPF-P for the Army. The program also funds development and integration of new data sources and services into the JFFT Mission Management Center (MMC), providing users FFT information system services at the highest Mission Assurance Category level (MAC 1). Software products developed and deployed by the JFFT Testbed into the MMC enable the receipt, integration and dissemination of real-time FFT information to the Common Operating Picture (COP) displays for Combatant Commanders, Joint Task Forces and coalition partners. JFFT Subject Matter Expert support to critical FFT interoperability assessments and development activities with coalition partners are supporting DOD's priority of strong alliances and partnerships. Integrated FFT data solutions developed by JFFT Testbed enable FFT data for COP display and Situational Awareness between Army forces and Unified Action Partners. The JFFT Testbed will continues to leverage FFT systems expertise and reduce Department of Defense costs by supporting numerous efforts, including the joint Personnel Recovery community response to a Joint Urgent Operational Needs Statement to resolve critical issues in isolated persons reporting and locating.

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020
Title: Architecture Development, Wargames and Demonstrations	12.705	10.440	9.535

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: N	larch 2019		
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	Project FE5 / J Integra	c <b>t (Number/I</b> Space And N ation	<b>lame)</b> Iissile Defens	se
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020
<b>Description:</b> Funding is provided for planning, developing, and executing arch Army integration of space systems, space control capabilities, missile defense,	itectures and combat development solutions f and high altitude systems.	for			
<b>FY 2019 Plans:</b> Plan, develop, and execute architectures and combat development solutions for capabilities, and high altitude systems. As the Army Executive Agent for Space and defend Army equities relative to space and high altitude domains in Joint/E wargames to evaluate emerging concepts within the space and high altitude do to Army and Joint wargames and experiments where space and high altitude cerevaluated in the most realistic operating environment possible. Ensure that spation of the exploited. Develop space modernization strategies and sponsor exploration of USASMDC/ARSTRAT Future Warfare Center (FWC) will continue efforts to enspace-based assets and JCIDS capability development activities for space supsatellites and tactical launch systems. Will develop Space and High Altitude JC Documents (ICD) or Capability Development Documents (CDD), and Capability Operational Requirements Documents (ORD). Develop a space superiority Cato develop the JCIDS documentation required to Integrate space and high altitude JC (MDTF).	or Army integration of space systems, space of e Program Assessments, represent Army pos DoD and inter-Service forums. Plan and exec- omains as well as participate and provide sup apabilities and technologies can be integrated ace, high altitude and cyber capability gaps and hese capabilities is explored and where possib future space and high altitude warfighting com hance the resiliency and effectiveness of critic periority, high altitude persistent platforms, nar CIDS documents including Initial Capabilities y Production Documents (CPD) to update sys apability Production Document (CPD) and com ude capabilities into Multi-Domain Task Force	control itions ute port d and re ole, ncepts. cal no- stem atinue			
<b>FY 2020 Plans:</b> Expand upon FY19 developments to plan, develop, and execute architectures a integration of space systems, space control capabilities, and high altitude system Program Assessments, represent Army positions and defend Army equities related by and inter-Service forums. Plan and execute wargames to evaluate emergined domains as well as participate and provide support to Army and Joint wargame capabilities and technologies can be integrated and evaluated in the most realise space, high altitude and cyber capability gaps are identified and capabilities are these capabilities is explored and where possible, exploited. Develop space most future space and high altitude warfighting concepts. USASMDC/ARSTRAT F to enhance the resiliency and effectiveness of critical space-based assets and superiority, high altitude persistent platforms, nano-satellites and tactical launch JCIDS documents including Initial Capabilities Documents or Capability Develop Documents (CPD) to update system Operational Requirements Documents. D	and combat development solutions for Army ems. As the Army Executive Agent for Space ative to space and high altitude domains in Jo ing concepts within the space and high altitud es and experiments where space and high altitud stic operating environment possible. Ensure e correctly represented so that the Army's use odernization strategies and sponsor exploration Future Warfare Center (FWC) will continue eff JCIDS capability development activities for sp h systems. Will develop Space and High Altitu- opment Documents, and Capability Production bevelop a space superiority CPD and continue	pint/ le thude that e of on forts pace ude n e to			

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019						
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	<b>Project</b> FE5 / Sp Integrati	<b>ct (Number/Name)</b> Space And Missile Defense ration			
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020	
develop the JCIDS documentation required to Integrate space and high altitude USASMDC/ARSTRAT Future Warfare Center will execute these funds in FY20	e capabilities into Multi-Domain Task Force (M 20.	DTF).				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY2019 to FY2020 decrease attributed to economic factors and to support the National Defense Strategy.	Army's modernization priorities in support of th	e				
Title: Joint Friendly Force Tracking (J-FFT) Testbed			2.950	2.526	2.225	
<b>Description:</b> Funding is provided for integration of the Joint Friendly Force Tra friendly force tracking requirements, developing the J-FFT Testbed, leveraging enhancements, and continuing to support development of FFT capabilities for o	cking (J-FFT) into Combat Commanders' network enabled command and control syster deployed and coalition forces	n				
<b>FY 2019 Plans:</b> Support the full integration of Joint Friendly Force Tracking (J-FFT) into Combarrequirements. Continue to develop the J-FFT Testbed for its use in integrating I to the field. Leverage network enabled command and control system enhancements Friendly Force Tracking (FFT) capabilities for deployed and coalition forces. Compandement System (FTAMS) to FFT-Mission Management Center (MMC). The USSTRATCOM-directed FFT tasks in order to assure continuous 24/7 FFT date the Combatant Commands, the Services, agencies, allies, and coalition partner (SA), enhance command and control (C2) to reduce fratricide in combat, home I Gain Army approval of a Joint Capabilities Integration and Development System	t Commanders' friendly force tracking hardware and software prior to its deployment nents and continue to support development of ontinue to transition Force Tracking Advanced he J-FFT Division coordinates and executes a services support to authorized users to inclu rs in order to improve their situational awarene land defense, civil and contingency operations m (JCIDS) document for JFFT.	de ss				
<b>FY 2020 Plans:</b> The JFFT Testbed will provide agile capabilities development and integrated so interoperable force tracking data exchange and satisfy joint, agency and coalitie Operational Picture (COP) displays and decision making. JFFT development we use by enabling the number of device types supported by the MMC and increase operational deployment to the Joint Force Tracking Mission MMC?s 24/7 data is and deliver new capabilities including command and control messaging, new dat message standard for FFT. Also planned is the re-design and implementation of product, fulfilling requirements for added functionality in data visualization and r and provide mission owners with approved infrastructures (classified and unclair reduce costs. JFFT Testbed will remain a key contributor to support North Atlantice in the statement of the	plutions to validated requirements that enable on warfighting needs for timely, accurate Com ill continue to respond to the growth in FFT de sed data architectures, expanding user groups services, the JFFT Testbed is scheduled to de ata sources and devices, and the ratified NATC of needed upgrades to the Force Tracking Wet management. JFFT will continue to exploit, exp ssified) that achieve improved performance ar ntic Treaty Organization Capability Team activity	mon vice . For velop D D D D D D D D d ties				

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019		
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	Project (N FE5 / Spac Integration	Number/Name) ace And Missile Defense n		
B. Accomplishments/Planned Programs (\$ in Millions)		FY	2018	FY 2019	FY 2020
and other coalition assessments and exercises that advance US and coalition Warfare Center will execute these funds in FY2020.	FFT interoperability. USASMDC/ARSTRAT Fu	iture			
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY2019 to FY2020 decrease attributed to economic factors and to support the National Defense Strategy.	Army's modernization priorities in support of the	ne			
Title: Organizationational Development as Part of the SRC40 Proponecy Missi	ion		-	1.450	1.050
<b>Description:</b> Continue participation in the Force Design Update (FDU) process (O&O) Concept Papers, Organization Design Papers, Cost Benefit Analyses, U Requirements Criteria (MARC) determination.	s. Development of Operational & Organization Jnit Reference Sheets (URS), and Manpower	al			
<b>FY 2019 Plans:</b> Participate in the Force Design Update (FDU) process. FWC will participate in the recurring process used to gain HQDA approval of organizational structure changes and designs through the FDU and FDU Jr. processes. This includes the development of Operational & Organizational (0&O) Concept Papers, Organization Design Papers, Cost Benefit Analyses, Unit Reference Sheets (URS), and Manpower Requirements Criteria (MARC) determination. Participate in the Total Army Analysis (TAA), the Army's annual process to examine the projected Army force qualitatively and quantitatively. SMDC/ARSTRAT will support TAA Rule of Allocation (ROA) development, Capability Demand Analysis (CDA) and Resourcing phases to ensure SRC40 units are properly accounted for in the future POM force. This is performed to analyze the projected Army Force against future demands and levels of funding/authorizations to build the POM Force. SMDC/ARSTRAT FWC will review the SMDC Troops, Organization and Equipment (TOE) requirements documents conducted as part of a cyclic process as well as when needed during other Force Design processes (i.e., Basis of Issue Plan (BOIP) Modernization Path (MODPATH) reviews, Notification of Change (NOFC) reviews, SSN-LIN Automated Management and Integrating System (SLAMIS) reviews, etc.). Participate in BOIP Development, which is a collection of processes including the cyclic review of Army-wide BOIPs under development, development of Feeder Data for SMDC proponent item BOIPs, and validation of BOIP MODPATHs to SMDC TOEs. Complete the Space Forces Force Structure Review (FSR) which is a CBA-like structure d three-phased process consisting of a Needs Analysis (NA), Gap Analysis (GA), and Solutions Analysis (SA) to identify and document organizational based capability needs and gaps, develop a prioritized list of those gaps, and identify potential materiel and/or non-materiel solutions. <b>FY 2020 Plans:</b> Continue to participate in the Force Design Update (FDU) process. The U.S. Army Space and Missile Defense					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army Date: March 2019						
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	Project FE5 / J Integra	o <b>ject (Number/Name)</b> 5 I Space And Missile Defense egration			
B. Accomplishments/Planned Programs (\$ in Millions)		Γ	FY 2018	FY 2019	FY 2020	
Unit Reference Sheets, and Manpower Requirements Criteria determination. Participate in the Total Army Analysis (TAA), the Army's annual process to examine the projected Army force qualitatively and quantitatively. USASMDC/ARSTRAT will support TAA Rule of Allocation development, Capability Demand Analysis and Resourcing phases to ensure SRC40 units are properly accounted for in the future Program Objectives Memorandum (POM) Force. This is performed to analyze the projected Army Force against future demands and levels of funding/authorizations to build the POM Force. USASMDC/ARSTRAT FWC will review the USASMDC/ARSTRAT Troops, Organization and Equipment (TOE) requirements documents conducted as part of a cyclic process as well when needed during other Force Design processes (i.eBasis of Issue Plan (BOIP) Modernization Path (MODPATH) reviews, Notification of Change reviews, SSN-LIN Automated Management and Integrating System (SLAMIS) reviews, etc.). Participate in BOIP Development. BOIP Development is collection of processes including the cyclic review of Army-wide BOIPs under development, development of Feeder Data for USASMDC/ARSTRAT proponent item BOIPs, and validation of BOIP MODPATHs to USASMDC/ARSTRAT TOEs. Complete the Space Forces Force Structure Review which is a Cost-Benefit Analysis-like structured three-phased process consisting of a Needs Analysis, Gap Analysis, and Solutions Analysis to identify and document organizational based capability needs and gaps, develop a prioritized list of those gaps, and identify potential materiel and/or non-materiel solutions. USASMDC/ARSTRAT Future Warfare Center will execute these funds in FY2020.		e rt ly a n s a ysis 2020.				
FY 2019 to FY 2020 Increase/Decrease Statement: FY2019 to FY2020 decrease attributed to economic factors and to support the National Defense Strategy.	Army's modernization priorities in support of th	ie				
<i>Title:</i> Position, Navigation, and Timing Navigation Warfare (PNT/NAVWAR)			-	2.410	1.810	
<b>Description:</b> Identifying and advocating for positioning, navigation, and timing requirements through CDR USSTRATCOM to the joint staff to establish and for Capabilities Integration and Development System (JCIDS) process. Continuing emerging requirements through Commander, U.S. Strategic Command to the joint requirements, in the JCIDS process. Supporting the Army Assured Positioning Team by conducting required capability analysis and developing JCIDS docum Situational Awareness. USASMDC/ARSTRAT Future Warfare Center will exect	(PNT) and Navigation Warfare (NAVWAR) rmalize joint NAVWAR requirements, in the Jo to identify and advocate for PNT and NAVWA point staff to establish and formalize joint NAVW Navigation and Timing (APNT) Cross Functior ents for APNT Enabling systems and APNT cute these funds in FY2020.	int R /AR nal				
<b>FY 2019 Plans:</b> Identify and advocate for positioning, navigation, and timing (PNT) and Navigat USSTRATCOM to the joint staff to establish and formalize joint NAVWAR require Development System (JCIDS) process. <b>FY 2020 Plans:</b>	ion Warfare (NAVWAR) requirements through irements, in the Joint Capabilities Integration a	CDR nd				
Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: N	larch 2019		
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Appropriation/Budget Activity 2040 / 4	<b>Project (</b> FE5 / Sp Integratic	e <b>ct (Number/Name)</b> I Space And Missile Defense gration				
B. Accomplishments/Planned Programs (\$ in Millions)		F	Y 2018	FY 2019	FY 2020	
Based on the results of our efforts in 2019 the Future Warfare Center will cor emerging requirements through Commander, U.S. Strategic Command to the requirements, in the JCIDS process. Support the Army Assured Positioning I Team by conducting required capability analysis and developing JCIDS docu Situational Awareness.	ntinue to identify and advocate for PNT and NAV e joint staff to establish and formalize joint NAVV Navigation and Timing (APNT) Cross Functional uments for APNT Enabling systems and APNT	WAR /AR				
<b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> FY2019 to FY2020 decrease attributed to economic factors and to support the National Defense Strategy.	ne Army's modernization priorities in support of the	e				
Title: Narrowband C-SSE enterprise level capability to monitor, detect, and a	assess UHF SATCOM interference		-	-	11.600	
<b>Description:</b> Developing and deploying Narrowband Consolidated SATCOM allow the U.S. Army to fight SATCOM. The USASMDC/ARSTRAT NB C-SS interference (EMI) mission in support of CCMDs, Services, Agencies, and W provide NB EMI management and Space Situation Awareness. Once fully de plan, this will improve the joint commander's ability to "fight SATCOM" in a commander.	ll iic are to iment					
<i>FY 2020 Plans:</i> Fully develop and deploy Narrowband C-SSE SATCOM Tools that will allow ARSTRAT NB C-SSE Division executes the SATCOM electromagnetic interf Agencies, and Warfighters. Two critical elements of that support are to provide Awareness. Once fully developed and operational, coupled with a sustaining to "fight SATCOM" in a contested environment. USASMDC/ARSTRAT will environment.	the U.S. Army to fight SATCOM. The USASME ference (EMI) mission in support of CCMDs, Ser ide NB EMI management and Space Situation ent plan, this will improve the joint commander's execute these funds in FY2020.	C/ vices, ability				
FY 2019 to FY 2020 Increase/Decrease Statement: The increase from FY2019 to FY 2020 is the result of the Narrowband C-SSI	E SATCOM requirement					
Title: Low Earth Orbit Strategy		-	-	78.776		
Description: New Classified effort Low Earth Orbit.						
<i>FY 2020 Plans:</i> Low Earth Orbit Strategy						
FY 2019 to FY 2020 Increase/Decrease Statement: New effort Low Earth Orbit.						
<i>Title:</i> FY2019 SBIR/STTR Transfer			-	0.387	-	

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: M	arch 2019				
Appropriation/Budget Activity 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 1206308A <i>I Army Space Systems</i> <i>Integration</i>	Project FE5 / Sµ Integrati	P <b>roject (Number/Name)</b> E5 I Space And Missile Defense Integration					
B. Accomplishments/Planned Programs (\$ in Millions)			FY 2018	FY 2019	FY 2020			
Description: FY2019 SBIR/STTR adjustment.								
<i>FY 2019 Plans:</i> FY2019 SBIR/STTR Transfer								
FY 2019 to FY 2020 Increase/Decrease Statement: N/A								
	Accomplishments/Planned Programs Sub	totals	15.655	17.213	104.996			
C. Other Program Funding Summary (\$ in Millions) N/A Remarks N/A D. Acquisition Strategy N/A E. Performance Metrics N/A								

Exhibit R-3, RDT&E F	Project C	ost Analysis: PB 2	020 Arm	У								Date:	March 20	19	
Appropriation/Budge 2040 / 4		R-1 Program Element (Number/Name)Project (Number/Name)PE 1206308A / Army Space SystemsFE5 / Space And Missile DefenseIntegrationIntegration													
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2	2020 CO	FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Personnel and operations support.	TBD	SMDC/ARSTRAT Huntsville, AL and Colorado Springs : SMDC/ARSTRAT Huntsville, AL and Colorado Springs	-	-		16.826		7.726		-		7.726	0.000	24.552	-
FY2019 SBIR/STTR Transfer	TBD	TBD : TBD	-	-		0.387		-		-		-	0.000	0.387	-
		Subtotal	-	-		17.213		7.726		-		7.726	0.000	24.939	N/A
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
Contracts for Experiments & technology enhancements of prototypes/tools and analysis	Various	SMDC/ARSTRAT Huntsville, AL and Colorado Springs : SMDC/ARSTRAT Huntsville, AL and Colorado Springs	-	15.655		-		18.494		-		18.494	0.000	34.149	-
Low Earth Orbit	TBD	TBD : TBD	-	-		-		78.776		-		78.776	0.000	78.776	-
		Subtotal	-	15.655		-		97.270		-		97.270	0.000	112.925	N/A
			Prior Years	FY 2	2018	FY 2	019	FY 2 Ba	2020 se	FY 2	2020 CO	FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
		Project Cost Totals	-	15.655		17.213		104.996		-		104.996	0.000	137.864	N/A
Remarks															

Exhibit R-4, RDT&E Schedule Profile: PB 2020 A	Date: March 2019								
Appropriation/Budget Activity 2040 / 4		R-1 F PE 12 Integ	Program Elemer 206308A / Army vration	nt (Number/Name Space Systems	<b>Number/Name)</b> ace And Missile Defense n				
Event Name	FY 2018	FY 20	19	FY 2020	FY 2021	I	TY 2022	FY 2023	FY 2024
Development of SMDC MMC Force Tracking	I Z J 4	<u> </u>	4	I Z J 4	I Z J 4	•	2 J 4		I Z J 4
Jericho Thunder Analysis Support									
SMDC NanoSat Analysis (SNAP, KE)									
Space Superiority Joint Architecture Analysis									
Force Design Assessment of Army Forces									
NAVWAR/PNT Gap Analysis and Advocacy									
Implications of the Emerging "Third" Offset Strategy for SMDC S	pace								
Space Simulation Support to TRADOC ARCIC Experimentation									
Common Ground Station Operating Concept and Requirement I	Document								
NAVWAR Defense/Attack Operating Concepts and Requirement									
Army Enduring JFFT Development									
High Altitude Persistent Platform Capability Development Docu									
NAVWAR/PNT in Denied Environment									
				1	1			1	1

xhibit R-4, RDT&E Schedule Profile: PB 2020 Army       Date: March 201											
Appropriation/Budget Activity 2040 / 4		R-1 Program Element (Number/Name) PE 1206308A / Army Space Systems IntegrationProject (Number/Name) FE5 / Space And Missile Defense 								efense	
Event Name	FY 2018	FY 20	019	F	Y 2020	FY 2021		FY 2022	F	Y 2023	FY 2024
Space Superiority Capability Development	1 Z 3 4	1   2   .	3 4	1 2	3   4	1   2   3   4	1	2   3   4		2   3   4	1 2 3 4
Counter ISR Capability Development											
Space Operations Multi-Domain Environment Analysis											
ICEWS Study											
High Altitude Impacts on Ground Effectiveness Study											
NAVWAR Characterization Study											
NAVWAR Attack Study											
Psuedolite Performance Analysis											
APNT CFT Analysis Support											
Joint Space Warfighting Forum (JSWF) Analysis Support											
Support of the APN/CFT											
						1	I		1		1

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army		Date: March 2019					
Appropriation/Budget Activity F 2040 / 4 F //	R-1 Program Element (Numbe PE 1206308A / Army Space System Integration	r <b>/Name)</b> stems	<b>Project (Number/Name)</b> FE5 I Space And Missile Defense Integration				
Sche	dule Details						
	St	art	E	nd			
Events	Quarter	Year	Quarter	Year			
Development of SMDC MMC Force Tracking	1	2018	4	2023			
Jericho Thunder Analysis Support	1	2019	4	2024			
SMDC NanoSat Analysis (SNAP, KE)	1	2019	4	2024			
Space Superiority Joint Architecture Analysis	1	2018	4	2023			
Force Design Assessment of Army Forces	1	2019	4	2022			
NAVWAR/PNT Gap Analysis and Advocacy	1	2018	4	2024			
Implications of the Emerging "Third" Offset Strategy for SMDC Space	1	2019	2	2019			
Space Simulation Support to TRADOC ARCIC Experimentation	1	2018	4	2023			
Common Ground Station Operating Concept and Requirement Document	1	2019	3	2019			
NAVWAR Defense/Attack Operating Concepts and Requirements Documen	tation 1	2018	4	2023			
Army Enduring JFFT Development	1	2018	4	2023			
High Altitude Persistent Platform Capability Development Document	1	2018	4	2023			
NAVWAR/PNT in Denied Environment	1	2019	2	2020			
Space Superiority Capability Development	1	2018	4	2023			
Counter ISR Capability Development	3	2017	4	2023			
Space Operations Multi-Domain Environment Analysis	4	2017	4	2023			
ICEWS Study	4	2018	4	2019			
High Altitude Impacts on Ground Effectiveness Study	4	2018	4	2019			
NAVWAR Characterization Study	4	2018	4	2019			
NAVWAR Attack Study	4	2019	4	2020			
Psuedolite Performance Analysis	2	2019	1	2020			
APNT CFT Analysis Support	3	2018	4	2024			

Exh	ibit R-4A, RDT&E Schedule Details: PB 2020 Army				Da	<b>ate:</b> March	n 2019	
<b>App</b> 204	oropriation/Budget Activity 0 / 4	I Element (Number/Name)Project (Number/Name)A I Army Space SystemsFE5 I Space And Missile DefenseIntegration						
			Sta	art		En	d	
	Events		Quarter	Year	Qua	arter	Year	
	Joint Space Warfighting Forum (JSWF) Analysis Support		1	2018	4	4	2024	
	Support of the APN/CFT		1	2018	4	4	2024	

Exhibit R-2A, RDT&E Project Ju	stification	: PB 2020 A	rmy							Date: Marc	h 2019	
Appropriation/Budget ActivityR-1 P2040 / 4PE 12Integr					R-1 Program Element (Number/Name)Project (Number/Name)PE 1206308A I Army Space SystemsFE6 I Army Space System EnhancementIntegrationIntegration							cement/
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
FE6: Army Space System Enhancement/Integration	-	14.466	21.094	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	35.560
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

### A. Mission Description and Budget Item Justification

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