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

March 2019



Army

*Justification Book of*  
***Research, Development, Test & Evaluation, Army***  
**RDT&E – Volume II, Budget Activity 5A**

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Army • Budget Estimates FY 2020 • RDT&E Program

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**RESEARCH, DEVELOPMENT, TEST AND EVALUATION, ARMY**  
**APPROPRIATION LANGUAGE**

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

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

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

**COST STATEMENT**

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

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

1. **General.** The purpose of this document is to provide summary information concerning the Research, Development, Test and Evaluation, Army program. The descriptive summaries are comprised of R-2 (Army RDT&E Budget Item Justification – program element level), R-2A (Army RDT&E Budget Item Justification – project level), R-3 (Army RDT&E Cost Analysis), R-4 (Schedule Profile Detail) and R-5 (Termination Liability Funding for MDAPs) Exhibits, which provide narrative information on all RDT&E program elements and projects through FY 2020.
2. **Relationship of the FY 2020 Budget Submitted to Congress to the FY 2019 Budget Submitted to Congress.** This paragraph provides a list of program elements/projects that are major new starts, restructures, developmental transitions, and terminated programs. Explanations for these changes can be found in the narrative sections of the Program Element R-2A Exhibits.

**New Start Programs:**

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

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

### **Program Element/Project Restructures:**

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

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

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

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|----|--|---|
| 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  |

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|----|--|---|
| 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  |

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|----|--|---|
| 03 | 0603313A / 263: Future MsI 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><u>Budget Activity</u></b> | <b><u>OSDPE / Project</u></b> | <b><u>OSDPE Title / Project Title</u></b>   |
|-------------------------------|-------------------------------|---|
| 01                            | 0601103A / V72                | University Research Initiatives / Minerva   |
| 01                            | 0601104A / H09                | University and Industry Research Centers / Robotics CTA   |
| 01                            | 0601104A / H50                | University and Industry Research Centers / Network Sciences Cta   |
| 02                            | 0602105A / H7G                | Materials Technology / Nanomaterials Applied Research   |
| 02                            | 0602120A / SA2                | Sensors and Electronic Survivability / Biotechnology Applied Research                                   |
| 02                            | 0602624A / H19                | Weapons and Munitions Technology / Asymmetric & Counter Measure Technologies                            |
| 02                            | 0602705A / H17                | Electronics and Electronic Devices / Flexible Display Center  |
| 02                            | 0602720A / 895                | Environmental Quality Technology / Pollution Prevention   |
| 02                            | 0602786A / 283                | Warfighter Technology / Airdrop Adv Tech  |
| 02                            | 0602786A / VT4                | Warfighter Technology / Expeditionary Mobile Base Camp Technology                                       |
| 03                            | 0603001A / 543                | Warfighter Advanced Technology / Ammunition Logistics   |
| 03                            | 0603001A / VT5                | Warfighter Advanced Technology / Expeditionary Mobile Base Camp Demonstration                           |
| 03                            | 0603002A / ET5                | Medical Advanced Technology / Adv Tech Dev in Clinical & Rehabilitative Medicine                        |
| 03                            | 0603728A / 025                | Environmental Quality Technology Demonstrations / Pollution Prevention Technology                       |
| 04                            | 0603619A / 606                | Landmine Warfare and Barrier - Adv Dev / Cntrmn/Barrier Adv Dev   |
| 04                            | 0603639A / EL8                | Tank and Medium Caliber Ammunition / LIGHTWEIGHT CARTRIDGE CASE FOR SMALL CALIBER                       |
| 04                            | 0603804A / EW8                | Logistics and Engineer Equipment - Adv Dev / Armored Engineer Vehicles                                  |
| 04                            | 0603804A / K39                | Logistics and Engineer Equipment - Adv Dev / Field Sustainment Support Ad                               |
| 04                            | 0603804A / K41                | Logistics and Engineer Equipment - Adv Dev / Water And Petroleum Distribution - Ad                      |
| 04                            | 0603804A / VR8                | Logistics and Engineer Equipment - Adv Dev / Combat Service Support Systems - Ad                        |
| 04                            | 0604020A / CF1                | Cross Functional Team (CFT) Advanced Development & Prototyping / CFT Advanced Development & Prototyping |
| 04                            | 0604115A / DS3                | Technology Maturation Initiatives / Technology Maturation Initiatives                                   |
| 04                            | 1206308A / FE6                | Army Space Systems Integration / Army Space System Enhancement/Integration                              |
| 05                            | 0210609A / ED8                | Paladin Integrated Management (PIM) / Paladin Integrated Management (PIM)                               |
| 05                            | 0604321A / B41                | All Source Analysis System / CI/HUMINT Software Products (MIP)  |
| 05                            | 0604321A / B51                | All Source Analysis System / Machine - Foreign Language Translation System                              |
| 05                            | 0604601A / S62                | Infantry Support Weapons / Counter-Defilade Target Engagement - SDD                                     |

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

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

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



## UNCLASSIFIED

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

12 Feb 2019

| Appropriation                                  | FY 2018<br>(Base + OCO) | FY 2019<br>Base Enacted | FY 2019<br>OCO Enacted | FY 2019<br>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               |

## UNCLASSIFIED

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

12 Feb 2019

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

## UNCLASSIFIED

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

12 Feb 2019

| Summary Recap of Budget Activities             | FY 2018<br>(Base + OCO) | FY 2019<br>Base Enacted | FY 2019<br>OCO Enacted | FY 2019<br>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               |

## UNCLASSIFIED

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

12 Feb 2019

| Summary Recap of Budget Activities             | FY 2020<br>Base | FY 2020<br>OCO for Base<br>Requirements | FY 2020<br>OCO for<br>Direct War<br>and Enduring<br>Costs | FY 2020<br>Total<br>OCO | FY 2020<br>Total<br>(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                       |

## UNCLASSIFIED

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

12 Feb 2019

| Summary Recap of Budget Activities             | FY 2018<br>(Base + OCO) | FY 2019<br>Base Enacted | FY 2019<br>OCO Enacted | FY 2019<br>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               |
| <hr/>  |                         |                         |                        |                          |
| 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               |

## UNCLASSIFIED

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

12 Feb 2019

| Summary Recap of Budget Activities             | FY 2020<br>Base | FY 2020<br>OCO for Base<br>Requirements | FY 2020<br>OCO for<br>Direct War<br>and Enduring<br>Costs | FY 2020<br>Total<br>OCO | FY 2020<br>Total<br>(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)

12 Feb 2019

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

| Program Line Element No | Item                                      | Act | FY 2018      | FY 2019      | FY 2019     | FY 2019       | S      |
|-------------------------|---|-----|--------------|--------------|-------------|---------------|--------|
|                         |   |     | (Base + OCO) | Base Enacted | OCO Enacted | Total Enacted | e<br>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      |
|                         | Basic Research                            |     | 464,187      | 506,444      |             | 506,444       |        |
| 6 0602105A              | Materials Technology                      | 02  | 73,136       | 83,586       |             | 83,586        | U      |
| 7 0602120A              | Sensors and Electronic Survivability      | 02  | 83,581       | 80,849       |             | 80,849        | U      |
| 8 0602122A              | TRACTOR HIP                               | 02  | 8,627        | 8,674        |             | 8,674         | U      |
| 9 0602126A              | TRACTOR JACK                              | 02  |              | 400          |             | 400           | U      |
| 10 0602141A             | Lethality Technology                      | 02  |              |              |             |               | U      |
| 11 0602142A             | Army Applied Research                     | 02  |              |              |             |               | U      |
| 12 0602143A             | Soldier Lethality Technology              | 02  |              |              |             |               | U      |
| 13 0602144A             | Ground Technology                         | 02  |              |              |             |               | U      |
| 14 0602145A             | Next Generation Combat Vehicle Technology | 02  |              |              |             |               | U      |
| 15 0602146A             | Network C3I Technology                    | 02  |              |              |             |               | U      |
| 16 0602147A             | Long Range Precision Fires Technology     | 02  |              |              |             |               | U      |
| 17 0602148A             | Future Vertical 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)

12 Feb 2019

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

| Program Line Element No Number | Item                                      | Act | FY 2020 Base | FY 2020 OCO for Base Requirements | FY 2020 Direct War and Enduring Costs | FY 2020 Total OCO | FY 2020 Total (Base + OCO) | S e c |
|--------------------------------|---|-----|--------------|-----------------------------------|---------------------------------------|-------------------|----------------------------|-------|
| 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  |              |                                   |                                       |                   |                            | U     |
| 7 0602120A                     | Sensors and Electronic Survivability      | 02  |              |                                   |                                       |                   |                            | U     |
| 8 0602122A                     | TRACTOR HIP                               | 02  |              |                                   |                                       |                   |                            | U     |
| 9 0602126A                     | TRACTOR JACK                              | 02  |              |                                   |                                       |                   |                            | U     |
| 10 0602141A                    | Lethality Technology                      | 02  | 26,961       |                                   |                                       |                   | 26,961                     | U     |
| 11 0602142A                    | Army Applied Research                     | 02  | 25,319       |                                   |                                       |                   | 25,319                     | U     |
| 12 0602143A                    | Soldier Lethality Technology              | 02  | 115,274      |                                   |                                       |                   | 115,274                    | U     |
| 13 0602144A                    | Ground Technology                         | 02  | 35,199       |                                   |                                       |                   | 35,199                     | U     |
| 14 0602145A                    | Next Generation Combat Vehicle Technology | 02  | 219,047      |                                   |                                       |                   | 219,047                    | U     |
| 15 0602146A                    | Network C3I Technology                    | 02  | 114,516      |                                   |                                       |                   | 114,516                    | U     |
| 16 0602147A                    | Long Range Precision Fires Technology     | 02  | 74,327       |                                   |                                       |                   | 74,327                     | U     |
| 17 0602148A                    | Future Verticle Lift Technology           | 02  | 93,601       |                                   |                                       |                   | 93,601                     | U     |

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

12 Feb 2019

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

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

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## UNCLASSIFIED

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

12 Feb 2019

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

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

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

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

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| Program Line Element No | 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  |              |                                   |   |                   |                            | U     |
| 40 0602787A             | Medical Technology                                   | 02  | 99,155       |                                   |   |                   | 99,155                     | U     |
|                         | Applied Research                                     |     | 893,990      |                                   |   |                   | 893,990                    |       |
| 41 0603001A             | Warfighter Advanced Technology                       | 03  |              |                                   |   |                   |                            | U     |
| 42 0603002A             | Medical Advanced Technology                          | 03  | 42,030       |                                   |   |                   | 42,030                     | U     |
| 43 0603003A             | Aviation Advanced Technology                         | 03  |              |                                   |   |                   |                            | U     |
| 44 0603004A             | Weapons and Munitions Advanced Technology            | 03  |              |                                   |   |                   |                            | U     |
| 45 0603005A             | Combat Vehicle and Automotive Advanced Technology    | 03  |              |                                   |   |                   |                            | U     |
| 46 0603006A             | Space Application Advanced Technology                | 03  |              |                                   |   |                   |                            | U     |
| 47 0603007A             | Manpower, Personnel and Training Advanced Technology | 03  | 11,038       |                                   |   |                   | 11,038                     | U     |
| 48 0603009A             | TRACTOR HIKE   | 03  |              |                                   |   |                   |                            | U     |
| 49 0603015A             | Next Generation Training & Simulation Systems        | 03  |              |                                   |   |                   |                            | U     |
| 50 0603117A             | Army Advanced Technology Development                 | 03  | 63,338       |                                   |   |                   | 63,338                     | U     |
| 51 0603118A             | Soldier Lethality Advanced Technology                | 03  | 118,468      |                                   |   |                   | 118,468                    | U     |
| 52 0603119A             | Ground Advanced Technology                           | 03  | 12,593       |                                   |   |                   | 12,593                     | U     |

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

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|-------------------------|--|-----|--------------|------------------------------|-------------------------------|-------------------|----------------------------|-------|
| 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            | 13,769                     | U     |
| 60 0603461A             | High Performance Computing Modernization Program   | 03  | 184,755      |                              |                               | 184,755           | 184,755                    | U     |
| 61 0603462A             | Next Generation Combat Vehicle Advanced Technology | 03  | 160,035      |                              |                               | 160,035           | 160,035                    | U     |
| 62 0603463A             | Network C3I Advanced Technology                    | 03  | 106,899      |                              |                               | 106,899           | 106,899                    | U     |
| 63 0603464A             | Long Range Precision Fires Advanced Technology     | 03  | 174,386      |                              |                               | 174,386           | 174,386                    | U     |
| 64 0603465A             | Future Vertical Lift Advanced Technology           | 03  | 151,640      |                              |                               | 151,640           | 151,640                    | U     |
| 65 0603466A             | Air and Missile Defense Advanced Technology        | 03  | 60,613       |                              |                               | 60,613            | 60,613                     | U     |
| 66 0603606A             | Landmine Warfare and Barrier Advanced Technology   | 03  |              |                              |                               |                   |                            | U     |
| 67 0603607A             | Joint Service Small Arms Program                   | 03  |              |                              |                               |                   |                            | U     |
| 68 0603710A             | Night Vision Advanced Technology                   | 03  |              |                              |                               |                   |                            | U     |

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|-------------------------|--|-----|-------------------------|-------------------------|------------------------|--------------------------|-------|
| 69 0603728A             | Environmental Quality Technology Demonstrations          | 03  | 29,150                  | 29,132                  |                        | 29,132                   | U     |
| 70 0603734A             | Military Engineering Advanced Technology                 | 03  | 96,586                  | 101,438                 |                        | 101,438                  | U     |
| 71 0603772A             | Advanced Tactical Computer Science and Sensor Technology | 03  | 50,637                  | 43,856                  |                        | 43,856                   | U     |
| 72 0603794A             | C3 Advanced Technology                                   | 03  | 32,404                  | 52,332                  |                        | 52,332                   | U     |
|                         | Advanced Technology Development                          |     | 1,503,959               | 1,585,778               |                        | 1,585,778                |       |
| 73 0603305A             | Army Missile Defense Systems Integration                 | 04  | 23,558                  | 60,472                  |                        | 60,472                   | U     |
| 74 0603327A             | Air and Missile Defense Systems Engineering              | 04  | 58,812                  | 45,231                  | 1,000                  | 46,231                   | U     |
| 75 0603619A             | Landmine Warfare and Barrier - Adv Dev                   | 04  | 69,237                  | 45,198                  |                        | 45,198                   | U     |
| 76 0603627A             | Smoke, Obscurant and Target Defeating Sys-Adv Dev        | 04  | 8,920                   | 20,674                  |                        | 20,674                   | U     |
| 77 0603639A             | Tank and Medium Caliber Ammunition                       | 04  | 45,448                  | 41,921                  |                        | 41,921                   | U     |
| 78 0603645A             | Armored System Modernization - Adv Dev                   | 04  | 41,431                  | 84,297                  |                        | 84,297                   | U     |
| 79 0603747A             | Soldier Support and Survivability                        | 04  | 15,759                  | 8,735                   | 3,000                  | 11,735                   | U     |
| 80 0603766A             | Tactical Electronic Surveillance System - Adv Dev        | 04  | 27,733                  | 35,667                  |                        | 35,667                   | U     |
| 81 0603774A             | Night Vision Systems Advanced Development                | 04  | 501,816                 | 7,341                   |                        | 7,341                    | U     |
| 82 0603779A             | Environmental Quality Technology - Dem/Val               | 04  | 15,039                  | 14,731                  |                        | 14,731                   | U     |

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|--------------------------------|--|-----|--------------|-----------------------------------|---------------------------------------|-------------------|----------------------------|-------|
| 69 0603728A                    | Environmental Quality Technology Demonstrations          | 03  |              |                                   |                                       |                   |                            | U     |
| 70 0603734A                    | Military Engineering Advanced Technology                 | 03  |              |                                   |                                       |                   |                            | U     |
| 71 0603772A                    | Advanced Tactical Computer Science and Sensor Technology | 03  |              |                                   |                                       |                   |                            | U     |
| 72 0603794A                    | C3 Advanced Technology                                   | 03  |              |                                   |                                       |                   |                            | U     |
|                                | Advanced Technology Development                          |     | 1,099,564    |                                   |                                       |                   | 1,099,564                  |       |
| 73 0603305A                    | Army Missile Defense Systems Integration                 | 04  | 10,987       |                                   |                                       |                   | 10,987                     | U     |
| 74 0603327A                    | Air and Missile Defense Systems Engineering              | 04  | 15,148       |                                   | 500                                   | 500               | 15,648                     | U     |
| 75 0603619A                    | Landmine Warfare and Barrier - Adv Dev                   | 04  | 92,915       |                                   |                                       |                   | 92,915                     | U     |
| 76 0603627A                    | Smoke, Obscurant and Target Defeating Sys-Adv Dev        | 04  |              |                                   |                                       |                   |                            | U     |
| 77 0603639A                    | Tank and Medium Caliber Ammunition                       | 04  | 82,146       |                                   |                                       |                   | 82,146                     | U     |
| 78 0603645A                    | Armored System Modernization - Adv Dev                   | 04  | 157,656      |                                   |                                       |                   | 157,656                    | U     |
| 79 0603747A                    | Soldier Support and Survivability                        | 04  | 6,514        |                                   | 3,000                                 | 3,000             | 9,514                      | U     |
| 80 0603766A                    | Tactical Electronic Surveillance System - Adv Dev        | 04  | 34,890       |                                   |                                       |                   | 34,890                     | U     |
| 81 0603774A                    | Night Vision Systems Advanced Development                | 04  | 251,011      |                                   |                                       |                   | 251,011                    | U     |
| 82 0603779A                    | Environmental Quality Technology - Dem/Val               | 04  | 15,132       |                                   |                                       |                   | 15,132                     | U     |

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

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|--------------------------------|--|-----|--------------|-----------------------------------|---------------------------------------|-------------------|----------------------------|-------|
| 83 0603790A                    | NATO Research and Development                                  | 04  | 5,406        |                                   |                                       |                   | 5,406                      | U     |
| 84 0603801A                    | Aviation - Adv Dev   | 04  | 459,290      |                                   |                                       |                   | 459,290                    | U     |
| 85 0603804A                    | Logistics and Engineer Equipment - Adv Dev                     | 04  | 6,254        |                                   | 1,085                                 | 1,085             | 7,339                      | U     |
| 86 0603807A                    | Medical Systems - Adv Dev                                      | 04  | 31,175       |                                   |                                       |                   | 31,175                     | U     |
| 87 0603827A                    | Soldier Systems - Advanced Development                         | 04  | 22,113       |                                   |                                       |                   | 22,113                     | U     |
| 88 0604017A                    | Robotics Development   | 04  | 115,222      |                                   |                                       |                   | 115,222                    | U     |
| 89 0604020A                    | Cross Functional Team (CFT) Advanced Development & Prototyping | 04  |              |                                   |                                       |                   |                            | U     |
| 90 0604021A                    | Electronic Warfare Technology Maturation (MIP)                 | 04  | 18,043       |                                   |                                       |                   | 18,043                     | U     |
| 91 0604100A                    | Analysis Of Alternatives                                       | 04  | 10,023       |                                   |                                       |                   | 10,023                     | U     |
| 92 0604113A                    | Future Tactical Unmanned Aircraft System (FTUAS)               | 04  | 40,745       |                                   |                                       |                   | 40,745                     | U     |
| 93 0604114A                    | Lower Tier Air Missile Defense (LTAMD) Sensor                  | 04  | 427,772      |                                   |                                       |                   | 427,772                    | U     |
| 94 0604115A                    | Technology Maturation Initiatives                              | 04  | 196,676      |                                   |                                       |                   | 196,676                    | U     |
| 95 0604117A                    | Maneuver - Short Range Air Defense (M-SHORAD)                  | 04  | 33,100       |                                   | 6,000                                 | 6,000             | 39,100                     | U     |
| 96 0604118A                    | TRACTOR BEAM   | 04  |              |                                   |                                       |                   |                            | U     |
| 97 0604119A                    | Army Advanced Component Development & Prototyping              | 04  | 115,116      |                                   | 4,529                                 | 4,529             | 119,645                    | U     |
| 98 0604120A                    | Assured Positioning, Navigation and Timing (PNT)               | 04  |              |                                   |                                       |                   |                            | U     |

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

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

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

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

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|--------------------------------|---|-----|--------------|--------------|-------------|---------------|--------|
|                                |   |     | (Base + OCO) | Base Enacted | OCO Enacted | Total Enacted | e<br>c |
| 131 0604804A                   | Logistics and Engineer Equipment - Eng Dev                            | 05  | 76,030       | 76,388       |             | 76,388        | U      |
| 132 0604805A                   | Command, Control, Communications Systems - Eng Dev                    | 05  | 9,559        | 15,950       |             | 15,950        | U      |
| 133 0604807A                   | Medical Materiel/Medical Biological Defense Equipment - Eng Dev       | 05  | 36,685       | 44,495       |             | 44,495        | U      |
| 134 0604808A                   | Landmine Warfare/Barrier - Eng Dev                                    | 05  | 26,188       | 43,064       |             | 43,064        | U      |
| 135 0604818A                   | Army Tactical Command & Control Hardware & Software                   | 05  | 157,852      | 169,607      |             | 169,607       | U      |
| 136 0604820A                   | Radar Development   | 05  | 31,651       | 39,289       |             | 39,289        | U      |
| 137 0604822A                   | General Fund Enterprise Business System (GFEBS)                       | 05  | 47,575       | 36,810       |             | 36,810        | U      |
| 138 0604823A                   | Firefinder  | 05  | 43,762       | 27,439       |             | 27,439        | U      |
| 139 0604827A                   | Soldier Systems - Warrior Dem/Val                                     | 05  | 15,490       | 10,382       |             | 10,382        | U      |
| 140 0604852A                   | Suite of Survivability Enhancement Systems - EMD                      | 05  | 90,187       | 52,839       |             | 52,839        | U      |
| 141 0604854A                   | Artillery Systems - EMD   | 05  | 3,892        | 1,779        |             | 1,779         | U      |
| 142 0605013A                   | Information Technology Development                                    | 05  | 62,613       | 77,686       |             | 77,686        | U      |
| 143 0605018A                   | Integrated Personnel and Pay System-Army (IPPS-A)                     | 05  | 188,637      | 164,899      |             | 164,899       | U      |
| 144 0605028A                   | Armored Multi-Purpose Vehicle (AMPV)                                  | 05  | 184,300      | 111,821      |             | 111,821       | U      |
| 145 0605029A                   | Integrated Ground Security Surveillance Response Capability (IGSSR-C) | 05  | 4,241        | 3,207        |             | 3,207         | U      |
| 146 0605030A                   | Joint Tactical Network Center (JTNC)                                  | 05  | 15,242       | 15,869       |             | 15,869        | U      |

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

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|--------------------------------|---|-----|--------------|------------------------------|---------------------------------------|-------------------|----------------------------|-------|
| 147 0605031A                   | Joint Tactical Network (JTN)  | 05  | 40,808       |                              |                                       |                   | 40,808                     | U     |
| 148 0605032A                   | TRACTOR TIRE  | 05  |              |                              |                                       |                   |                            | U     |
| 149 0605033A                   | Ground-Based Operational Surveillance System - Expeditionary (GBOSS-E)  | 05  | 3,847        |                              |                                       |                   | 3,847                      | U     |
| 150 0605034A                   | Tactical Security System (TSS)  | 05  | 6,928        |                              |                                       |                   | 6,928                      | U     |
| 151 0605035A                   | Common Infrared Countermeasures (CIRCM)                                 | 05  | 34,488       |                              | 11,770                                | 11,770            | 46,258                     | U     |
| 152 0605036A                   | Combating Weapons of Mass Destruction (CWMD)                            | 05  | 10,000       |                              |                                       |                   | 10,000                     | U     |
| 153 0605037A                   | Evidence Collection and Detainee Processing                             | 05  |              |                              |                                       |                   |                            | U     |
| 154 0605038A                   | Nuclear Biological Chemical Reconnaissance Vehicle (NBCRV) Sensor Suite | 05  | 6,054        |                              |                                       |                   | 6,054                      | U     |
| 155 0605041A                   | Defensive CYBER Tool Development  | 05  | 62,262       |                              |                                       |                   | 62,262                     | U     |
| 156 0605042A                   | Tactical Network Radio Systems (Low-Tier)                               | 05  | 35,654       |                              |                                       |                   | 35,654                     | U     |
| 157 0605047A                   | Contract Writing System   | 05  | 19,682       |                              |                                       |                   | 19,682                     | U     |
| 158 0605049A                   | Missile Warning System Modernization (MWSM)                             | 05  | 1,539        |                              |                                       |                   | 1,539                      | U     |
| 159 0605051A                   | Aircraft Survivability Development                                      | 05  | 64,557       |                              | 77,420                                | 77,420            | 141,977                    | U     |
| 160 0605052A                   | Indirect Fire Protection Capability Inc 2 - Block 1                     | 05  | 243,228      |                              |                                       |                   | 243,228                    | U     |
| 161 0605053A                   | Ground Robotics   | 05  | 41,308       |                              |                                       |                   | 41,308                     | U     |

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|-------------------------|--|-----|-------------------------|-------------------------|------------------------|--------------------------|-------|
| 162 0605054A            | Emerging Technology Initiatives  | 05  |                         | 42,813                  |                        | 42,813                   | U     |
| 163 0605203A            | Army System Development & Demonstration  | 05  |                         |                         |                        |                          | U     |
| 164 0605380A            | AMF Joint Tactical Radio System (JTRS)   | 05  | 18,639                  | 15,964                  |                        | 15,964                   | U     |
| 165 0605450A            | Joint Air-to-Ground Missile (JAGM)   | 05  | 28,539                  | 11,758                  |                        | 11,758                   | U     |
| 166 0605457A            | Army Integrated Air and Missile Defense (AIAMD)                                  | 05  | 339,051                 | 322,263                 |                        | 322,263                  | U     |
| 167 0605625A            | Manned Ground Vehicle  | 05  |                         |                         |                        |                          | U     |
| 168 0605766A            | National Capabilities Integration (MIP)  | 05  | 9,382                   | 12,340                  |                        | 12,340                   | U     |
| 169 0605812A            | Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph | 05  | 22,530                  |                         |                        |                          | U     |
| 170 0605830A            | Aviation Ground Support Equipment  | 05  | 6,653                   | 7,703                   |                        | 7,703                    | U     |
| 171 0210609A            | Paladin Integrated Management (PIM)  | 05  | 5,868                   |                         |                        |                          | U     |
| 172 0303032A            | TROJAN - RH12  | 05  | 5,631                   | 4,521                   | 1,200                  | 5,721                    | U     |
| 173 0303267A            | Auctioned Spectrum Relocation Fund   | 05  | 15,885                  |                         |                        |                          | U     |
| 174 0304270A            | Electronic Warfare Development   | 05  | 14,616                  | 8,922                   |                        | 8,922                    | U     |
| 175 1205117A            | Tractor Bears  | 05  | 17,928                  | 23,170                  |                        | 23,170                   | U     |
|                         | System Development & Demonstration   |     | 3,349,488               | 2,965,361               | 236,863                | 3,202,224                |       |
| 176 0604256A            | Threat Simulator Development   | 06  | 31,401                  | 47,322                  |                        | 47,322                   | U     |
| 177 0604258A            | Target Systems Development   | 06  | 13,467                  | 32,120                  |                        | 32,120                   | U     |

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|--------------------------------|--|-----|--------------|-----------------------------------|-------------------------------|-------------------|----------------------------|-------|
| 162 0605054A                   | Emerging Technology Initiatives  | 05  | 45,896       |                                   |                               |                   | 45,896                     | U     |
| 163 0605203A                   | Army System Development & Demonstration  | 05  | 164,883      |                                   | 19,527                        | 19,527            | 184,410                    | U     |
| 164 0605380A                   | AMF Joint Tactical Radio System (JTRS)   | 05  |              |                                   |                               |                   |                            | U     |
| 165 0605450A                   | Joint Air-to-Ground Missile (JAGM)   | 05  | 9,500        |                                   |                               |                   | 9,500                      | U     |
| 166 0605457A                   | Army Integrated Air and Missile Defense (AIAMD)                                  | 05  | 208,938      |                                   |                               |                   | 208,938                    | U     |
| 167 0605625A                   | Manned Ground Vehicle  | 05  | 378,400      |                                   |                               |                   | 378,400                    | U     |
| 168 0605766A                   | National Capabilities Integration (MIP)  | 05  | 7,835        |                                   |                               |                   | 7,835                      | U     |
| 169 0605812A                   | Joint Light Tactical Vehicle (JLTV) Engineering and Manufacturing Development Ph | 05  | 2,732        |                                   |                               |                   | 2,732                      | U     |
| 170 0605830A                   | Aviation Ground Support Equipment  | 05  | 1,664        |                                   |                               |                   | 1,664                      | U     |
| 171 0210609A                   | Paladin Integrated Management (PIM)  | 05  |              |                                   |                               |                   |                            | U     |
| 172 0303032A                   | TROJAN - RH12  | 05  | 3,936        |                                   |                               |                   | 3,936                      | U     |
| 173 0303267A                   | Auctioned Spectrum Relocation Fund   | 05  |              |                                   |                               |                   |                            | U     |
| 174 0304270A                   | Electronic Warfare Development   | 05  | 19,675       |                                   | 3,200                         | 3,200             | 22,875                     | U     |
| 175 1205117A                   | Tractor Bears  | 05  |              |                                   |                               |                   |                            | U     |
|                                | System Development & Demonstration   |     | 3,549,431    |                                   | 111,917                       | 111,917           | 3,661,348                  |       |
| 176 0604256A                   | Threat Simulator Development   | 06  | 14,117       |                                   |                               |                   | 14,117                     | U     |
| 177 0604258A                   | Target Systems Development   | 06  | 8,327        |                                   |                               |                   | 8,327                      | U     |

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

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

| Program Line Element No Number | Item  | Act | FY 2020 Base | FY 2020 OCO for Base Requirements | FY 2020 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       |                                   |                                       |                   | 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 &amp; Eval, Army

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

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

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

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

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

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

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| Program Line Element No Number | Item  | Act | FY 2020 Base | FY 2020 OCO for Base Requirements | FY 2020 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  |              |                                   |                                       |                   |                            | U     |
| 232 0205402A                   | Integrated Base Defense - Operational System Dev          | 07  |              |                                   |                                       |                   |                            | U     |
| 233 0205410A                   | Materials Handling Equipment                              | 07  |              |                                   |                                       |                   |                            | U     |
| 234 0205412A                   | Environmental Quality Technology - Operational System Dev | 07  | 732          |                                   |                                       |                   | 732                        | U     |
| 235 0205456A                   | Lower Tier Air and Missile Defense (AMD) System           | 07  | 107,746      |                                   |                                       |                   | 107,746                    | U     |
| 236 0205778A                   | Guided Multiple-Launch Rocket System (GMLRS)              | 07  | 138,594      |                                   |                                       |                   | 138,594                    | U     |
| 238 0303028A                   | Security and Intelligence Activities                      | 07  | 13,845       |                                   | 22,904                                | 22,904            | 36,749                     | U     |
| 239 0303140A                   | Information Systems Security Program                      | 07  | 29,185       |                                   |                                       |                   | 29,185                     | U     |
| 240 0303141A                   | Global Combat Support System                              | 07  | 68,976       |                                   |                                       |                   | 68,976                     | U     |
| 241 0303150A                   | WWMCCS/Global Command and Control System                  | 07  | 2,073        |                                   |                                       |                   | 2,073                      | U     |
| 244 0305172A                   | Combined Advanced Applications                            | 07  |              |                                   |                                       |                   |                            | U     |
| 245 0305179A                   | Integrated Broadcast Service (IBS)                        | 07  | 459          |                                   |                                       |                   | 459                        | U     |

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| Program Line Element No | Item   | Act | FY 2018      | FY 2019      | FY 2019     | FY 2019       | S      |
|-------------------------|--|-----|--------------|--------------|-------------|---------------|--------|
|                         |  |     | (Base + OCO) | Base Enacted | OCO Enacted | Total Enacted | e<br>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       |             | 17,863        | U      |
| 252 0307665A            | Biometrics Enabled Intelligence                | 07  | 8,573        | 4,310        | 2,214       | 6,524         | U      |
| 253 0708045A            | End Item Industrial Preparedness Activities    | 07  | 118,410      | 108,696      |             | 108,696       | U      |
| 254 1203142A            | SATCOM Ground Environment (SPACE)              | 07  | 9,945        | 12,105       |             | 12,105        | U      |
| 255 1208053A            | Joint Tactical Ground System                   | 07  | 10,228       | 7,400        |             | 7,400         | U      |
| 9999 9999999999         | Classified Programs                            |     | 7,154        | 5,955        |             | 5,955         | U      |
|                         | Operational Systems Development                |     | 1,830,278    | 1,735,065    | 59,741      | 1,794,806     |        |
|                         | Total Research, Development, Test & Eval, Army |     | 11,633,461   | 11,074,556   | 300,604     | 11,375,160    |        |

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

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| All Source Analysis System                              | 0604321A                      | 111           | 05.....   | 51          |
| Armored Systems Modernization (ASM) - Eng Dev           | 0604645A                      | 119           | 05.....   | 251         |
| Automatic Test Equipment Development                    | 0604746A                      | 125           | 05.....   | 401         |
| Brilliant Anti-Armor Submunition (BAT)                  | 0604768A                      | 127           | 05.....   | 447         |
| Combat Feeding, Clothing, and Equipment                 | 0604713A                      | 121           | 05.....   | 306         |
| Combined Arms Tactical Trainer (CATT) Core              | 0604780A                      | 128           | 05.....   | 461         |
| Constructive Simulation Systems Development             | 0604742A                      | 124           | 05.....   | 383         |
| Distributive Interactive Simulations (DIS) - Eng Dev    | 0604760A                      | 126           | 05.....   | 424         |
| Electronic Warfare Development                          | 0604270A                      | 110           | 05.....   | 26          |
| Family of Heavy Tactical Vehicles                       | 0604622A                      | 116           | 05.....   | 198         |
| Infantry Support Weapons                                | 0604601A                      | 113           | 05.....   | 67          |
| JAVELIN   | 0604611A                      | 115           | 05.....   | 191         |
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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |                                   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|-----------------------------------|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name) |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604201A / Aircraft Avionics   |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | 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   | -           | 30.812  | 32.253  | 29.164       | -                                 | 29.164        | 7.673   | 6.955   | 5.472   | 7.209   | Continuing       | Continuing |
| C97: ACFT Avionics  | -           | 20.112  | 16.727  | 11.187       | -                                 | 11.187        | 4.824   | 3.470   | 2.228   | 1.264   | Continuing       | Continuing |
| EW7: Degraded Visual Environment  | -           | 7.941   | 14.724  | 17.161       | -                                 | 17.161        | 2.012   | 2.557   | 2.210   | 4.699   | 0.000            | 51.304     |
| VU3: Networking And Mission Planning  | -           | 2.759   | 0.802   | 0.816        | -                                 | 0.816         | 0.837   | 0.928   | 1.034   | 1.246   | 0.000            | 8.422      |

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

The Fiscal Year FY 2020 budget estimate request funds the development of Aircraft Avionics systems required to horizontally and vertically integrate the battlefield and the integration of those systems into Army aircraft. Tasks in this Program Element support research, development, and test efforts in the Engineering and Manufacturing Development phases of these systems.

The Doppler Global Positioning System Navigation Set (DGNS) Upgrade program completes system engineering trade studies to reduce space, weight, and power with the introduction of new navigation support capabilities such as an inertial sensor interface card and Instrument Flight Rules map display. It also prepares Engineering Change Proposals (ECP) to the existing DGNS Line Replaceable Units (LRU) as a result of those trade studies. The DGNS upgrade continues with execution of Non-Recurring Engineering for Computer Display Unit (CDU) and Signal Data Converter LRU ECP packages. The DGNS CDU upgrade replaces the current CDU faceplate with a touch screen display, provides a moving navigation map capability and optimizes pilot interface to augment existing Instrument Flight Rules capability promoting safer flight operations. The CDU upgrade will support Assured-Position Navigation and Timing (A-PNT) operations in conjunction with additional system LRU upgrades, includes anti-jam antenna capabilities, and supports Department of Defense (DoD) and Army's requirement to maintain A-PNT throughout operations. This will require assessment and follow-on upgrade to the DGNS navigation system. The CDU upgrade will perform an assessment of A-PNT assurance levels to understand system performance and associated PNT capability gaps, and will evaluate candidate solutions to cover any identified gaps.

The Enhanced Aviation GATM Localizer Performance with Vertical Guidance (LPV) Embedded GPS Inertial (EGI) Navigation System (EAGLE) A-PNT integration program assesses current capabilities in identified operational PNT environment levels, tests identified upgrades to existing EGI hardware in order to accommodate A-PNT in identified operational environments, and incorporates M-Code. It supports DoD and Army's requirement to maintain A-PNT throughout operations and requires assessment and follow-on upgrade to the EGI navigation system. The EAGLE upgrade will perform an assessment of A-PNT assurance levels to understand system performance, associated PNT capability gaps, integrate anti-jam antenna capabilities, and evaluate candidate solutions to cover any identified gaps.

The Degraded Visual Environments (DVE) program portfolio includes DVE Army Directed Requirement (DR) and Environment Exploitation System (EES).

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Army  |  | <b>Date:</b> March 2019 |  |  |
|--|--|-------------------------|--|--|
| <b>Appropriation/Budget Activity</b>   | <b>R-1 Program Element (Number/Name)</b> |                         |  |  |
| 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>   | PE 0604201A / Aircraft Avionics          |                         |  |  |
| The DVE DR is to provide DVE systems to 15 HH-60M Blackhawk MEDEVAC helicopters and 25 Special Operations aircraft. The DVE DR fulfills an immediate DVE requirement while bridging the gap between future DVE capabilities. The DVE DR system provides a forward looking, situational awareness, fused-sensor image for single aircraft takeoff and landing in brownout conditions. The program will complete development and test efforts in support of the DVE DR in FY 2019.   |  |                         |  |  |
| The EES program focuses on development and maturation of active and passive sensors, synthetic vision, sensor and software data fusion, imagery processing, user interface, and multicore processing technologies to enable current and future fleet capabilities and innovative technical solutions for the current Army aviation fleet to safely operate in DVE. EES will equip Combat Aviation Brigades with evolving modular DVE solutions creating revolutionary tactical advantages while increasing survivability.  |  |                         |  |  |
| The DVE Increment I Capability Development Document outlining the DVE requirement for the UH-60 and CH-47 to takeoff, land and perform ground taxi operations in brownout conditions was removed from Army staffing in February 2018.  |  |                         |  |  |
| The Aviation Data Exploitation Capability (ADEC) is an Army aviation automated information system program providing specific capabilities needed at the aviation unit level to implement and support improvements within aviation operations, safety, and training to increase operational effectiveness and situational awareness at all command echelons. ADEC provides a common and interoperable capability required to implement the DoD mandated Military Flight Operations Quality Assurance processes. ADEC will standardize flight scheduling/management, risk management, mission approval, and flight data analysis and visualization. ADEC provides interfaces to Centralized Aviation Flight Records System (CAFRS) to reduce data entry and the information technology footprint while enabling disconnected and split based operations.   |  |                         |  |  |
| The Improved Data Modem (IDM) is the common solution for digitizing Army Aviation and is fielded on every modernized, rotary-wing Army aircraft, including the CH-47 Chinook, AH-64 Apache and UH-60 Black Hawk. The IDM-401 provides the Army rotary-wing fleet with critical communication capabilities, performing as an internet controller and gateway to the Tactical Internet (TI) and Fire Support (FS) internet. The IDM enables connectivity to multiple radios used by rotary-wing aircraft and the Blue Force Tracker transceiver, as well as providing the means for rapid data transfer. The Multi-Core Processor (MCP)-501 modification effort will be a technology replacement for the current Army IDM-401. The MCP-501 will satisfy Army requirements for hardware, software, and firmware and be able to satisfy cybersecurity requirements. The MCP-501 will replace the current IDM-401 with a common server capability to support current and additional IDM-401 functionality that are common among multiple Army Aviation platforms and become a core component of the Digital Backbone for Army rotary wing aircraft.   |  |                         |  |  |
| The Aviation Mission Planning System (AMPS) is a decision support and battle synchronization system for automated mission planning, risk assessment, and transfer of mission data to aviation platforms in support of Mission Command functions within an Aviation unit. This includes route generation, performance planning, communications planning, terrain analysis, data transfer, and mission rehearsal. It also provides connectivity to Army Mission Command Systems. The AMPS efforts support the advancement of Army Aviation Mission Planning from the legacy Hardware/Software solution to a mobile, Future Airborne Capability Environment/Open Architecture conformant, hardware agnostic system. These efforts will include development and testing of a new underlying architecture to support the move of Army Aviation Mission Planning from the current structure to one that supports synchronization both vertically and horizontally between Aviation and Ground forces. It will allow for a modular, multipronged approach to meet the needs of the various planning and execution environments and allow aircrews to continually plan and update route, threat and performance data throughout all phases of an Aviation mission. |  |                         |  |  |

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>  |  |                |                     |                    | <b>Date:</b> March 2019 |
|--|--|----------------|---------------------|--------------------|-------------------------|
| <b>Appropriation/Budget Activity</b>   | <b>R-1 Program Element (Number/Name)</b> |                |                     |                    |                         |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)                    | PE 0604201A / Aircraft Avionics          |                |                     |                    |                         |
| <b>B. Program Change Summary (\$ in Millions)</b>  | <b>FY 2018</b>                           | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |
| Previous President's Budget  | 30.153                                   | 32.293         | 25.582              | -                  | 25.582                  |
| Current President's Budget   | 30.812                                   | 32.253         | 29.164              | -                  | 29.164                  |
| Total Adjustments  | 0.659                                    | -0.040         | 3.582               | -                  | 3.582                   |
| • Congressional General Reductions   | -0.023                                   | -0.040         |                     |                    |                         |
| • Congressional Directed Reductions  | -  | -              |                     |                    |                         |
| • Congressional Rescissions  | -  | -              |                     |                    |                         |
| • Congressional Adds   | -  | -              |                     |                    |                         |
| • Congressional Directed Transfers   | -  | -              |                     |                    |                         |
| • Reprogrammings   | 1.800                                    | -              |                     |                    |                         |
| • SBIR/STTR Transfer   | -1.118                                   | -              |                     |                    |                         |
| • Adjustments to Budget Years  | -  | -              | 3.582               | -                  | 3.582                   |
| <b>Change Summary Explanation</b>  |  |                |                     |                    |                         |
| FY 2020 reflects an increase to support capabilities associated with Assured - Position, Navigation, and Timing (A-PNT). |  |                |                     |                    |                         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  | Date: March 2019 |                  |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|------------------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |               |         |         | Project (Number/Name)<br>C97 / ACFT Avionics |                  |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                                      | FY 2024          | Cost To Complete | Total Cost |
| C97: ACFT Avionics                                      | -           | 20.112  | 16.727  | 11.187       | -  | 11.187        | 4.824   | 3.470   | 2.228  | 1.264            | Continuing       | Continuing |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -  | -                |                  |            |

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

The Fiscal Year FY 2020 budget request funds the development of Aircraft Avionics systems required to horizontally and vertically integrate the battlefield and the integration of those systems into Army aircraft. Tasks in this Project support research, development, and test efforts in the Engineering and Manufacturing Development phases of these systems.

The Doppler Global Positioning System Navigation Set (DGNS) Upgrade program completes system engineering trade studies to reduce space, weight, and power with the introduction of new navigation support capabilities such as an inertial sensor interface card and Instrument Flight Rules map display. It also prepares Engineering Change Proposals (ECP) to the existing DGNS Line Replaceable Units (LRU) as a result of those trade studies. The DGNS upgrade continues with execution of Non-Recurring Engineering for Computer Display Unit (CDU) and Signal Data Converter LRU ECP packages. The DGNS CDU upgrade replaces the current CDU faceplate with a touch screen display, provides a moving navigation map capability and optimizes pilot interface to augment existing Instrument Flight Rules capability promoting safer flight operations. The CDU upgrade will support Assured-Position Navigation and Timing (A-PNT) operations in conjunction with additional system LRU upgrades, includes anti-jam antenna capabilities, and supports Department of Defense (DoD) and Army's requirement to maintain A-PNT throughout operations. This will require assessment and follow-on upgrade to the DGNS navigation system. The CDU upgrade will perform an assessment of A-PNT assurance levels to understand system performance and associated PNT capability gaps, and will evaluate candidate solutions to cover any identified gaps.

The Enhanced Aviation GATM Localizer Performance with Vertical Guidance (LPV) Embedded Global Positioning System (GPS) Inertial (EGI) Navigation System (EAGLE) A-PNT integration program assesses current capabilities in identified operational PNT environment levels, tests identified upgrades to existing EGI hardware in order to accommodate A-PNT in identified operational environments, and incorporates M-Code. It supports DoD and Army's requirement to maintain A-PNT throughout operations and requires assessment and follow-on upgrade to the EGI navigation system. The EAGLE upgrade will perform an assessment of A-PNT assurance levels to understand system performance, associated PNT capability gaps, integrate anti-jam antenna capabilities, and evaluate candidate solutions to cover any identified gaps.

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

|                                       | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---------------------------------------|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> DGNS / A-PNT Assessment | 7.068   | 1.837   | 1.360        | -           | 1.360         |

**Description:** The DGNS Upgrade program completes system engineering trade studies to reduce space, weight, and power with the introduction of new navigation support capabilities such as inertial sensor interface card and Instrument Flight Rules (IFR) map display. It also prepares ECPs to the existing DGNS LRU as a result of those trade studies. The DGNS upgrade continues with execution of Non-Recurring Engineering for CDU and Signal Data Converter LRU ECP packages. The DGNS CDU Upgrade replaces the current CDU

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |   |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604201A / Aircraft Avionics | <b>Project (Number/Name)</b><br>C97 / ACFT Avionics |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>                                      | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| faceplate with a touch screen display, provides a moving navigation map capability and optimized pilot interface to augment existing IFR capability and promote safer flight operations. It also enables CDU support for A-PNT operations in conjunction with additional system LRU upgrades, including anti-jam antenna capabilities.      |   |   |                |                     |                         |                      |
| <b>FY 2019 Plans:</b><br>Complete software modifications to legacy GPS receiver cards to include RSAM and complete GPS anti-jam antenna development and integration.  |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Complete Airworthiness Qualification of RSAM software modifications and complete Airworthiness Qualification of the Multiplatform Anti-jam GPS Navigation Antenna.  |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>The decreases in FY 2020 over funding levels in FY 2019 are attributed to the completion of engineering work and materials procurement in FY 2019 and only system test, qualification, and CDRL closeout taking place in FY 2020.   |   |   |                |                     |                         |                      |
| <b>Title:</b> EAGLE Navigation System A-PNT Integration<br><br><b>Description:</b> The EAGLE Navigation System A-PNT integration program assesses current capabilities in identified operational PNT environment levels and tests identified upgrades to existing EGI hardware to accommodate A-PNT in identified operational environments. |   | 13.044  | 14.277         | 9.827               | -                       | 9.827                |
| <b>FY 2019 Plans:</b><br>Complete software modifications to legacy GPS receiver cards, continue M-Code integration into the EAGLE, and complete the development and integration of a GPS anti-jam antenna.  |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Complete M-Code integration into the EAGLE system, begin final EAGLE-M airworthiness qualification testing, and begin final RSAM integration onto legacy GPS receivers.   |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>The increases in FY 2020 over funding levels in FY 2019 are attributed to the initiation of final RSAM integration onto legacy EGI GPS receivers.   |   |   |                |                     |                         |                      |
| <b>Title:</b> FY2019 SBIR STTR Transfer<br><br><b>Description:</b> FY 2019 SBIR STTR Transfer   |   | -   | 0.613          | -                   | -                       | -                    |

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|   |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |
|---|----------------|----------------|---------------------|---|----------------------|----------------|----------------|----------------|---|-------------------------|-------------------|---------------------|--------------------|----------------------|--|--|--|--|--|
| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |                |                |                     |   |                      |                |                |                |   | Date: March 2019        |                   |                     |                    |                      |  |  |  |  |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                     | <b>R-1 Program Element (Number/Name)</b><br>PE 0604201A / Aircraft Avionics |                      |                |                |                | <b>Project (Number/Name)</b><br>C97 / ACFT Avionics |                         |                   |                     |                    |                      |  |  |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |                     |   |                      |                |                |                |   | <b>FY 2018</b>          | <b>FY 2019</b>    | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |  |  |  |  |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR STTR Transfer   |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR STTR Transfer  |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                     |   |                      |                |                |                |   | 20.112                  | 16.727            | 11.187              | -                  | 11.187               |  |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>  | <b>FY 2020 Total</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b> | <b>FY 2024</b>                                      | <b>Cost To Complete</b> | <b>Total Cost</b> |                     |                    |                      |  |  |  |  |  |
| • AA0723: Comms, Nav Surveillance   | 162.639        | 156.969        | 164.315             | -   | 164.315              | 138.817        | 94.588         | 149.306        | 116.084   | Continuing              | Continuing        |                     |                    |                      |  |  |  |  |  |
| • AA0704: GATM - Rotary Wing Aircraft   | 37.403         | 26.848         | 30.966              | -   | 30.966               | 30.008         | 19.864         | 17.675         | 14.998  | Continuing              | Continuing        |                     |                    |                      |  |  |  |  |  |
| <b>Remarks</b>  |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |
| <b>D. Acquisition Strategy</b>  |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |
| This project is comprised of multiple systems supporting aircraft avionics. While the detailed acquisition strategy varies from program to program, the general strategy is for each individual program to complete the development and testing efforts in coordination with the aircraft platforms on integration issues, use the various contracts of the aircraft platforms original equipment manufacturers on integration efforts, and utilize the Aviation & Missile Research, Development, and Engineering Center for software development. This requires the use of various contract methods and types to accomplish the aircraft avionics development efforts. All required acquisition program documentation is prepared. |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |
| <b>E. Performance Metrics</b>   |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |
| N/A   |                |                |                     |   |                      |                |                |                |   |                         |                   |                     |                    |                      |  |  |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army     |                        |  |               |         |  |         |            |                 |            |  |            |                  | Date: March 2019 |              |                          |
|--|------------------------|--|---------------|---------|--|---------|------------|-----------------|------------|--|------------|------------------|------------------|--------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                  |                        |  |               |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |         |            |                 |            | Project (Number/Name)<br>C97 / ACFT Avionics |            |                  |                  |              |                          |
| Management Services (\$ in Millions)                       |                        |  |               | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO                               |            | FY 2020<br>Total |                  |              |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location               | 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 Services (DGNS Upgrade/ DGNS A-PNT)                     | Various                | PM AME/AMRDEC SED : Redstone Arsenal, AL     | 0.626         | 0.272   | Oct 2017   | 0.212   | Oct 2018   | 0.047           | Oct 2019   | -  |            | 0.047            | 0.000            | 1.157        | -                        |
| PM Services (EAGLE)  | Various                | PM AME/AMRDEC SED : Redstone Arsenal, AL     | 0.014         | 0.273   | Oct 2017   | 0.212   | Oct 2018   | 0.047           | Oct 2019   | -  |            | 0.047            | 0.000            | 0.546        | -                        |
| FY2019 SBIR STTR Transfer                                  | TBD                    | HQDA : Washington D.C.                       | -             | -       |  | 0.613   | Oct 2018   | -               |            | -  |            | -                | 0.000            | 0.613        | -                        |
| <b>Subtotal</b>  |                        | <b>0.640</b>                                 | <b>0.545</b>  |         | <b>1.037</b>   |         |            | <b>0.094</b>    |            |  |            | <b>0.094</b>     | <b>0.000</b>     | <b>2.316</b> | N/A                      |
| Product Development (\$ in Millions)                       |                        |  |               | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO                               |            | FY 2020<br>Total |                  |              |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location               | Prior Years   | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost   | Target Value of Contract |
| DGNS A-PNT Assessment and Upgrade                          | SS/CPFF                | BAE Systems : Wayne, NJ                      | -             | 6.621   | May 2018   | 1.100   | Jul 2019   | 1.183           | Mar 2020   | -  |            | 1.183            | 0.000            | 8.904        | -                        |
| DGNS Anti-Jam Antenna Development                          | SS/CPFF                | Mayflower Communications, Inc. : Bedford, MA | 0.981         | 0.175   | Oct 2017   | 0.275   | Nov 2018   | -               |            | -  |            | -                | 0.000            | 1.431        | -                        |
| EGI/EAGLE A-PNT Assessment and Upgrade/ M-Code Integration | SS/CPFF                | Honeywell : Clearwater, FL                   | -             | 5.649   | Sep 2018   | 10.587  | Mar 2019   | 7.042           | Oct 2019   | -  |            | 7.042            | 0.804            | 24.082       | -                        |
| EGI Anti-Jam Antenna Development                           | SS/CPFF                | Mayflower Communications, Inc. : Bedford, MA | 0.392         | 7.122   | Oct 2017   | 3.171   | Nov 2018   | -               |            | -  |            | -                | 0.000            | 10.685       | -                        |
| EGI/EAGLE RSAM Development                                 | SS/CPIF                | Honeywell International : Clearwater, FL     | -             | -       |  | -       |            | 2.388           | Dec 2019   | -  |            | 2.388            | Continuing       | Continuing   | -                        |
| <b>Subtotal</b>  |                        | <b>1.373</b>                                 | <b>19.567</b> |         | <b>15.133</b>  |         |            | <b>10.613</b>   |            |  |            | <b>10.613</b>    | Continuing       | Continuing   | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army      |                        |  |             |         |  |         |            |                 |            |  |            |                  | Date: March 2019 |            |                          |
|---|------------------------|--|-------------|---------|--|---------|------------|-----------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                   |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |         |            |                 |            | Project (Number/Name)<br>C97 / ACFT Avionics |            |                  |                  |            |                          |
| Support (\$ in Millions)                                    |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO                               |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location                                 | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| DGNS RSAM Flight Test Support                               | Various                | AMRDEC Aviation Engineering Directorate : Redstone Arsenal, AL | -           | -       |  | 0.125   | Jun 2019   | 0.055           | Jun 2020   | -  |            | 0.055            | 0.000            | 0.180      | -                        |
| EAGLE M-Code / EGI RSAM Flight Test Support                 | Various                | AMRDEC Aviation Engineering Directorate : Redstone Arsenal, AL | -           | -       |  | 0.173   | Jun 2019   | 0.125           | Jun 2020   | -  |            | 0.125            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>   |                        |  | -           | -       |  | 0.298   |            | 0.180           |            | -  |            | 0.180            | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                        |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO                               |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location                                 | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| DGNS RSAM Airworthiness Qualification Testing               | RO                     | Redstone Test Center : Redstone Arsenal, AL                    | -           | -       |  | 0.125   | Jun 2019   | 0.075           | Jun 2020   | -  |            | 0.075            | 0.000            | 0.200      | -                        |
| EAGLE M-Code / EGI RSAM Airworthiness Qualification Testing | RO                     | Redstone Test Center : Redstone Arsenal, AL                    | -           | -       |  | 0.134   | Jun 2019   | 0.225           | Jun 2020   | -  |            | 0.225            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>   |                        |  | -           | -       |  | 0.259   |            | 0.300           |            | -  |            | 0.300            | Continuing       | Continuing | N/A                      |
|   |                        |  | Prior Years | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO                               |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                                  |                        |  | 2.013       | 20.112  |  | 16.727  |            | 11.187          |            | -  |            | 11.187           | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>  |                        |  |             |         |  |         |            |                 |            |  |            |                  |                  |            |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

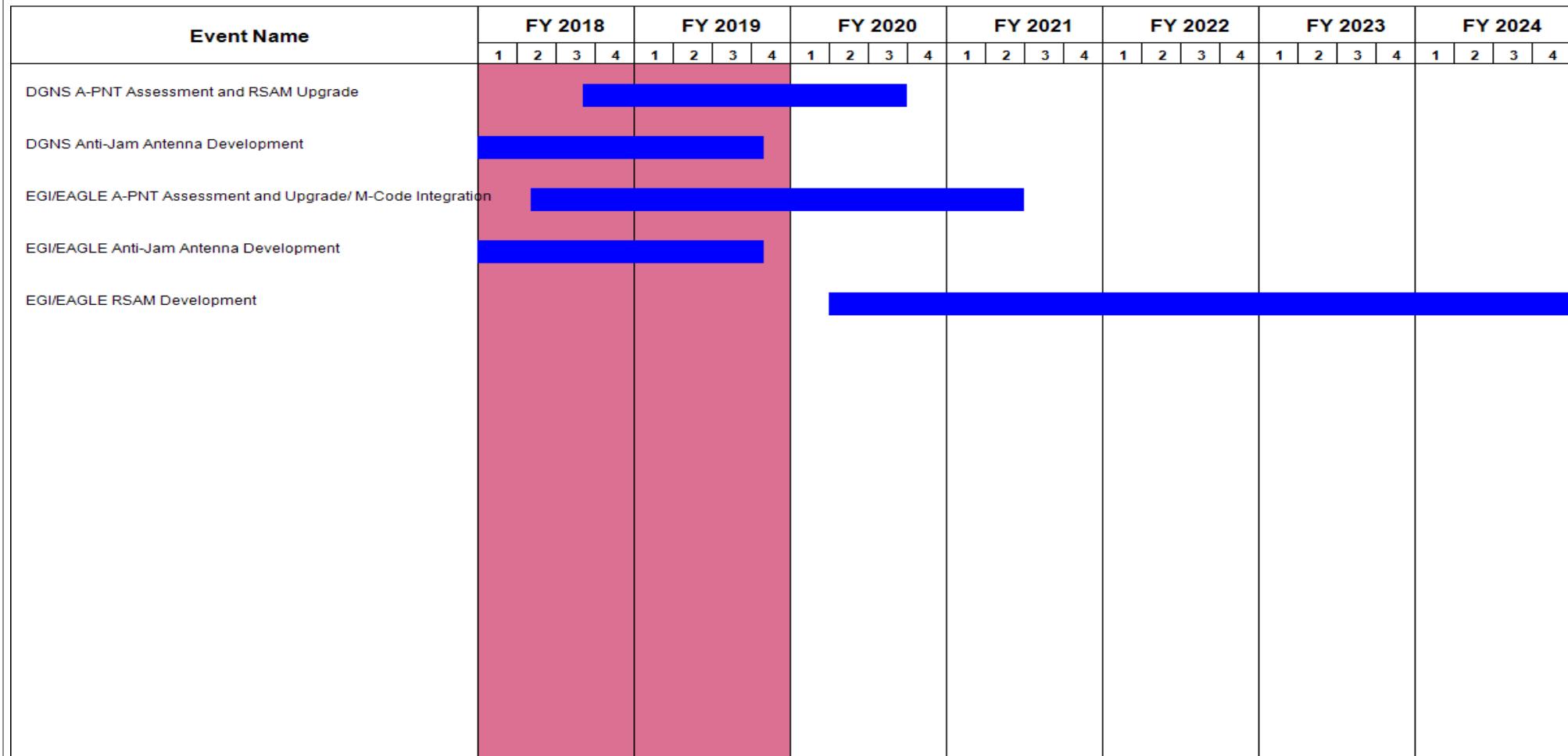
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604201A / Aircraft Avionics

**Project (Number/Name)**

C97 / ACFT Avionics



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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army         |  |  | Date: March 2019 |
|--|--|--|------------------|
| Appropriation/Budget Activity<br>2040 / 5                  | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics | Project (Number/Name)<br>C97 / ACFT Avionics |                  |
| Schedule Details   |  |  |                  |
| Events   | Start  | End  |                  |
| Events   | Quarter  | Year   | Quarter          |
| DGNS A-PNT Assessment and RSAM Upgrade                     | 3  | 2018   | 3                |
| DGNS Anti-Jam Antenna Development                          | 4  | 2016   | 4                |
| EGI/EAGLE A-PNT Assessment and Upgrade/ M-Code Integration | 2  | 2018   | 2                |
| EGI/EAGLE Anti-Jam Antenna Development                     | 4  | 2016   | 4                |
| EGI/EAGLE RSAM Development                                 | 2  | 2020   | 2                |
|  |  |  | 2025             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  | Date: March 2019 |                  |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|------------------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |               |         |         | Project (Number/Name)<br>EW7 / Degraded Visual Environment |                  |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024          | Cost To Complete | Total Cost |
| EW7: Degraded Visual Environment                        | -           | 7.941   | 14.724  | 17.161       | -  | 17.161        | 2.012   | 2.557   | 2.210  | 4.699            | 0.000            | 51.304     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -  | -                | -                |            |

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

The Fiscal Year (FY) 2020 budget request funds the development and integration of the Environment Exploitation System (EES) on Army aviation platforms to achieve a tactical advantage and increase aircrew situational awareness and survivability during adverse flight conditions.

The Degraded Visual Environments (DVE) program portfolio includes DVE Army Directed Requirement (DR) and EES.

The DVE DR is to provide DVE systems to 15 HH-60M Blackhawk MEDEVAC helicopters and 25 Special Operations aircraft. The DVE DR fulfills an immediate DVE requirement while bridging the gap between future DVE capabilities. The DVE DR system provides a forward looking, situational awareness, fused-sensor image for single aircraft takeoff and landing in brownout conditions. The program will complete development and test efforts in support of the DVE DR in FY 2019.

The EES program focuses on development and maturation of active and passive sensors, synthetic vision, sensor and software data fusion, imagery processing, user interface, and multicore processing technologies to enable current and future capabilities and innovative technical solutions for the current Army aviation fleet to safely operate in DVE. EES will equip Combat Aviation Brigades with evolving modular DVE solutions creating revolutionary tactical advantages while increasing survivability.

The DVE Increment I Capability Development Document outlining the DVE requirement for the UH-60 and CH-47 to takeoff, land and perform ground taxi operations in brownout conditions was removed from Army staffing in February 2018.

| B. Accomplishments/Planned Programs (\$ in Millions)  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---------|---------|--------------|-------------|---------------|
| <p><b>Title:</b> Degraded Visual Environment (DVE)</p> <p><b>Description:</b> The Degraded Visual Environments (DVE) program portfolio includes DVE Army Directed Requirement (DR) and Environment Exploitation System (EES).</p> <p>The DVE DR is to provide DVE systems to 15 HH-60M Blackhawk MEDEVAC helicopters and 25 Special Operations aircraft. The DVE DR fulfills an immediate DVE requirement while bridging the gap between future DVE capabilities. The DVE DR system provides a forward looking, situational awareness, fused-sensor image for single aircraft takeoff and landing in brownout conditions. The program will complete development and test efforts in support of the DVE DR in FY 2019.</p> | 7.941   | 14.185  | 17.161       | -           | 17.161        |

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|  |   |                |   |                         |                      |
|--|---|----------------|---|-------------------------|----------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   |                |   | <b>Date:</b> March 2019 |                      |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604201A / Aircraft Avionics |                | <b>Project (Number/Name)</b><br>EW7 / Degraded Visual Environment |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b>   | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| The EES program focuses on development and maturation of active and passive sensors, synthetic vision, sensor and software data fusion, imagery processing, user interface, and multicore processing technologies to enable current and future capabilities and innovative technical solutions for the current Army aviation fleet to safely operate in DVE. EES will equip Combat Aviation Brigades with evolving modular DVE solutions creating revolutionary tactical advantages while increasing survivability.<br><br>The DVE Increment I Capability Development Document outlining the DVE requirement for the UH-60 and CH-47 to takeoff, land and perform ground taxi operations in brownout conditions was removed from Army staffing in February 2018. |   |                |   |                         |                      |
| <b>FY 2019 Plans:</b><br>DVE DR developmental test began in June of FY 2018 and will continue through May of FY 2019.  |   |                |   |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Develop and mature active and passive sensors, synthetic vision, sensor and software data fusion, imagery processing, user interface, and multicore processing technologies for aviation capabilities and innovate technical solutions for the current Army aviation fleet to safely operate in DVE. Continue system architecture development, modeling and simulation, multi-use sensor integration and demonstrations. Initiate DVE application development for aviation multicore common server, sensor characterization, and platform integration and conduct technology demonstrations.   |   |                |   |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase in funding as DVE DR development effort transitions to EES development efforts.   |   |                |   |                         |                      |
| <b>Title:</b> FY2019 SBIR STTR Transfer<br><b>Description:</b> FY2019 SBIR STTR Transfer   | -   | 0.539          | -   | -                       | -                    |
| <b>FY 2019 Plans:</b><br>FY2019 SBIR STTR Transfer   |   |                |   |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY2019 SBIR STTR Transfer  |   |                |   |                         |                      |
| <b>Accomplishments/Planned Programs Subtotals</b>  |   | 7.941          | 14.724  | 17.161                  | - 17.161             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |         |  |         |         |         |  |         |         | Date: March 2019            |
|---|---------|---------|--|---------|---------|---------|--|---------|---------|-----------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |         |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |         |         |         | Project (Number/Name)<br>EW7 / Degraded Visual Environment |         |         |                             |
| C. Other Program Funding Summary (\$ in Millions)   |         |         |  |         |         |         |  |         |         |                             |
| Line Item   | FY 2018 | FY 2019 | FY 2020  | FY 2020 | FY 2020 | FY 2021 | FY 2022  | FY 2023 | FY 2024 | Cost To Complete Total Cost |
| • A00713: Degraded Visual Environment   | -       | 30.000  | 0.000  | 49.450  | 49.450  | 49.450  | -  | -       | -       | 0.000 128.900               |
| Remarks   |         |         |  |         |         |         |  |         |         |                             |
| D. Acquisition Strategy   |         |         |  |         |         |         |  |         |         |                             |
| The DVE DR acquisition strategy is to leverage an existing contract competitively awarded by the Technology Applications Program Office. Another Government Agency will perform the installation of the DVE DR system into the designated aircraft. A disposition analysis of the DVE DR will inform future DVE requirements for both current and future Army aviation platforms. |         |         |  |         |         |         |  |         |         |                             |
| E. Performance Metrics  |         |         |  |         |         |         |  |         |         |                             |
| N/A   |         |         |  |         |         |         |  |         |         |                             |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army      |                        |  |             |         |  |         |            |                 |            |  |            |                  | Date: March 2019 |            |                          |
|---|------------------------|--|-------------|---------|--|---------|------------|-----------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                   |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |         |            |                 |            | Project (Number/Name)<br>EW7 / Degraded Visual Environment |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                        |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location                                 | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| PM Support for DR   | Various                | Various : Various  | -           | 1.606   | Oct 2017   | 3.862   | Oct 2018   | -               | -          | -  | -          | -                | 0.000            | 5.468      | Continuing               |
| PM Support for EES  | Various                | Various : Various  | -           | -       | -  | -       | -          | 0.860           | Oct 2019   | -  | -          | 0.860            | Continuing       | Continuing | -                        |
| FY2019 SBIR STTR Transfer                                   | TBD                    | HQDA : Washington D.C.   | -           | -       | -  | 0.539   | Oct 2018   | -               | -          | -  | -          | -                | 0.000            | 0.539      | -                        |
| <b>Subtotal</b>   |                        |  | -           | 1.606   |  | 4.401   |            | 0.860           |            | -  | -          | 0.860            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                        |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location                                 | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Develop and qualify the A-Kit software and hardware for DR  | MIPR                   | Aviation Development Directorate-Eustis : Ft. Eustis, Virginia | -           | 2.819   | Jul 2018   | 1.800   | Dec 2018   | -               | -          | -  | -          | -                | 0.000            | 4.619      | Continuing               |
| Develop and qualify software and hardware for DR            | Various                | Various : Various  | -           | -       | -  | 1.774   | Mar 2019   | -               | -          | -  | -          | -                | 0.000            | 1.774      | -                        |
| Develop and qualify the software and hardware for EES       | TBD                    | TBD : TBD  | -           | -       | -  | -       | -          | 7.000           | Jan 2020   | -  | -          | 7.000            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>   |                        |  | -           | 2.819   |  | 3.574   |            | 7.000           |            | -  | -          | 7.000            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                                    |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location                                 | 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, Logistics and Technical Support for DR  | Various                | Various : Various  | -           | 1.411   | Mar 2019   | 2.649   | May 2019   | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
| System Engineering, Logistics and Technical Support for EES | TBD                    | TBD : TBD  | -           | -       | -  | -       | -          | 1.791           | Mar 2020   | -  | -          | 1.791            | 0.000            | 1.791      | -                        |
| <b>Subtotal</b>   |                        |  | -           | 1.411   |  | 2.649   |            | 1.791           |            | -  | -          | 1.791            | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |         |  |         |            |                 |            |  |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---------|--|---------|------------|-----------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |         |            |                 |            | Project (Number/Name)<br>EW7 / Degraded Visual Environment |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location   | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Airworthiness and Qualification Testing for DR         | MIPR                   | Redstone Test Center, Aviation Applied Technology Directorate : Redstone Arsenal, AL | -           | 2.105   | Aug 2018   | 3.100   | Mar 2019   | -               | -          | -  | -          | -                | 0.000            | 5.205      | -                        |
| DVEPS System Characterization for DR                   | MIPR                   | Yuma Testing Center : Yuma Proving Ground, AZ  | -           | -       |  | 1.000   | Jun 2019   | -               | -          | -  | -          | -                | 0.000            | 1.000      | -                        |
| Airworthiness and Qualification Testing for EES        | TBD                    | TBD : TBD  | -           | -       |  | -       |            | 7.510           | May 2020   | -  | -          | 7.510            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |  | -           | 2.105   |  | 4.100   |            | 7.510           |            | -  |            | 7.510            | Continuing       | Continuing | N/A                      |
|  |                        |  | Prior Years | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |  | -           | 7.941   |  | 14.724  |            | 17.161          |            | -  |            | 17.161           | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>   |                        |  |             |         |  |         |            |                 |            |  |            |                  |                  |            |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

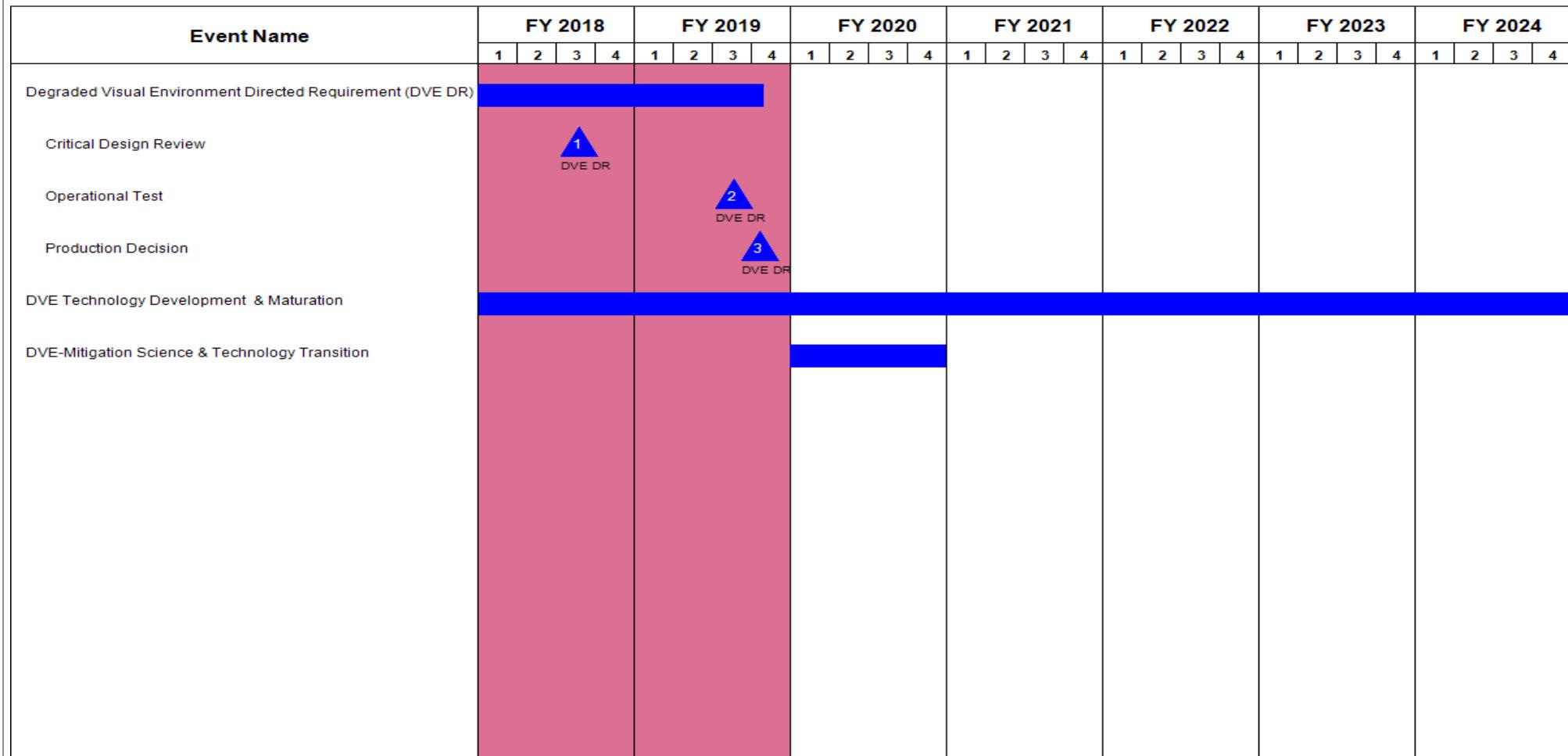
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604201A / Aircraft Avionics

**Project (Number/Name)**

EW7 / Degraded Visual Environment



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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army        |  |  | Date: March 2019 |
|---|--|--|------------------|
| Appropriation/Budget Activity<br>2040 / 5                 | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics | Project (Number/Name)<br>EW7 / Degraded Visual Environment |                  |
| Schedule Details  |  |  |                  |
| Events  | Start  | End  |                  |
| Events  | Quarter  | Year   | Quarter          |
| Degraded Visual Environment Directed Requirement (DVE DR) | 3  | 2017   | 4                |
| Critical Design Review                                    | 3  | 2018   | 3                |
| Operational Test  | 3  | 2019   | 3                |
| Production Decision                                       | 4  | 2019   | 4                |
| DVE Technology Development & Maturation                   | 1  | 2018   | 4                |
| DVE-Mitigation Science & Technology Transition            | 1  | 2020   | 4                |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |               |         |         | Project (Number/Name)<br>VU3 / Networking And Mission Planning |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To Complete | Total Cost |  |
| VU3: <i>Networking And Mission Planning</i>             | -           | 2.759   | 0.802   | 0.816        | -  | 0.816         | 0.837   | 0.928   | 1.034  | 1.246   | 0.000            | 8.422      |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -  | -       | -                |            |  |

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

The Fiscal Year (FY) 2020 budget estimate submission request funds the development of Networking and Mission Planning systems required to horizontally and vertically integrate the battlefield and the integration of those systems into Army aircraft. Tasks in this Project support research, development, and test efforts in the Engineering and Manufacturing Development phases of these systems.

The Aviation Data Exploitation Capability (ADEC) is an Army aviation automated information system program providing specific capabilities needed at the aviation unit level to implement and support improvements within aviation operations, safety, and training to increase operational effectiveness and situational awareness at all command echelons. ADEC provides a common and interoperable capability required to implement the DoD mandated Military Flight Operations Quality Assurance processes. ADEC will standardize flight scheduling/management, risk management, mission approval, and flight data analysis and visualization. ADEC provides interfaces to Centralized Aviation Flight Records System (CAFRS) to reduce data entry and the information technology footprint while enabling disconnected and split based operations.

The Improved Data Modem (IDM) is the common solution for digitizing Army Aviation and is fielded on every modernized, rotary-wing Army aircraft, including the CH-47 Chinook, AH-64 Apache and UH-60 Black Hawk. The IDM-401 provides the Army rotary-wing fleet with critical communication capabilities, performing as an internet controller and gateway to the Tactical Internet (TI) and Fire Support (FS) internet. The IDM enables connectivity to multiple radios used by rotary-wing aircraft and the Blue Force Tracker transceiver, as well as providing the means for rapid data transfer. The Multi-Core Processor (MCP)-501 modification effort will be a technology replacement for the current Army IDM-401. The MCP-501 will satisfy Army requirements for hardware, software, and firmware and be able to satisfy cybersecurity requirements. The MCP-501 will replace the current IDM-401 with a common server capability to support current and additional IDM-401 functionality that are common among multiple Army Aviation platforms and become a core component of the Digital Backbone for Army rotary wing aircraft.

The Aviation Mission Planning System (AMPS) is a decision support and battle synchronization system for automated mission planning, risk assessment, and transfer of mission data to aviation platforms in support of Mission Command functions within an Aviation unit. This includes route generation, performance planning, communications planning, terrain analysis, data transfer, and mission rehearsal. It also provides connectivity to Army Mission Command Systems. The AMPS efforts support the advancement of Army Aviation Mission Planning from the legacy Hardware/Software solution to a mobile, Future Airborne Capability Environment/Open Architecture conformant, hardware agnostic system. These efforts will include development and testing of a new underlying architecture to support the move of Army Aviation Mission Planning from the current structure to one that supports synchronization both vertically and horizontally between Aviation and Ground forces. It will allow for a modular, multipronged approach to meet the needs of the various planning and execution environments and allow aircrews to continually plan and update route, threat and performance data throughout all phases of an Aviation mission. Development of a mobile aircraft performance planning/weight & balance calculator is currently underway and will be the first migration of AMPS capabilities to a mobile hardware agnostic environment.

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |   |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604201A / Aircraft Avionics | <b>Project (Number/Name)</b><br>VU3 / Networking And Mission Planning |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| <b>Title:</b> Improved Data Modem (IDM)   |   | 0.800   | 0.802          | 0.816               | -                       | 0.816                |
| <b>Description:</b> The IDM provides digital connectivity among airborne and ground platforms and transmission of air-to-air target data between IDM equipped aircraft using existing radio and crypto equipment.   |   |   |                |                     |                         |                      |
| <b>FY 2019 Plans:</b><br>Conduct market research, prepare requests for information (RFI), perform requirements determination and Size, Weight, and Power research on Army helicopter platforms, and develop Airworthiness Qualification Plan in support of Multi-Core Processor (MCP)-501 hardware which will be an upgrade, and eventual replacement for the current IDM-401.  |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Finalize specifications for MCP-501 hardware, prepare request for proposals (RFP) from industry, and publish solicitation for eventual award of developmental contract.   |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>IDM's increase in RDTE from FY 2019 to FY 2020 can be attributed to transition from cybersecurity efforts to the modification of IDM-401 hardware to enable its evolution to the MCP-501.   |   |   |                |                     |                         |                      |
| <b>Title:</b> Aviation Data Exploitation Capability (ADEC)  |   | 0.018   | -              | -                   | -                       | -                    |
| <b>Description:</b> The ADEC is an Army aviation automated information system program providing specific capabilities needed at the aviation unit level to implement and support improvements within aviation operations, safety, and training to increase operational effectiveness and situational awareness at all command echelons. ADEC provides a common and interoperable capability required to implement the DoD mandated Military Flight Operations Quality Assurance processes. ADEC will standardize flight scheduling/management, risk management, mission approval, and flight data analysis and visualization. ADEC provides interfaces to CAFRS to reduce data entry and the information technology footprint while enabling disconnected and split based operations. |   |   |                |                     |                         |                      |
| <b>Title:</b> Aviation Mission Planning System (AMPS)   |   | 1.941   | -              | -                   | -                       | -                    |
| <b>Description:</b> The AMPS is a decision support and battle synchronization system for automated mission planning, risk assessment, and transfer of mission data to aviation platforms in support of Mission Command functions within an Aviation unit. This includes route generation, performance planning, communications planning, terrain analysis, data transfer, and mission rehearsal. It also provides connectivity to Army Mission Command Systems. The AMPS efforts support the advancement of Army Aviation Mission Planning from the   |   |   |                |                     |                         |                      |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |         |  |             |               |  |         |         |         | Date: March 2019 |             |               |  |  |  |
|---|---------|---------|--|-------------|---------------|--|---------|---------|---------|------------------|-------------|---------------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5   |         |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |             |               | Project (Number/Name)<br>VU3 / Networking And Mission Planning |         |         |         |                  |             |               |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |         |         |  |             |               |  |         |         |         | FY 2018          | FY 2019     |               |  |  |  |
| legacy Hardware/Software solution to a mobile, Future Airborne Capability Environment/Open Architecture conformant, hardware agnostic system. These efforts will include development and testing of a new underlying architecture to support the move of Army Aviation Mission Planning from the current structure to one that supports synchronization both vertically and horizontally between Aviation and Ground forces. It will allow for a modular, multipronged approach to meet the needs of the various planning and execution environments and allow aircrews to continually plan and update route, threat and performance data throughout all phases of an Aviation mission. |         |         |  |             |               |  |         |         |         | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |         |         |  |             |               |  |         |         |         | 2.759            | 0.802       | 0.816         |  |  |  |
|   |         |         |  |             |               |  |         |         |         | -                | 0.816       |               |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |         |  |             |               |  |         |         |         |                  |             |               |  |  |  |
| Line Item   | FY 2018 | FY 2019 | FY 2020 Base   | FY 2020 OCO | FY 2020 Total | FY 2021  | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost  |               |  |  |  |
| • AA0712: Network And Mission Plan  | 132.402 | 118.614 | 105.442  | 0.010       | 105.452       | 77.687   | 42.617  | 50.718  | 43.510  | Continuing       | Continuing  |               |  |  |  |
| <b>Remarks</b>  |         |         |  |             |               |  |         |         |         |                  |             |               |  |  |  |
| <b>D. Acquisition Strategy</b>  |         |         |  |             |               |  |         |         |         |                  |             |               |  |  |  |
| This project is comprised of multiple systems supporting aircraft avionics. While the detailed acquisition strategy varies from program to program, the general strategy is for each individual program to complete the development and testing efforts in coordination with the aircraft platforms on integration issues, use the various contracts of the aircraft platforms original equipment manufacturers on integration efforts, and utilize the Aviation & Missile Research, Development, and Engineering Center for software development. The Product Directorate Office continues to look for other competitive options to decrease cost and schedule.                        |         |         |  |             |               |  |         |         |         |                  |             |               |  |  |  |
| <b>E. Performance Metrics</b>   |         |         |  |             |               |  |         |         |         |                  |             |               |  |  |  |
| N/A   |         |         |  |             |               |  |         |         |         |                  |             |               |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |         |  |         |            |                 |            |  |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---------|--|---------|------------|-----------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |         |            |                 |            | Project (Number/Name)<br>VU3 / Networking And Mission Planning |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location   | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| PM Support (IDM)                                       | MIPR                   | PM ANMP : Redstone Arsenal, AL   | -           | 0.050   | Jul 2018   | 0.015   | Dec 2018   | 0.041           | Mar 2019   | -  |            | 0.041            | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>  | -           | 0.050   |  | 0.015   |            | 0.041           |            | -  |            | 0.041            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location   | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Qualify ADEC software and hardware                     | MIPR                   | Aviation Missile Research Development Engineering Center (AMRDEC) : Redstone Arsenal, AL | 17.388      | 0.018   | Feb 2018   | -       |            | -               |            | -  |            | -                | 0.000            | 17.406     | -                        |
| Develop software for IDM                               | C/Various              | Aviation Missile Research Development Engineering Center (AMRDEC) : Redstone Arsenal, AL | -           | 0.578   | Aug 2018   | 0.787   | Apr 2019   | 0.775           | Mar 2019   | -  |            | 0.775            | Continuing       | Continuing | Continuing               |
| Develop AMPS Software                                  | TBD                    | Aviation Missile Research Development Engineering Center (AMRDEC) : Redstone Arsenal, AL | -           | 1.590   | Sep 2018   | -       |            | -               |            | -  |            | -                | 0.000            | 1.590      | -                        |
|  |                        | <b>Subtotal</b>  | 17.388      | 2.186   |  | 0.787   |            | 0.775           |            | -  |            | 0.775            | Continuing       | Continuing | N/A                      |
|  |                        |  |             |         |  |         |            |                 |            |  |            |                  |                  |            |                          |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army      |                        |  |             |         |  |         |            |                 |            |  |            |                  | Date: March 2019 |            |                          |
|---|------------------------|--|-------------|---------|--|---------|------------|-----------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                   |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |         |            |                 |            | Project (Number/Name)<br>VU3 / Networking And Mission Planning |            |                  |                  |            |                          |
| Support (\$ in Millions)                                    |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location   | 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, Logistics, and Technical Support (ADEC) | Various                | Army Test & Evaluation (ATEC), Aberdeen, MD; AMRDEC : Redstone Arsenal, AL               | 1.193       | -       |  | -       |            | -               |            | -  |            | -                | 0.000            | 1.193      | -                        |
| System Engineering, Logistics, and Technical Support (IDM)  | MIPR                   | Aviation Missile Research Development Engineering Center (AMRDEC) : Redstone Arsenal, AL | -           | 0.172   | Dec 2018   | -       |            | -               |            | -  |            | -                | 0.000            | 0.172      | -                        |
| System Engineering, Logistics, and Technical Support (AMPS) | MIPR                   | Aviation Missile Research Development Engineering Center (AMRDEC) : Redstone Arsenal, AL | -           | 0.351   | Sep 2018   | -       |            | -               |            | -  |            | -                | 0.000            | 0.351      | -                        |
| <b>Subtotal</b>   |                        |  | 1.193       | 0.523   |  | -       |            | -               |            | -  |            | -                | 0.000            | 1.716      | N/A                      |
| Test and Evaluation (\$ in Millions)                        |                        |  |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location   | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| ADEC  | Various                | Army Test & Evaluation Command (ATEC), Aberdeen MD; AMRDEC : Redstone Arsenal, AL        | 4.589       | -       |  | -       |            | -               |            | -  |            | -                | 0.000            | 4.589      | -                        |
| <b>Subtotal</b>   |                        |  | 4.589       | -       |  | -       |            | -               |            | -  |            | -                | 0.000            | 4.589      | N/A                      |
|   |                        |  |             |         |  |         |            |                 |            |  |            |                  |                  |            |                          |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                     |         |  |         |       |                 |  |                |   | Date: March 2019 |                     |               |                                |
|--|---------------------|---------|--|---------|-------|-----------------|--|----------------|---|------------------|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                     |         | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |         |       |                 | Project (Number/Name)<br>VU3 / Networking And Mission Planning |                |   |                  |                     |               |                                |
|  | Prior<br>Years      | FY 2018 |  | FY 2019 |       | FY 2020<br>Base |  | FY 2020<br>OCO |   | FY 2020<br>Total | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
|  | Project Cost Totals | 23.170  | 2.759  |         | 0.802 |                 | 0.816  |                | - | 0.816            | Continuing          | Continuing    | N/A                            |
| <b>Remarks</b>   |                     |         |  |         |       |                 |  |                |   |                  |                     |               |                                |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army |         |   |   |   |  |   |   |   |         |  |   |   |         | Date: March 2019 |   |   |         |   |   |   |         |   |   |   |  |
|---|---------|---|---|---|--|---|---|---|---------|--|---|---|---------|------------------|---|---|---------|---|---|---|---------|---|---|---|--|
| Appropriation/Budget Activity<br>2040 / 5         |         |   |   |   | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics |   |   |   |         | Project (Number/Name)<br>VU3 / Networking And Mission Planning |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |  |
| Event Name  | FY 2018 |   |   |   | FY 2019  |   |   |   | FY 2020 |  |   |   | FY 2021 |                  |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |  |
|   | 1       | 2 | 3 | 4 | 1  | 2 | 3 | 4 | 1       | 2  | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |  |
| Qualify ADEC Hardware and Software                |         |   |   |   |  |   |   |   |         |  |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |  |
| Develop IDM Software                              |         |   |   |   |  |   |   |   |         |  |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |  |
| Develop AMPS Software                             |         |   |   |   |  |   |   |   |         |  |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |  |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |  |  | Date: March 2019 |
|--|--|--|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604201A / Aircraft Avionics | Project (Number/Name)<br>VU3 / Networking And Mission Planning |                  |
| Schedule Details                                   |  |  |                  |
| Events   | Start  | End  |                  |
| Events   | Quarter  | Year   | Quarter          |
| Qualify ADEC Hardware and Software                 | 2  | 2011   | 2                |
| Develop hardware and software (ACN)                | 1  | 2012   | 4                |
| Develop IDM Software                               | 4  | 2018   | 4                |
| Develop AMPS Software                              | 1  | 2018   | 4                |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)            |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604270A / Electronic Warfare 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   | -           | 68.935  | 58.627  | 70.539       | -  | 70.539        | 51.711  | 23.397  | 9.811   | 7.909   | 0.000            | 290.929    |
| DX5: Electronic Warfare And Management Tool   | -           | 31.809  | 18.295  | 23.514       | -  | 23.514        | 8.251   | 7.039   | 2.019   | 0.000   | 0.000            | 90.927     |
| DX6: Multi-Function Electronic Warfare (MFEW)   | -           | 23.376  | 31.688  | 41.574       | -  | 41.574        | 38.183  | 11.272  | 5.659   | 5.750   | 0.000            | 157.502    |
| ET7: Radio Frequency Interference Mitigation  | -           | 4.276   | 0.999   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 5.275      |
| VS6: Integrated Electronic Warfare Systems  | -           | 9.474   | 7.645   | 5.451        | -  | 5.451         | 5.277   | 5.086   | 2.133   | 2.159   | 0.000            | 37.225     |

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

This program element (PE) encompasses engineering and manufacturing development for tactical Electronic Warfare (EW). The Integrated Electronic Warfare System (IEWS) is a capability set that integrates electronic attack, protect and support functions to dramatically improve the ability to seize, retain, and exploit an advantage within the electromagnetic spectrum (EMS). It is based on a modular, scalable and open architecture to allow Army Brigade Combat Team (BCT) and Joint Force Commander's to tailor capability responses against a variety of EW threats/scenarios.

The IEWS capability set is structured along four program lines of effort: 1) Project DX5 Electronic Warfare Planning and Management Tools (EWPMT), 2) Project DX6 Multi-Function EW (MFEW), 3) Project VS6 Counter Radio-Controlled Improvised Explosive Devices (RCIED) Electronic Warfare (CREW) which provides current defensive electronic attack capability, and 4) Project ET7 Radio Frequency Interference Mitigation (RIM) which resolves radio frequency interference and electromagnetic fratricide and enables electronic warfare and communications compatibility.

Project DX5 - The Electronic Warfare Planning and Management Tool (EWPMT) is a software solution that provides the Commander, their staff (Electronic Warfare Officer (EWO) and Spectrum Manager), and the Cyber Electromagnetic Activities (CEMA) working group/cell the ability to control, manage, and dominate the Electromagnetic Spectrum (EMS) in order to fight in contested and congested EMS/Cyber environments. EWPMT will provide: capabilities to plan, coordinate, manage, and de-conflict Electronic Warfare (EW) activities, the ability for remote control & management of EW assets to conduct offensive and defensive Electronic Attack and cyber, EW targeting, enable maneuver through CEMA operations, and synchronize EW, Spectrum Management Operations (SMO) and CEMA across Intelligence, Operations, and Signals. EWPMT will integrate essential data elements to include but not limited to Mission Command, Intelligence, Fires, Signals to successfully execute Multi-Domain Operations and meet the Commander's needs and desired effects.

Project DX6 - The Multi-Function EW (MFEW) is a capability set that will provide the BCT Commander with an organic Electronic Attack (EA) and Electronic Warfare Support (ES) capability. MFEW variants empower Commanders to shape the Electromagnetic Spectrum (EMS) to their advantage. MFEW will provide commanders with an organic EW capability that dramatically improves a land force's ability to seize, retain, and exploit an advantage within the EMS in order to execute successful

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>  |   |                |                     | <b>Date:</b> March 2019 |                      |  |  |  |
|--|---|----------------|---------------------|-------------------------|----------------------|--|--|--|
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> |                |                     |                         |                      |  |  |  |
| unified land operations. These capabilities give the commander a competitive advantage by denying, degrading the enemy's ability to conduct Command and Control (C2), Intelligence, Surveillance and Reconnaissance (ISR), and targeting; and allows the commander to optimize effects within the EMS at the time and place of their choosing. These systems are networked with a C2 system that enables remote operation and dynamic tasking/reprogramming. |   |                |                     |                         |                      |  |  |  |
| Project ET7 - Radio Frequency Interference Mitigation (RIM) is a cross cutting capability to centrally manage and provide oversight to identify, define, test, and coordinate development of Radio Frequency (RF) interference mitigation material solutions to resolve mutual RF interference and electromagnetic fratricide for Spectrum Dependent Systems (SDS).  |   |                |                     |                         |                      |  |  |  |
| Project VS6 - Counter Radio Controlled Improvised Explosive Device (RCIED) Electronic Warfare (CREW) provides for protection for ground forces operating in vehicle convoys, single vehicle operations and fixed locations in all theatres of operations. It is programmable to migrate with the evolving threat and provides non-lethal capabilities which enable freedom of movement across depth/breadth of the operational environment.                  |   |                |                     |                         |                      |  |  |  |
| <b>B. Program Change Summary (\$ in Millions)</b>  | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |  |  |  |
| Previous President's Budget  | 71.671  | 78.699         | 88.746              | -                       | 88.746               |  |  |  |
| Current President's Budget   | 68.935  | 58.627         | 70.539              | -                       | 70.539               |  |  |  |
| Total Adjustments  | -2.736  | -20.072        | -18.207             | -                       | -18.207              |  |  |  |
| • Congressional General Reductions   | -0.056  | -0.072         |                     |                         |                      |  |  |  |
| • Congressional Directed Reductions  | -   | -20.000        |                     |                         |                      |  |  |  |
| • Congressional Rescissions  | -   | -              |                     |                         |                      |  |  |  |
| • Congressional Adds   | -   | -              |                     |                         |                      |  |  |  |
| • Congressional Directed Transfers   | -   | -              |                     |                         |                      |  |  |  |
| • Reprogrammings   | -   | -              |                     |                         |                      |  |  |  |
| • SBIR/STTR Transfer   | -2.680  | -              |                     |                         |                      |  |  |  |
| • Adjustments to Budget Years  | -   | -              | -18.207             | -                       | -18.207              |  |  |  |
| <b>Change Summary Explanation</b>  |   |                |                     |                         |                      |  |  |  |
| In FY 2020, \$5.759 million was reduced as a result of Radio Frequency Interference Mitigation (RIM), Project ET7 cancellation.  |   |                |                     |                         |                      |  |  |  |
| In FY 2020, the reduction of \$12.448 million represents program rephrasing of Base funding from FY 2020 to out years.   |   |                |                     |                         |                      |  |  |  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |               |         |         | Project (Number/Name)<br>DX5 / Electronic Warfare And Management Tool |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| DX5: Electronic Warfare And Management Tool             | -           | 31.809  | 18.295  | 23.514       | -   | 23.514        | 8.251   | 7.039   | 2.019   | 0.000   | 0.000            | 90.927     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                |            |  |

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

The Electronic Warfare Planning and Management Tool (EWPMT) is a software solution that provides the Commander, their staff (Electronic Warfare Officer (EWO) and Spectrum Manager), and the Cyber Electromagnetic Activities (CEMA) working group/cell the ability to control, manage, and dominate the Electromagnetic Spectrum (EMS) in order to fight in contested and congested EMS/Cyber environments. EWPMT will provide: capabilities to plan, coordinate, manage, and de-conflict Electronic Warfare (EW) activities, the ability for remote control & management of EW assets to conduct offensive and defensive Electronic Attack and cyber, EW targeting, enable maneuver through CEMA operations, and synchronize EW, Spectrum Management Operations (SMO) and CEMA across Intelligence, Operations, and Signals. EWPMT will integrate essential data elements to include but not limited to Mission Command, Intelligence, Fires, Signals to successfully execute Multi-Domain Operations and meet the Commander's needs and desired effects.

**Justification:**

FY2020 Base funds in the amount of \$23.514 million will continue Capability Drop 4 (CD4) development, as well as continue CD3 testing and support activities for the EWPMT program.

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

**Title:** EWPMT

**Description:** EWPMT is a software application that will allow the Commander, staff, and CEMA element a mission command capability to plan, coordinate, manage, and de-conflict unit EW and spectrum management activities across Intelligence, Operations, and Signals.

**FY 2019 Plans:**

Continue CD3 development, test and support activities

Award CD4 development, test and support activities

**FY 2020 Plans:**

Complete CD3 testing and deliver CD3 baseline

Continue CD4 development, test and support activities

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

|  | FY 2018 | FY 2019 | FY 2020 |
|--|---------|---------|---------|
|  | 31.809  | 17.714  | 23.514  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |                |                |   |                |                |                |                |   |                | Date: March 2019        |                   |
|---|----------------|----------------|---|----------------|----------------|----------------|----------------|---|----------------|-------------------------|-------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> |                |                |                |                | <b>Project (Number/Name)</b><br>DX5 / <i>Electronic Warfare And Management Tool</i> |                |                         |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |   |                | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> |   |                |                         |                   |
| An increase of \$5.800 million is to support completion of CD3 testing overlapping with the continued CD4 development in FY 2020  |                |                |   |                | -              | 0.581          | -              |   |                |                         |                   |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer<br><b>FY 2019 Plans:</b><br>FY 2019 SBIR/STTR Transfer   |                |                |   |                |                |                |                |   |                |                         |                   |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR/STTR Transfer  |                |                |   |                |                |                |                |   |                |                         |                   |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |   |                |                |                |                | 31.809  | 18.295         | 23.514                  |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |   |                |                |                |                |   |                |                         |                   |
| Line Item   | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b>  | <b>FY 2020</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>  | <b>FY 2024</b> | <b>Cost To Complete</b> | <b>Total Cost</b> |
| • K00002: <i>EW Planning &amp; Management Tools (EWPMPT)</i>  | 5.805          | 5.875          | 7.568   | -              | 7.568          | 7.857          | 0.793          | -   | -              | Continuing              | Continuing        |
| <b>Remarks</b>  |                |                |   |                |                |                |                |   |                |                         |                   |
| EWPMPT Fielding Support which includes New Equipment Training (NET); delta training; Interim Contractor Support (ICS); and SETA Support.  |                |                |   |                |                |                |                |   |                |                         |                   |
| <b>D. Acquisition Strategy</b>  |                |                |   |                |                |                |                |   |                |                         |                   |
| EWPMPT is an Automated Information System (AIS) that will follow an evolutionary acquisition strategy using a Capability Drop (CD) construct for rapid development and integration of new Electronic Warfare and Spectrum Management capabilities to pace the near peer threats as well as provide for continuous product improvements. |                |                |   |                |                |                |                |   |                |                         |                   |
| <b>E. Performance Metrics</b>   |                |                |   |                |                |                |                |   |                |                         |                   |
| N/A   |                |                |   |                |                |                |                |   |                |                         |                   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army  |                        |   |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|---|------------------------|---|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |            |         |            | Project (Number/Name)<br>DX5 / Electronic Warfare And Management Tool |            |             |            |                  |                  |            |                          |
| 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 |
| PMO Staff/Travel  | Various                | PM Electronic Warfare & Cyber : Aberdeen Proving Ground, MD | 10.576      | 2.159   | Dec 2017   | -       |            | 0.100   | Mar 2020   | -           |            | 0.100            | 0.000            | 12.835     | -                        |
|   |                        | <b>Subtotal</b>   | 10.576      | 2.159   |            | -       |            | 0.100   |            | -           |            | 0.100            | 0.000            | 12.835     | 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 |
| EMD Contract - EWPMT CD1  | C/IDIQ                 | Raytheon : Fort Wayne, IN                                   | 18.200      | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 18.200     | 18.200                   |
| EMD Contract - EWPMT CD2  | C/IDIQ                 | Raytheon : Fort Wayne, IN                                   | 18.252      | 6.107   | Dec 2017   | -       |            | -   |            | -           |            | -                | 0.000            | 24.359     | 24.359                   |
| EMD Contract - EWPMT CD3  | C/IDIQ                 | Raytheon : Fort Wayne, IN                                   | -           | 18.020  | Apr 2018   | 10.607  | Dec 2018   | -   |            | -           |            | -                | 0.000            | 28.627     | 28.627                   |
| EMD Contract - EWPMT CD4  | C/IDIQ                 | Raytheon : Fort Wayne, IN                                   | -           | -   |            | 1.869   | Jun 2019   | 16.029  | Dec 2019   | -           |            | 16.029           | 10.102           | 28.000     | 28.000                   |
| FY 2019 SBIR / STTR Transfer  | TBD                    | TBD : TBD   | -           | -   |            | 0.581   |            | -   |            | -           |            | -                | 0.000            | 0.581      | -                        |
|   |                        | <b>Subtotal</b>   | 36.452      | 24.127  |            | 13.057  |            | 16.029  |            | -           |            | 16.029           | 10.102           | 99.767     | N/A                      |
| <b>Remarks</b>  |                        |   |             |   |            |         |            |   |            |             |            |                  |                  |            |                          |
| FY 2020 funds in the amount of \$16.029 million represent incremental funding for CD4 development on the CD4 Task Order to be awarded July 2019 |                        |   |             |   |            |         |            |   |            |             |            |                  |                  |            |                          |
| 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 |
| EWPMT Technical and Engineering Support   | Option/ CPFF           | Various : Various   | 21.821      | 3.152   | Dec 2017   | 3.918   | Dec 2018   | 3.873   | Dec 2019   | -           |            | 3.873            | Continuing       | Continuing | Continuing               |
|   |                        | <b>Subtotal</b>   | 21.821      | 3.152   |            | 3.918   |            | 3.873   |            | -           |            | 3.873            | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                   |                        |                                |             |         |            |         |            |              |            |             |            | Date: March 2019                                    |                  |                  |                          |
|--|------------------------|--------------------------------|-------------|---------|------------|---------|------------|--------------|------------|-------------|------------|---|------------------|------------------|--------------------------|
| <b>Appropriation/Budget Activity</b>                                     |                        |                                |             |         |            |         |            |              |            |             |            | <b>R-1 Program Element (Number/Name)</b>            |                  |                  |                          |
| 2040 / 5   |                        |                                |             |         |            |         |            |              |            |             |            | PE 0604270A / <i>Electronic Warfare Development</i> |                  |                  |                          |
| <b>Test and Evaluation (\$ in Millions)</b>                              |                        |                                |             |         |            |         |            |              |            |             |            | FY 2020<br>Base                                     | FY 2020<br>OCO   | FY 2020<br>Total |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost    | Award Date | Cost    | Award Date | Cost         | Award Date | Cost        | Award Date | Cost  | Cost To Complete | Total Cost       | Target Value of Contract |
| EWPMT Test Support   | MIPR                   | Various : Various              | 3.483       | 2.371   | Dec 2017   | 1.320   | Jul 2019   | 3.512        | Dec 2019   | -           |            | 3.512   | Continuing       | Continuing       | Continuing               |
| <b>Subtotal</b>  |                        | 3.483                          | 2.371       |         | 1.320      |         | 3.512      |              |            | -           |            | 3.512   | Continuing       | Continuing       | N/A                      |
| <b>Remarks</b>   |                        |                                |             |         |            |         |            |              |            |             |            |   |                  |                  |                          |
| FY 2020 funds in the amount of \$3.512 million will continue CD3 testing |                        |                                |             |         |            |         |            |              |            |             |            |   |                  |                  |                          |
|  |                        |                                | Prior Years | FY 2018 |            | FY 2019 |            | FY 2020 Base |            | FY 2020 OCO |            | FY 2020 Total                                       | Cost To Complete | Total Cost       | Target Value of Contract |
| <b>Project Cost Totals</b>   |                        |                                | 72.332      | 31.809  |            | 18.295  |            | 23.514       |            | -           |            | 23.514  | Continuing       | Continuing       | N/A                      |
| <b>Remarks</b>   |                        |                                |             |         |            |         |            |              |            |             |            |   |                  |                  |                          |

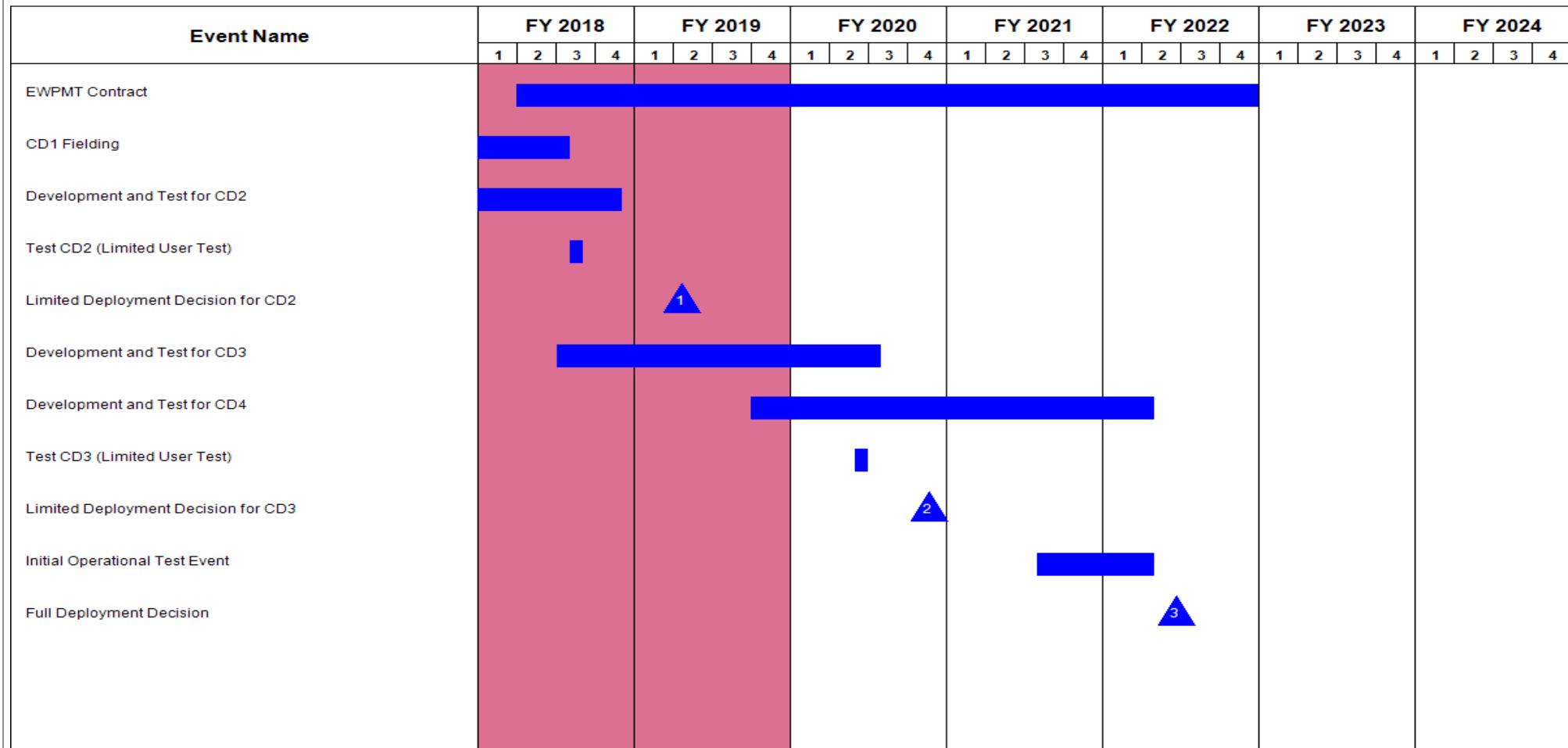
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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604270A / *Electronic Warfare Development***Project (Number/Name)**DX5 / *Electronic Warfare And Management Tool*

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|   |   |   |
|---|---|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> | <b>Project (Number/Name)</b><br>DX5 / <i>Electronic Warfare And Management Tool</i> |

**Schedule Details**

| Events                                 | Start   |      | End     |      |
|--|---------|------|---------|------|
|  | Quarter | Year | Quarter | Year |
| EWPMT Contract                         | 1       | 2014 | 4       | 2022 |
| Development and Test for CD 1          | 4       | 2014 | 3       | 2016 |
| Test CD 1 (Government Confidence test) | 2       | 2016 | 2       | 2016 |
| CD1 Fielding                           | 4       | 2016 | 3       | 2018 |
| Development and Test for CD2           | 4       | 2016 | 4       | 2018 |
| Test CD2 (Limited User Test)           | 3       | 2018 | 3       | 2018 |
| Limited Deployment Decision for CD2    | 2       | 2019 | 2       | 2019 |
| Development and Test for CD3           | 3       | 2018 | 3       | 2020 |
| Development and Test for CD4           | 4       | 2019 | 2       | 2022 |
| Test CD3 (Limited User Test)           | 2       | 2020 | 2       | 2020 |
| Limited Deployment Decision for CD3    | 4       | 2020 | 4       | 2020 |
| Initial Operational Test Event         | 3       | 2021 | 2       | 2022 |
| Full Deployment Decision               | 2       | 2022 | 2       | 2022 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|--|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5  |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |               |         |         | Project (Number/Name)<br>DX6 / Multi-Function Electronic Warfare (MFEW) |         |                  |            |  |
| COST (\$ in Millions)  | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| DX6: Multi-Function Electronic Warfare (MFEW)  | -           | 23.376  | 31.688  | 41.574       | -   | 41.574        | 38.183  | 11.272  | 5.659   | 5.750   | 0.000            | 157.502    |  |
| Quantity of RDT&E Articles   | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                |            |  |
| <b>A. Mission Description and Budget Item Justification</b>  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| The Multi-Function Electronic Warfare (MFEW) is a capability set that will provide BCT Commanders with an organic offensive Electronic Attack (EA) and Electronic Warfare Support (ES) capability. MFEW variants empower Commanders to shape the Electromagnetic Spectrum (EMS) to their advantage. MFEW will provide Commanders with an organic EW capability that dramatically improve a land force capabilities to seize, retain, and exploit an advantage within the EMS in order to execute successful unified land operations. These capabilities give the Commander a competitive advantage by denying or degrading the enemy's ability to conduct Command and Control (C2); Intelligence, Surveillance and Reconnaissance (ISR); and targeting, and allows the Commander to optimize effects within the EMS at the time and place of their choosing. These systems are networked with EWPMT and offensive cyber to enable remote operation and dynamic tasking or reprogramming. |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Justification:</b><br>FY 2020 Base funding in the amount of \$41.574 million will provide for MFEW Air Large follow-on Engineering and Manufacturing Development (EMD) activities and system prototyping, contractor test support, air worthiness testing, and Government Developmental Testing / Limited User Test (DT/LUT). In addition, this funding will provide for development of Electronic Attack software techniques needed to address MFEW threats required per the MFEW Capability Development Document.   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Title:</b> Multi-Function EW (MFEW) Air   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Description:</b> MFEW-Air Large is an airborne Electronic Warfare payload to be integrated onto a class IV Unmanned Aerial Vehicle to provide offensive Electronic Attack (EA) and Electronic Warfare Support (ES) capability to the BCT.   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 Plans:</b><br>MFEW Air Development and Test activities  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2020 Plans:</b><br>Engineering and Manufacturing Development (EMD) activities and development of EMD systems for test  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase of \$11.461M is due to a ramp up of EMD activities for MFEW Air Large.  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Title:</b> FY 2019 SIBR / STTR Transfer   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 Plans:</b>  |             |         |         |              |   |               |         |         |   |         |                  |            |  |

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|   |                |                |   |             |                |   |   |                |                |                         |                         |                   |
|---|----------------|----------------|---|-------------|----------------|---|---|----------------|----------------|-------------------------|-------------------------|-------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                |                |   |             |                |   |   |                |                | <b>Date:</b> March 2019 |                         |                   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> |             |                |   | <b>Project (Number/Name)</b><br>DX6 / <i>Multi-Function Electronic Warfare (MFEW)</i> |                |                |                         |                         |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |   |             |                |   | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020</b> |                         |                         |                   |
| FY 2019 SIBR / STTR Transfer<br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SIBR / STTR Transfer  |                |                |   |             |                |   |   |                |                |                         |                         |                   |
|   |                |                |   |             |                | <b>Accomplishments/Planned Programs Subtotals</b> | 23.376  | 31.688         | 41.574         |                         |                         |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |   |             |                |   |   |                |                |                         |                         |                   |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b>  | <b>Base</b> | <b>FY 2020</b> | <b>FY 2020</b>                                    | <b>FY 2021</b>  | <b>FY 2022</b> | <b>FY 2023</b> | <b>FY 2024</b>          | <b>Cost To Complete</b> | <b>Total Cost</b> |
| • B05000: <i>Multi-Function Electronic Warfare (MFEW) Systems</i>   | -              | -              | 6.420   | -           | 6.420          | 6.420   | 21.522  | 24.109         | 25.196         | 14.322                  | 0.000                   | 91.569            |
| <b>Remarks</b>  |                |                |   |             |                |   |   |                |                |                         |                         |                   |
| MFEW Air procurement to include long lead items.  |                |                |   |             |                |   |   |                |                |                         |                         |                   |
| <b>D. Acquisition Strategy</b>  |                |                |   |             |                |   |   |                |                |                         |                         |                   |
| The Multi-Function EW (MFEW) is a capability set that will provide the BCT Commander with organic offensive Electronic Attack (EA), Electronic Warfare Support (ES), and Defensive Electronic Attack (DEA) capabilities. Initially, the MFEW-AL variant payload will be developed. MFEW-AL will deliver scalable, non-lethal effects to support Unified Land Operations and protect personnel, equipment, and facilities.   |                |                |   |             |                |   |   |                |                |                         |                         |                   |
| A competitive Other Transaction Authority (OTA) Acquisition Strategy is being employed for MFEW-AL development. The MFEW-AL EMD effort uses a tailored Acquisition Strategy to rapidly deliver an initial airborne EW capability to the Army using the Consortium for Command, Control, Communications, and Computer Technologies (C5) OTA. Phase 1: MFEW-Air awarded an OTA for development and delivery of a prototype capable of demonstrating EW capabilities; Phase 2: Follow-on Engineering and Manufacturing Development (EMD) activities, development of EMD systems, and test using C5 OTA. The program will use all acquisition authorities to execute and/or accelerate the program. |                |                |   |             |                |   |   |                |                |                         |                         |                   |
| <b>E. Performance Metrics</b>   |                |                |   |             |                |   |   |                |                |                         |                         |                   |
| N/A   |                |                |   |             |                |   |   |                |                |                         |                         |                   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army    |                        |   |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|---|------------------------|---|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                 |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |            |         |            | Project (Number/Name)<br>DX6 / Multi-Function Electronic Warfare (MFEW) |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                      |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location                                | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management Office Support - MFEW Air              | Allot                  | CECOM : Aberdeen Proving Ground, MD                           | 0.139       | 0.756   | Jan 2018   | 1.656   | Jan 2019   | 0.239   | Jan 2020   | -           |            | 0.239            | 0.000            | 2.790      | -                        |
|   |                        | <b>Subtotal</b>   | 0.139       | 0.756   |            | 1.656   |            | 0.239   |            | -           |            | 0.239            | 0.000            | 2.790      | 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 |
| MFEW OTA Prototype Design&Development Contract            | C/FFP                  | C5 Consortium OTA : Acquisition Contracting Center-New Jersey | -           | 18.890  | Sep 2018   | 0.117   | Jan 2019   | -   |            | -           |            | -                | 0.000            | 19.007     | -                        |
| Command and Control Development Contract                  | C/Various              | Various : Various   | 0.800       | 0.240   | Aug 2018   | 1.800   | Jan 2019   | -   |            | -           |            | -                | 0.000            | 2.840      | -                        |
| MFEW Techniques and risk reduction activities             | C/CPFF                 | Various : APG, MD   | -           | 1.329   | Nov 2018   | 8.803   | Jan 2019   | 3.416   | Jan 2020   | -           |            | 3.416            | 0.000            | 13.548     | -                        |
| MFEW OTA EMD Contract                                     | C/FFP                  | C5 Consortium OTA : Acquisition Contracting Center-New Jersey | -           | -   |            | -       |            | 33.578  | Feb 2020   | -           |            | 33.578           | 0.000            | 33.578     | -                        |
| Build and integrate networked mobile emitter capabilities | C/Various              | CERDEC Flight Activity : APG, MD                              | -           | -   |            | 8.115   | Jan 2019   | -   |            | -           |            | -                | 0.000            | 8.115      | -                        |
| FY 2019 SIBR / STTR Transfer                              | TBD                    | TBD : TBD   | -           | -   |            | 1.575   |            | -   |            | -           |            | -                | 0.000            | 1.575      | -                        |
|   |                        | <b>Subtotal</b>   | 0.800       | 20.459  |            | 20.410  |            | 36.994  |            | -           |            | 36.994           | 0.000            | 78.663     | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                       |              |   |            |              |            |              |            |   |            | Date: March 2019 |                  |              |                          |
|--|------------------------|---------------------------------------|--------------|---|------------|--------------|------------|--------------|------------|---|------------|------------------|------------------|--------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                       |              | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |            |              |            |              |            | Project (Number/Name)<br>DX6 / Multi-Function Electronic Warfare (MFEW) |            |                  |                  |              |                          |
| Support (\$ in Millions)                               |                        |                                       |              | FY 2018   |            | FY 2019      |            | FY 2020 Base |            | FY 2020 OCO   |            | FY 2020 Total    |                  |              |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location        | Prior Years  | Cost  | Award Date | Cost         | Award Date | Cost         | Award Date | Cost  | Award Date | Cost             | Cost To Complete | Total Cost   | Target Value of Contract |
| Contractor Engineering - MFEW Air                      | C/CPFF                 | AASKI : Aberdeen Proving Ground, MD   | -            | 1.679   | Jul 2018   | 0.396        | Dec 2018   | 1.777        | Dec 2019   | -   |            | 1.777            | 0.000            | 3.852        | -                        |
| Government Engineering - MFEW Air                      | MIPR                   | Various : Aberdeen Proving Ground, MD | 0.220        | 0.482   | Dec 2017   | 0.815        | Dec 2018   | 1.004        | Dec 2019   | -   |            | 1.004            | 0.000            | 2.521        | -                        |
| Technical Support - MFEW Air                           | C/Various              | Various : Aberdeen Proving Ground, MD | 0.200        | -   |            | -            |            | -            |            | -   |            | -                | 0.000            | 0.200        | -                        |
| <b>Subtotal</b>  |                        | <b>0.420</b>                          | <b>2.161</b> |   |            | <b>1.211</b> |            | <b>2.781</b> |            |   |            | <b>2.781</b>     | <b>0.000</b>     | <b>6.573</b> | 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 |
| Developmental Test (DT) / Flight Testing (Air)         | TBD                    | Various : APG, MD                     | -            | -   |            | -            |            | 1.060        | Apr 2020   | -   |            | 1.060            | 0.000            | 1.060        | -                        |
| Test range and test support                            | Various                | Various : Various                     | -            | -   |            | 3.305        | Mar 2019   | 0.500        | Mar 2020   | -   |            | 0.500            | 0.000            | 3.805        | -                        |
| Pod evaluation and flight test                         | Various                | CERDEC Flight Activity : APG, MD      | -            | -   |            | 5.106        | Jan 2019   | -            |            | -   |            | -                | 0.000            | 5.106        | -                        |
| <b>Subtotal</b>  |                        | <b>-</b>                              | <b>-</b>     |   |            | <b>8.411</b> |            | <b>1.560</b> |            |   |            | <b>1.560</b>     | <b>0.000</b>     | <b>9.971</b> | 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 |
| <b>Project Cost Totals</b>                             |                        |                                       | 1.359        | 23.376  |            | 31.688       |            | 41.574       |            | -   |            | 41.574           | 0.000            | 97.997       | N/A                      |

Remarks

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| 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)                          |   |   |   |         |                  |   |   |         |   |
| 2040 / 5   |  |  |  | PE 0604270A / Electronic Warfare Development |   |   |   | DX6 / Multi-Function Electronic Warfare (MFEW) |   |   |   |         |                  |   |   |         |   |
|  |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |
|  |  |  |  | FY 2018                                      |   |   |   | FY 2019  |   |   |   | FY 2020 |                  |   |   | FY 2021 |   |
|  |  |  |  | 1  | 2 | 3 | 4 | 1  | 2 | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 |
| Tailored Milestone B                                 |  |  |  |  |   |   |   | 1  |   |   |   |         |                  |   |   |         |   |
| MFEW Air OTA Award                                   |  |  |  |  |   |   |   | 2  |   |   |   |         |                  |   |   |         |   |
| MFEW Air OTA Prototype Design&Development            |  |  |  |  |   |   |   |  | 4 |   |   |         |                  |   |   |         |   |
| MFEW Air OTA EMD                                     |  |  |  |  |   |   |   |  |   | 2 |   |         |                  |   |   |         |   |
| Developmental Test (DT)/Flight Testing/Airworthiness |  |  |  |  |   |   |   |  |   | 2 |   |         |                  |   |   |         |   |
| Tailored Milestone C                                 |  |  |  |  |   |   |   |  |   |   |   | 3       |                  |   |   |         |   |
| IOT&E  |  |  |  |  |   |   |   |  |   |   |   | 3       |                  |   |   |         |   |
| MFEW Air EDM Refurbishment, Production and Fielding  |  |  |  |  |   |   |   |  |   | 2 |   |         |                  |   |   |         |   |
| MFEW Air Large Long Lead Item purchase               |  |  |  |  |   |   |   |  |   | 3 |   |         |                  |   |   |         |   |

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|---|---|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> | <b>Project (Number/Name)</b><br>DX6 / <i>Multi-Function Electronic Warfare (MFEW)</i> |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Tailored Milestone B                                 | 3              | 2018        | 3              | 2018        |
| MFEW Air OTA Award                                   | 4              | 2018        | 4              | 2018        |
| MFEW Air OTA Prototype Design&Development            | 4              | 2018        | 2              | 2020        |
| MFEW Air OTA EMD                                     | 2              | 2020        | 4              | 2022        |
| Developmental Test (DT)/Flight Testing/Airworthiness | 3              | 2020        | 4              | 2022        |
| Tailored Milestone C                                 | 3              | 2021        | 3              | 2021        |
| IOT&E  | 3              | 2021        | 4              | 2021        |
| MFEW Air EDM Refurbishment, Production and Fielding  | 3              | 2021        | 4              | 2026        |
| MFEW Air Large Long Lead Item purchase               | 4              | 2020        | 4              | 2025        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)            |               |         |         | Project (Number/Name)                         |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604270A / Electronic Warfare Development |               |         |         | ET7 / Radio Frequency Interference Mitigation |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                                  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                                       | FY 2024 | Cost To Complete | Total Cost |  |
| ET7: Radio Frequency Interference Mitigation            | -           | 4.276   | 0.999   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 5.275      |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -   | -       | -                |            |  |

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

Radio Frequency Interference Mitigation (RIM) is a cross cutting capability to centrally manage and provide oversight to identify, define, test, and coordinate development of Radio Frequency (RF) interference mitigation material solutions to resolve mutual RF interference and electromagnetic fratricide for Spectrum Dependent Systems (SDS).

Centralized management of RIM offers a holistic approach for identification, system of systems engineering, developmental testing, and maturing of RIM solutions to address current and evolving RF interference issues. User and acquisition communities will synchronize, integrate, and codify RIM requirements to facilitate the cross cutting approach necessary for the efficient procurement of common RIM products. This approach will eliminate the need for separate hardware and platform integration research and development efforts for SDS and platforms. An integrated approach will eliminate the need for separate hardware and platform integration research and development efforts for SDS and platform Program Managers. RIM products are intended to preserve the investment that the Army has made in current Electronic Warfare (EW) and Mission Command Transport SDS and provide a strategy for future efforts for new SDS development with integrated RIM solutions.

**Justification:**

FY2020 Base funding for RIM was adjusted to zero (0) dollars.

| B. Accomplishments/Planned Programs (\$ in Millions)  | FY 2018 | FY 2019 | FY 2020 |
|---|---------|---------|---------|
| <b>Title:</b> RF Interference Mitigation  | 4.276   | 0.949   | -       |
| <b>Description:</b> RIM is a System of Systems Enterprise approach that will allow Spectrum Dependent Systems to co-exist with Force Protection assets. |         |         |         |
| <b>FY 2019 Plans:</b><br>Continue IC Light development, continue IC Algorithm development, and provide engineering support.                             |         |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 funding for RIM was adjusted to zero (0) dollars.                                     |         |         |         |
| <b>Title:</b> FY 2019 SIBR / STTR Transfer  | -       | 0.050   | -       |
| <b>FY 2019 Plans:</b>   |         |         |         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |  | Date: March 2019        |
|--|---|--|-------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> | <b>Project (Number/Name)</b><br>ET7 / <i>Radio Frequency Interference Mitigation</i> |                         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b><br><br><i>FY 2019 SIBR/STTR Transfer</i><br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br><i>FY 2019 SIBR/STTR Transfer</i>  |   | <b>FY 2018</b>   | <b>FY 2019</b>          |
|  |   | <b>Accomplishments/Planned Programs Subtotals</b>                                    | 4.276      0.999      - |
| <b>C. Other Program Funding Summary (\$ in Millions)</b><br><br>N/A  |   |  |                         |
| <b>Remarks</b>   |   |  |                         |
| <b>D. Acquisition Strategy</b><br><br>Radio Frequency (RF) Interference Mitigation (RIM) will follow a System of Systems enterprise strategy to develop and test hardware solutions such as tunable filters and Interference Cancellers (IC) to address RF interference on Army platforms. Designated platforms will procure, integrate and test RIM solutions with their associated spectrum dependent systems.   |   |  |                         |
| The RIM acquisition strategy shifted focus from tunable filter technology to IC technology. The decision to shift focus was a direct result of the S&T community accelerating the technical maturity. IC technology will enhance the warfighters ability to utilize the spectrum compared to tunable filter technology. Additionally, RIM is being leveraged through the U.S. Army Europe (USAREUR) and Cyber Electromagnetic Activities (CEMA) Operational Needs Statement (ONS) and this effort could result in future capabilities. |   |  |                         |
| <b>E. Performance Metrics</b><br><br>N/A   |   |  |                         |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |         |            |   |            |                 |            |                 |            | Date: March 2019   |                  |                  |                          |
|--|------------------------|---|-------------|---------|------------|---|------------|-----------------|------------|-----------------|------------|--|------------------|------------------|--------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5       |                        |   |             |         |            | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> |            |                 |            |                 |            | <b>Project (Number/Name)</b><br>ET7 / <i>Radio Frequency Interference Mitigation</i> |                  |                  |                          |
| <b>Management Services (\$ in Millions)</b>            |                        |   |             |         |            | FY 2018   |            | FY 2019         |            | FY 2020<br>Base |            | FY 2020<br>OCO   |                  | FY 2020<br>Total |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location          | 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 Electronic Warfare & Cyber : APG, MD | 0.298       | 0.323   | Dec 2017   | -   | -          | -               | -          | -               | -          | -  | Continuing       | Continuing       | Continuing               |
| <b>Subtotal</b>  |                        |   | 0.298       | 0.323   |            | -   | -          | -               | -          | -               | -          | -  | Continuing       | Continuing       | N/A                      |
| <b>Product Development (\$ in Millions)</b>            |                        |   |             |         |            | FY 2018   |            | FY 2019         |            | FY 2020<br>Base |            | FY 2020<br>OCO   |                  | FY 2020<br>Total |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location          | 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 Development Models                         | TBD                    | TBD : TBD                               | 2.238       | 2.895   | Dec 2017   | -   | -          | -               | -          | -               | -          | -  | Continuing       | Continuing       | -                        |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | TBD : TBD                               | -           | -       |            | 0.050   |            | -               | -          | -               | -          | -  | 0.000            | 0.050            | -                        |
| <b>Subtotal</b>  |                        |   | 2.238       | 2.895   |            | 0.050   |            | -               | -          | -               | -          | -  | Continuing       | Continuing       | N/A                      |
| <b>Support (\$ in Millions)</b>                        |                        |   |             |         |            | FY 2018   |            | FY 2019         |            | FY 2020<br>Base |            | FY 2020<br>OCO   |                  | FY 2020<br>Total |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location          | 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                                    | Allot                  | Various : Various                       | 1.456       | 1.058   | Dec 2017   | 0.949   | Dec 2018   | -               | -          | -               | -          | -  | Continuing       | Continuing       | -                        |
| <b>Subtotal</b>  |                        |   | 1.456       | 1.058   |            | 0.949   |            | -               | -          | -               | -          | -  | Continuing       | Continuing       | N/A                      |
|  |                        |   | Prior Years | FY 2018 |            | FY 2019   |            | FY 2020<br>Base |            | FY 2020<br>OCO  |            | FY 2020<br>Total   | Cost To Complete | Total Cost       | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |   | 3.992       | 4.276   |            | 0.999   |            | -               | -          | -               | -          | -  | Continuing       | Continuing       | N/A                      |
| <b>Remarks</b>   |                        |   |             |         |            |   |            |                 |            |                 |            |  |                  |                  |                          |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army |                                  |   |   |   |                        |   |   |   |  |   |   |   | Date: March 2019 |   |   |   |         |   |   |   |         |   |   |   |
|---|----------------------------------|---|---|---|------------------------|---|---|---|--|---|---|---|------------------|---|---|---|---------|---|---|---|---------|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5         |                                  |   |   | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |                        |   |   |   | Project (Number/Name)<br>ET7 / Radio Frequency Interference Mitigation |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Event Name  | FY 2018                          |   |   |   | FY 2019                |   |   |   | FY 2020  |   |   |   | FY 2021          |   |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |
|   | 1                                | 2 | 3 | 4   | 1                      | 2 | 3 | 4 | 1  | 2 | 3 | 4 | 1                | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |
| Development and testing for Tunable Filters       | Develop and Test Tunable Filters |   |   |   | DT for Tunable Filters |   |   |   |  |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Developmental Testing for Tunable Filters         |                                  |   |   |   | DT for Tunable Filters |   |   |   |  |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Development for Interference Cancellation (IC)    | Develop IC                       |   |   |   | DT for IC              |   |   |   |  |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Developmental Testing (DT) for IC                 |                                  |   |   |   | DT for IC              |   |   |   |  |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Development for IC Algorithm                      |                                  |   |   |   | Develop IC Algorithm   |   |   |   |  |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |

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|---|---|--|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |   | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> | <b>Project (Number/Name)</b><br>ET7 / <i>Radio Frequency Interference Mitigation</i> |

**Schedule Details**

| <b>Events</b>                                  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Development and testing for Tunable Filters    | 3              | 2017        | 3              | 2018        |
| Developmental Testing for Tunable Filters      | 2              | 2019        | 2              | 2019        |
| Development for Interference Cancellation (IC) | 1              | 2018        | 2              | 2019        |
| Developmental Testing (DT) for IC              | 3              | 2019        | 4              | 2019        |
| Development for IC Algorithm                   | 1              | 2019        | 4              | 2019        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |  |         | Date: March 2019 |            |       |
|--|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|-------|
| Appropriation/Budget Activity<br>2040 / 5  |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |               |         |         | Project (Number/Name)<br>VS6 / Integrated Electronic Warfare 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 |       |
| VS6: <i>Integrated Electronic Warfare Systems</i>  | -           | 9.474   | 7.645   | 5.451        | -   | 5.451         | 5.277   | 5.086   | 2.133  | 2.159   | 0.000            | 37.225     |       |
| Quantity of RDT&E Articles   | -           | -       | -       | -            | -   | -             | -       | -       | -  | -       | -                |            |       |
| <b>A. Mission Description and Budget Item Justification</b>  |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| Counter Radio Controlled Improvised Explosive Device (RCIED) Electronic Warfare (CREW) provides for protection of ground forces operating in vehicle convoys, single vehicle operations, and fixed locations in operational theaters. It is programmable to mitigate evolving threats and provides non-lethal capabilities which enable freedom of movement across the depth and breadth of the operational environment. |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| Justification: FY 2020 Base funding in the amount of \$5.451 million supports the continued development of CREW Relevancy technologies.  |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>Title:</b> IEWS - CREW  |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>Description:</b> The Integrated Electronic Warfare System (IEWS) will provide multiple capabilities, to include Electronic Warfare Planning and Management Tool (EWPMT), Multi-Function EW (MFEW), and Defensive Electronic Attack (DEA). The Army's only current Defensive Electronic Warfare solution is Counter Radio Controlled Improvised Explosive Device (RCIED) Electronic Warfare (CREW).                    |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>FY 2019 Plans:</b><br>Continue Secondary Unit HW upgrade and software development.  |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>FY 2020 Plans:</b><br>Integrate Duke Secondary Unit design and test the full system.  |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease of \$2.083 million will extend timeline to complete Duke Secondary Unit hardware upgrade.   |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>Title:</b> FY 2019 SIBR / STTR Transfer   |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>FY 2019 Plans:</b><br>FY 2019 SIBR / STTR Transfer  |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SIBR / STTR Transfer   |             |         |         |              |   |               |         |         |  |         |                  |            |       |
| <b>Accomplishments/Planned Programs Subtotals</b>  |             |         |         |              |   |               |         |         |  |         | 9.474            | 7.645      | 5.451 |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |   | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> | <b>Project (Number/Name)</b><br>VS6 / <i>Integrated Electronic Warfare Systems</i> |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |   |  |
| N/A   |   |  |
| <b>Remarks</b>  |   |  |
| <b>D. Acquisition Strategy</b><br>CREW Relevancy will provide for the continued growth and conduct of research, development, and testing against emerging Radio Controlled Improvised Explosive Device (RCIED) threats. Continuing research, development, and testing will allow the technology to remain relevant and responsive to emerging threats and approved user requirements. |   |  |
| Award five year Indefinite Delivery Indefinite Quantity (ID/IQ) contract to enable maximum flexibility as technology matures and as the RCIED threat changes. A Cost Plus Fixed Fee (CPFF) ID/IQ contract was awarded in FY16 with a five year period of performance to develop system improvements to address emerging threats.  |   |  |
| <b>E. Performance Metrics</b>   |   |  |
| N/A   |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |   |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |            |         |            | Project (Number/Name)<br>VS6 / Integrated Electronic Warfare Systems |            |             |            |                  |                  |            |                          |
| 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 |
| PMO Staff/Travel for EWPMT                             | Allot                  | PM Electronic Warfare & Cyber : Aberdeen Proving Ground, MD    | 4.956       | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 4.956      | -                        |
| Program and Technical Assistance support               | C/CPFF                 | TBD : Aberdeen Proving Ground, MD                              | 3.789       | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 3.789      | -                        |
| PMO Staff/Travel for CREW                              | Allot                  | PM Electronic Warfare & Cyber : Aberdeen Proving Ground, MD    | 2.334       | 0.220   | Dec 2017   | 0.233   | Dec 2018   | 0.238  | Dec 2019   | -           |            | 0.238            | 0.000            | 3.025      | -                        |
| <b>Subtotal</b>  |                        |  | 11.079      | 0.220   |            | 0.233   |            | 0.238  |            | -           |            | 0.238            | 0.000            | 11.770     | 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 |
| EMD Contract - EWPMT                                   | C/CPIF                 | SOTERA Defense Solutions Herndon, VA : RAYTHEON Fort Wayne, IN | 38.318      | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 38.318     | -                        |
| IEWS Engineering and Development                       | MIPR                   | I2WD : Aberdeen MD   | 5.557       | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 5.557      | -                        |
| Risk Reduction Studies for MFEW                        | MIPR                   | Various : Various  | 7.969       | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 7.969      | -                        |
| Develop CREW H/W and S/W solutions                     | C/CPFF                 | SRC, Inc. : Syracuse, NY                                       | 11.694      | 8.343   | Feb 2018   | 6.796   | Nov 2018   | 4.702  | Nov 2019   | -           |            | 4.702            | 0.000            | 31.535     | -                        |
| FY 2019 SIBR / STTR Transfer                           | TBD                    | TBD : TBD  | -           | -   |            | 0.111   |            | -  |            | -           |            | -                | 0.000            | 0.111      | -                        |
| <b>Subtotal</b>  |                        |  | 63.538      | 8.343   |            | 6.907   |            | 4.702  |            | -           |            | 4.702            | 0.000            | 83.490     | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |   |            |         |            |  |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--|-------------|---|------------|---------|------------|--|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604270A / Electronic Warfare Development |            |         |            | Project (Number/Name)<br>VS6 / Integrated Electronic Warfare Systems |              |             |             |                  |                  |                  |                          |                          |
| 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 |                          |
| MFEW Technical/Engineering Support - Contractor        | C/CPFF                 | GTRI : Atlanta, GA                     | 2.046       | -   |            | -       |            | -  |              | -           |             | -                | 0.000            | 2.046            | -                        |                          |
| Government Engineering Support                         | MIPR                   | CERDEC : Aberdeen Proving Ground, MD   | 4.169       | -   |            | -       |            | -  |              | -           |             | -                | 0.000            | 4.169            | -                        |                          |
| EWPMT Architecture Study                               | MIPR                   | Various : Various                      | 1.194       | -   |            | -       |            | -  |              | -           |             | -                | 0.000            | 1.194            | -                        |                          |
| CREW Engineering support                               | C/CPFF                 | Various : Various                      | 3.207       | -   |            | -       |            | -  |              | -           |             | -                | 0.000            | 3.207            | -                        |                          |
| CREW Government Engineering support                    | MIPR                   | Various : Various                      | 2.724       | 0.519   | Jan 2018   | 0.205   | Dec 2018   | 0.211  | Dec 2019     | -           |             | 0.211            | 0.000            | 3.659            | -                        |                          |
| <b>Subtotal</b>  |                        |  | 13.340      | 0.519   |            | 0.205   |            | 0.211  |              | -           |             | 0.211            | 0.000            | 14.275           | 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 |                          |
| EWPMT Test support                                     | MIPR                   | Various : TBD                          | 1.096       | -   |            | -       |            | -  |              | -           |             | -                | 0.000            | 1.096            | -                        |                          |
| Operational Assessment (OA) of DV4 systems             | MIPR                   | Yuma Proving Ground : Yuma, AZ         | 1.950       | -   |            | -       |            | -  |              | -           |             | -                | 0.000            | 1.950            | -                        |                          |
| Continous evaluation of CREW Technologies              | MIPR                   | Yuma Proving Ground Yuma, AZ : YPG, AZ | 1.326       | 0.392   | May 2018   | 0.300   | May 2019   | 0.300  | May 2020     | -           |             | 0.300            | 0.000            | 2.318            | -                        |                          |
| <b>Subtotal</b>  |                        |  | 4.372       | 0.392   |            | 0.300   |            | 0.300  |              | -           |             | 0.300            | 0.000            | 5.364            | 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 |
| <b>Project Cost Totals</b>                             |                        |  | 92.329      | 9.474   |            | 7.645   |            | 5.451  |              | -           |             | 5.451            | 0.000            | 114.899          | N/A                      |                          |
| <b>Remarks</b>   |                        |  |             |   |            |         |            |  |              |             |             |                  |                  |                  |                          |                          |

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| 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)                       |         |   |                  |   |         |   |   |   |  |  |
| 2040 / 5   |  |  |  | PE 0604270A / Electronic Warfare Development |   |   |   |         |   |   | VS6 / Integrated Electronic Warfare Systems |         |   |                  |   |         |   |   |   |  |  |
|  |  |  |  | FY 2018                                      |   |   |   | FY 2019 |   |   |   | FY 2020 |   |                  |   | FY 2021 |   |   |   |  |  |
|  |  |  |  | 1  | 2 | 3 | 4 | 1       | 2 | 3 | 4   | 1       | 2 | 3                | 4 | 1       | 2 | 3 | 4 |  |  |
| Develop H/W and S/W solutions for CREW                               |  |  |  |  |   |   |   |         |   |   |   |         |   |                  |   |         |   |   |   |  |  |
| Force Protection, Technique Development, and SAASM                   |  |  |  |  |   |   |   |         |   |   |   |         |   |                  |   |         |   |   |   |  |  |
| Secondary Unit Development   |  |  |  |  |   |   |   |         |   |   |   |         |   |                  |   |         |   |   |   |  |  |
| Follow On Secondary Unit Development                                 |  |  |  |  |   |   |   |         |   |   |   |         |   |                  |   |         |   |   |   |  |  |
| Improved Interoperability with Comms Systems and Antenna Development |  |  |  |  |   |   |   |         |   |   |   |         |   |                  |   |         |   |   |   |  |  |
| Implemented Technique Assessment                                     |  |  |  | 1  |   |   |   |         |   |   |   |         |   |                  |   |         |   |   |   |  |  |
| Secondary Unit-Hardware Assessment                                   |  |  |  |  |   |   |   | 2       |   |   |   |         |   |                  |   |         |   |   |   |  |  |
| Secondary Unit-Software and Implemented Techniques Assessment        |  |  |  |  |   |   |   |         |   |   |   | 3       |   |                  |   |         |   |   |   |  |  |
| CREW/Comms Interoperability Assessment                               |  |  |  |  |   |   |   |         |   |   |   |         |   |                  |   | 4       |   |   |   |  |  |

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|   |   |  |                         |
|---|---|--|-------------------------|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |   |  | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604270A / <i>Electronic Warfare Development</i> | <b>Project (Number/Name)</b><br>VS6 / <i>Integrated Electronic Warfare Systems</i> |                         |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| EWPMT Milestone B Decision   | 3              | 2013        | 3              | 2013        |
| EWPMT Contract   | 3              | 2013        | 4              | 2014        |
| MFEW Risk Reduction Studies  | 3              | 2013        | 4              | 2014        |
| Delivery of CREW-2 Duke (DV4) Systems for Development                | 1              | 2014        | 1              | 2014        |
| Operational Assessment and Engineering test of Duke (DV4) systems    | 2              | 2014        | 4              | 2014        |
| CREW Relevancy Development Contract Award                            | 2              | 2016        | 2              | 2016        |
| Develop H/W and S/W solutions for CREW                               | 2              | 2016        | 4              | 2021        |
| Force Protection, Technique Development, and SAASM                   | 2              | 2016        | 2              | 2018        |
| Secondary Unit Development   | 3              | 2018        | 3              | 2021        |
| Folllow On Secondary Unit Development                                | 2              | 2021        | 2              | 2026        |
| Improved Interoperability with Comms Systems and Antenna Development | 1              | 2021        | 2              | 2021        |
| Implemented Technique Assessment                                     | 3              | 2018        | 3              | 2018        |
| Secondary Unit-Hardware Assessment                                   | 3              | 2019        | 3              | 2019        |
| Secondary Unit-Software and Implemented Techniques Assessment        | 3              | 2020        | 3              | 2020        |
| CREW/Comms Interoperability Assessment                               | 3              | 2021        | 3              | 2021        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)        |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604321A / All Source Analysis System |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                              | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 4.774   | 0.000   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 4.774      |
| B41: CI/HUMINT Software Products (MIP)  | -           | 3.274   | 0.000   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 3.274      |
| B51: Machine - Foreign Language Translation System  | -           | 1.500   | 0.000   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 1.500      |

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

The All Source Analysis System (ASAS) provided US Army commanders at all echelons from battalion to Army Service Component Command (ASCC) with automated support to the management and planning, processing and analysis, and dissemination of intelligence, counterintelligence, and electronic warfare. ASAS provided the means to enhance the commander's timely and comprehensive understanding of enemy deployments, capabilities, and potential courses of action. The system used standard joint and Army protocols and message formats to interface with selected National, joint, theater, and tactical intelligence, surveillance, and reconnaissance systems and preprocessors and Army, joint, and coalition battle command systems. The ASAS Family of Systems migrated into the Distributed Common Ground System-Army (DCGS-A) program and the Army is using it as the initial platform to provide accelerated DCGS-A capabilities to the force.

The Counterintelligence (CI) and Human Intelligence (HUMINT) Automated Reporting and Collection System (CHARCS) is the Army's CI and HUMINT tactical collection and reporting system. CHARCS provides automation support for information collection, reporting, investigations, source & interrogation operations and document exploitation. The CHARCS automation architecture extends from the individual HUMINT team soldier or CI agent to the Corps Analysis and Control Element (ACE). CHARCS reports digital data such as maps, overlays, images, video, biometrics, scanned documents and audio files. These media are transmitted through secure networks and interfaces with the DCGS-A for detailed analysis and creation of finished intelligence products. Collection and reporting teams at Military Intelligence (MI) battalions and their operational managers are equipped with one of two CHARCS systems. The first is the AN/PYQ-8 Individual Tactical Reporting Tool (ITRT) which provides collection and processing devices for individual HUMINT team member or CI agents. The second is the AN/PYQ-3 CI/HUMINT Automated Tool Set (CHATS) which provides the team leader tools to process and manage team-collected information and a robust set of devices such as printers, scanners, cameras and audio recorders to assist the collection mission. Each CHATS has an associated Mission Support Peripheral Sets and Kits (MS-PSK) or Collection Peripheral Sets and Kits (C-PSK).

The Machine Foreign Language Translation System (MFLTS) develops, fields, and sustains a basic automated foreign speech and text translation capability for Army tactical systems to augment and compliment limited human linguistic resources. These integrated automated translation capabilities will be applicable across three different system configurations; a hand-held/wearable portable device, a laptop/mobile device, and in a networked/web-enabled system. The software modules will translate English from a prioritized list of languages in a prioritized collection of domains (e.g. medical, intelligence, base security). MFLTS is interoperable with Commercial Off-The-Shelf (COTS) and Government Off-The-Shelf (GOTS) automation equipment to include the Distributed Common Ground System-Army (DCGS-A) and Nett Warrior, and will be interoperable with a future version of the CI/HUMINT Automated Reporting and Collection System (CHARCS).

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>                                 |  |                |                     |                    | <b>Date:</b> March 2019 |
|---|--|----------------|---------------------|--------------------|-------------------------|
| <b>Appropriation/Budget Activity</b>  | <b>R-1 Program Element (Number/Name)</b> |                |                     |                    |                         |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) | PE 0604321A / All Source Analysis System |                |                     |                    |                         |
| <b>B. Program Change Summary (\$ in Millions)</b>   | <b>FY 2018</b>                           | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |
| Previous President's Budget   | 4.774                                    | 0.000          | 0.000               | -                  | 0.000                   |
| Current President's Budget  | 4.774                                    | 0.000          | 0.000               | -                  | 0.000                   |
| Total Adjustments   | 0.000                                    | 0.000          | 0.000               | -                  | 0.000                   |
| • Congressional General Reductions  | -  | -              |                     |                    |                         |
| • Congressional Directed Reductions   | -  | -              |                     |                    |                         |
| • Congressional Rescissions   | -  | -              |                     |                    |                         |
| • Congressional Adds  | -  | -              |                     |                    |                         |
| • Congressional Directed Transfers  | -  | -              |                     |                    |                         |
| • Reprogrammings  | -  | -              |                     |                    |                         |
| • SBIR/STTR Transfer  | -  | -              |                     |                    |                         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |  |         | Date: March 2019 |            |         |
|--|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|---------|
| Appropriation/Budget Activity<br>2040 / 5  |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |               |         |         | Project (Number/Name)<br>B41 / CI/HUMINT Software Products (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 |         |
| B41: CI/HUMINT Software Products (MIP)   | -           | 3.274   | 0.000   | 0.000        | -   | 0.000         | 0.000   | 0.000   | 0.000  | 0.000   | 0.000            | 3.274      |         |
| Quantity of RDT&E Articles   | -           | -       | -       | -            | -   | -             | -       | -       | -  | -       | -                |            |         |
| <b>A. Mission Description and Budget Item Justification</b>  |             |         |         |              |   |               |         |         |  |         |                  |            |         |
| The Counterintelligence (CI) and Human Intelligence (HUMINT) Automated Reporting and Collection System (CHARCS) is the Army's CI and HUMINT tactical collection and reporting system. CHARCS provides automation support for information collection, reporting, investigations, source & interrogation operations and document exploitation. The CHARCS automation architecture extends from the individual HUMINT team soldier or CI agent to the Corps. CHARCS reports digital data such as maps, overlays, images, video, biometrics, scanned documents and audio files. These media are transmitted through secure networks and interfaces with the Distributed Common Ground System-Army (DCGS-A) for detailed analysis and creation of finished intelligence products. Collection and reporting teams at Military Intelligence (MI) battalions and their operational managers are equipped with one of two CHARCS systems. The first is the AN/PYQ-8 Individual Tactical Reporting Tool (ITRT) which provides collection and processing devices for individual HUMINT team member or CI agents. The second is the AN/PYQ-3 CI/HUMINT Automated Tool Set (CHATS) which provides the team leader and Operational Management Team (OMT) tools to process and manage team-collected information and a robust set of devices such as printers, scanners, and cameras to assist the collection mission. Each CHATS has an associated Mission Support Peripheral Sets and Kits (MS-PSK) or Collection Peripheral Sets and Kits (C-PSK). Phasing in of the Mobile Hand Held (M H/H), to displace the C-PSK, will begin in FY 2018. |             |         |         |              |   |               |         |         |  |         |                  |            |         |
| The C-PSK provides specialized collection component capabilities to support CI/HUMINT collection missions. C-PSK capabilities are commercial-off-the-shelf (COTS) technologies and include video and camera equipment, global positioning system (GPS), voice recording device and infrared strobe lights. Phasing in of the Mobile Hand Held, to displace the C-PSK, will begin in FY 2018. The MS-PSK provides specialized collection component capabilities to support CI/HUMINT collection missions at the OMT. MS-PSK capabilities are COTS technologies and include night vision photography & video, captured materiel tracking, Credibility Assessment Capability, Digital Media Forensics software, and Document Exploitation software.   |             |         |         |              |   |               |         |         |  |         |                  |            |         |
| FY 2020 has zero funds.  |             |         |         |              |   |               |         |         |  |         |                  |            |         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |             |         |         |              |   |               |         |         |  |         | FY 2018          | FY 2019    | FY 2020 |
| <b>Title:</b> Development and Integration toward a single CI/HUMINT Software baseline; software testing of v1.0.4.2; software baseline enhancement and testing of v1.0.4.2.2 and v1.0.4.4; increased SW perf. cap.   |             |         |         |              |   |               |         |         |  |         | 3.274            | -          | -       |
| <b>Description:</b> Development and Integration toward a single CI/HUMINT Software baseline; software testing of v1.0.4.2; software baseline enhancement and testing of v1.0.4.2.2 and v1.0.4.4; increased software (SW) performance capability; Hardware (HW) integration testing of CHARCS SW. Integration of Exploitation software onto MHH.  |             |         |         |              |   |               |         |         |  |         |                  |            |         |
| <b>Accomplishments/Planned Programs Subtotals</b>  |             |         |         |              |   |               |         |         |  |         | 3.274            | -          | -       |
|  |             |         |         |              |   |               |         |         |  |         |                  |            |         |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                |                |                |  |                |                |                |                |   | <b>Date:</b> March 2019 |
|---|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|---|-------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604321A / All Source Analysis System |                |                |                |                | <b>Project (Number/Name)</b><br>B41 / CI/HUMINT Software Products (MIP) |                         |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                |  |                |                |                |                |   |                         |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b>   | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b> | <b>FY 2024</b>  | <b>Cost To Complete</b> |
| • BK5275: CI HUMINT Auto Reporting & Coll(CHARCS)(MIP)  | 22.275         | 0.296          | 0.000          | -  | 0.000          | -              | -              | -              | -   | 0.000                   |
|   |                |                |                |  |                |                |                |                |   | 22.571                  |
| <b>Remarks</b>  |                |                |                |  |                |                |                |                |   |                         |
| <b>D. Acquisition Strategy</b>  |                |                |                |  |                |                |                |                |   |                         |
| Program capability documentation was updated to include Capabilities Development Document (CDD) Increment 2 requirements in CHARCS Capabilities Production Document (CPD) Increment 1, Revision 1, which was signed 6 September 2012. CHARCS is a post-Milestone C program. CHARCS is leveraging Communications Electronic Command Software Engineering Center (CECOM SEC) to increase current capabilities and provide an increased performance capability version of the CHARCS software. CHARCS will conduct testing of the Nett Warrior End User device. CHARCS software requires development to keep pace with incremental technology improvements, Defense Intelligence Agency compliance, and to meet AROC approved requirements documented in the CHARCS CPD Increment 1, Revision 1. CHARCS is continuously evaluating and assessing existing Commercial-off-the-shelf (COTS) and Government-off-the-shelf (GOTS) that support CHARCS CPD Increment 1, Revision 1. |                |                |                |  |                |                |                |                |   |                         |
| <b>E. Performance Metrics</b>   |                |                |                |  |                |                |                |                |   |                         |
| N/A   |                |                |                |  |                |                |                |                |   |                         |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |                 |         |   |         |            |                 |            |  |            |                  | Date: March 2019 |            |                          |
|--|------------------------|---|-----------------|---------|---|---------|------------|-----------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |                 |         | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |         |            |                 |            | Project (Number/Name)<br>B41 / CI/HUMINT Software Products (MIP) |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |   |                 | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                            | Prior Years     | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| PD CHARCS PMO<br>Government Engineering Direct Support | Allot                  | PD CHARCS : APG, MD                                       | 4.430           | 0.150   | -   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
|  |                        |   | <b>Subtotal</b> | 4.430   | 0.150   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |   |                 | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                            | Prior Years     | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date | Cost   | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Single CI&HUMINT SW Baseline                           | MIPR                   | DCGS-A : APG, MD  | 0.644           | -       | -   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
| CI/HUMINT Single SW Baseline                           | C/CPFF                 | Buzz Allen : APG, MD                                      | 4.853           | 2.774   | -   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
| CHARCS Software Development                            | MIPR                   | CECOM Software Engineering Center : Various Locations     | 16.119          | -       | -   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
| CHARCS Software Management/Development                 | MIPR                   | DCGS-A : APG, MD  | 1.044           | -       | -   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
| CHARC Software Development                             | MIPR                   | DCGS-A : APG, MD  | 0.520           | -       | -   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
| DOME Tools   | MIPR                   | National Ground Intelligence Center : Charlottesville, VA | 8.100           | -       | -   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
| Program Management and Tech Support                    | C/CPFF                 | Millennium : APG, MD                                      | 0.200           | -       | -   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | Continuing               |
|  |                        |   | <b>Subtotal</b> | 31.480  | 2.774   | -       | -          | -               | -          | -  | -          | -                | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army   |                        |                                |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5  |                        |                                |             |         | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |         |            |                 | Project (Number/Name)<br>B41 / CI/HUMINT Software Products (MIP) |                |            |                  |                  |            |                          |
| Support (\$ in Millions)   |                        |                                |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Software Engineering & Testing Services - PD CHARCS PMO SETA                                   | C/CPFF                 | Booz Allen Hamilton : APG, MD  | 1.088       | 0.150   | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>                | 1.088       | 0.150   | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)   |                        |                                |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| CTSF: Army Interoperability Certification (AIC), Common Operating environment (COE) compliance | MIPR                   | CECOM SEC : Ft Huachuca, AZ    | 0.395       | 0.100   | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
| Reliability, Availability, Maintainability (RAM)   | MIPR                   | EPG : Ft Huachuca, AZ          | 0.100       | -       | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
| Quality Assurance  | MIPR                   | CECOM SEC : Ft Huachuca, AZ    | 0.100       | -       | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
| Test Support and Interoperability  | MIPR                   | CTSF, : Ft. Hood, TX           | 0.612       | -       | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
| Test Support and Interoperability  | MIPR                   | US Army EPG : Ft Huachuca, AZ  | 0.600       | -       | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
| Operational Test / Security Accreditation Testing / HW Integration Testing                     | MIPR                   | ATEC : Multiple                | 0.436       | -       | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
| Security Accreditation Collateral  | MIPR                   | CECOM : Ft. Monmouth, NJ       | 0.381       | -       | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
| Safety release   | MIPR                   | CECOM : Ft. Monmouth, NJ       | 0.035       | -       | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
| Test of Nett Warrior EUD   | C/TBD                  | TBD : TBD                      | -           | 0.100   | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>                | 2.659       | 0.200   | -   | -       | -          | -               | -  | -              | -          | -                | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                     |         |   |         |       |                 |  |                |   | Date: March 2019 |                     |               |                                |
|--|---------------------|---------|---|---------|-------|-----------------|--|----------------|---|------------------|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                     |         | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |         |       |                 | Project (Number/Name)<br>B41 / CI/HUMINT Software Products (MIP) |                |   |                  |                     |               |                                |
|  | Prior<br>Years      | FY 2018 |   | FY 2019 |       | FY 2020<br>Base |  | FY 2020<br>OCO |   | FY 2020<br>Total | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
|  | Project Cost Totals | 39.657  | 3.274   |         | 0.000 |                 | -  |                | - | -                | Continuing          | Continuing    | N/A                            |
| <b>Remarks</b>   |                     |         |   |         |       |                 |  |                |   |                  |                     |               |                                |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army        |         |   |   |   |         |   |   |  |         |   |   |   |         | Date: March 2019 |   |   |         |   |   |   |         |   |   |   |   |   |   |   |
|--|---------|---|---|---|---------|---|---|--|---------|---|---|---|---------|------------------|---|---|---------|---|---|---|---------|---|---|---|---|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5                |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |         |   |   | Project (Number/Name)<br>B41 / CI/HUMINT Software Products (MIP) |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |
| Event Name   | FY 2018 |   |   |   | FY 2019 |   |   |  | FY 2020 |   |   |   | FY 2021 |                  |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |   |   |   |   |
|  | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4  | 1       | 2 | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1 | 2 | 3 | 4 |
| v1.0.4.2.2 Software Release (SR), Fielding & Sustainment |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |
| v1.0.4.4 Software Baseline Enhancement & Testing         |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |
| v1.0.4.4 Software Release (SR), Fielding & Sustainment   |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |
| Single CI/HUMINT SW Baseline Development & Testing       |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  |   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604321A / All Source Analysis System | <b>Project (Number/Name)</b><br>B41 / CI/HUMINT Software Products (MIP) |

**Schedule Details**

| Events   | Start   |      | End     |      |
|--|---------|------|---------|------|
|  | Quarter | Year | Quarter | Year |
| v1.0.4.2 Developmental Test (DT)                         | 4       | 2015 | 4       | 2015 |
| v1.0.4.2 Operational Test (OT)                           | 4       | 2015 | 4       | 2015 |
| v1.0.0.2 SP4 Conditional Materiel Release                | 2       | 2016 | 2       | 2016 |
| v1.0.4.1.1 Software Release (SR), Fielding & Sustainment | 1       | 2015 | 4       | 2015 |
| v1.0.4.2 Software Release (SR), Fielding & Sustainment   | 4       | 2015 | 4       | 2017 |
| v1.0.4.2.2 Software Baseline Enhancement & Testing       | 4       | 2015 | 3       | 2017 |
| v1.0.4.2.2 Software Release (SR), Fielding & Sustainment | 3       | 2017 | 4       | 2018 |
| v1.0.4.4 Software Baseline Enhancement & Testing         | 3       | 2016 | 3       | 2018 |
| v1.0.4.4 Software Release (SR), Fielding & Sustainment   | 3       | 2018 | 4       | 2019 |
| Single CI/HUMINT SW Baseline Development & Testing       | 1       | 2017 | 4       | 2019 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |             |         |              |              |   |               |         |         |  |                  | Date: March 2019 |            |  |
|--|-------------|---------|--------------|--------------|---|---------------|---------|---------|--|------------------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5  |             |         |              |              | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |               |         |         | Project (Number/Name)<br>B51 / Machine - Foreign Language Translation 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 |  |
| B51: Machine - Foreign Language Translation System   | -           | 1.500   | 0.000        | 0.000        | -   | 0.000         | 0.000   | 0.000   | 0.000  | 0.000            | 0.000            | 1.500      |  |
| Quantity of RDT&E Articles   | -           | -       | -            | -            | -   | -             | -       | -       | -  | -                | -                |            |  |
| <b>A. Mission Description and Budget Item Justification</b>  |             |         |              |              |   |               |         |         |  |                  |                  |            |  |
| The Machine Foreign Language Translation System (MFLTS) develops, fields, and sustains a basic automated foreign speech and text translation capability for Army tactical systems to augment and compliment limited human linguistic resources. These integrated automated translation capabilities will be applicable across three different system configurations; a hand-held/wearable portable device, a laptop/mobile device, and in a networked/web-enabled system. The software modules will translate English from a prioritized list of languages in a prioritized collection of domains (e.g. medical, intelligence, base security). MFLTS is interoperable with Commercial Off-The-Shelf (COTS) and Government Off-The-Shelf (GOTS) automation equipment to include the Distributed Common Ground System-Army (DCGS-A) and Nett Warrior, and will be interoperable with a future version of the CI/HUMINT Automated Reporting and Collection System (CHARCS). |             |         |              |              |   |               |         |         |  |                  |                  |            |  |
| FY 2020 has zero funding.  |             |         |              |              |   |               |         |         |  |                  |                  |            |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |             |         |              |              |   |               |         |         |  |                  |                  |            |  |
| <b>Title:</b> Product Development and Engineering Support  |             |         |              |              |   |               |         |         |  | 0.772            | -                | -          |  |
| <b>Description:</b> Development, integration and improvement of Critical Technology Elements (CTE) of Automated Speech Recognition (ASR), Optical Character Recognition (OCR), and Machine Language Translation Translation Engine (MLT TE) software. Includes incremental development of Speech to Speech (S2S) and Text to Text (T2T) languages and domains.   |             |         |              |              |   |               |         |         |  |                  |                  |            |  |
| <b>Title:</b> PD Support and Management Services   |             |         |              |              |   |               |         |         |  | 0.728            | -                | -          |  |
| <b>Description:</b> Program Office Support.  |             |         |              |              |   |               |         |         |  |                  |                  |            |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |             |         |              |              |   |               |         |         |  | 1.500            | -                | -          |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |             |         |              |              |   |               |         |         |  |                  |                  |            |  |
| Line Item  | FY 2018     | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total   | FY 2021       | FY 2022 | FY 2023 | FY 2024  | Cost To Complete | Total Cost       |            |  |
| • B88605: Machine Foreign Language Translation System-MFLTS  | 0.567       | -       | 0.000        | -            | 0.000   | -             | -       | -       | -  | Continuing       | Continuing       |            |  |
| <b>Remarks</b>   |             |         |              |              |   |               |         |         |  |                  |                  |            |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |  | <b>Date:</b> March 2019   |
|--|--|---|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604321A / All Source Analysis System | <b>Project (Number/Name)</b><br>B51 / Machine - Foreign Language Translation System |
| <b>D. Acquisition Strategy</b><br>The MFLTS Technology Development (TD) Phase developed an open software architecture prototype using full and open competition that allowed the addition, upgrade and replacement of translation system components for integration into existing Programs. During the Engineering and Manufacturing Development (EMD) Phase, the program integrated technology demonstrated during the TD Phase to meet Key Performance Parameters (KPPs). This included the requirement to meet an Interagency Language Roundtable (ILR) level of 1 for two speech translation modules and an ILR level of 1+ for one text translation module in hand-held/wearable portable, laptop/mobile, and networked/web-enabled system configurations. Milestone B was achieved 22 Jul 13 and an option period for the EMD phase contract was awarded 22 Jul 13. Following the Limited Deployment Decision (LDD), a contract was awarded to integrate and field MFLTS capability drop #1 in FY 2016. A full and open competition will result in the award of a contract(s) in FY 2018 for the incremental development of new MFLTS SW Capability Drops. |  |   |
| <b>E. Performance Metrics</b><br>N/A   |  |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |   |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |            |         |            | Project (Number/Name)<br>B51 / Machine - Foreign Language Translation System |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location             | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Support  | MIPR                   | Various : Ft. Belvoir, VA                  | 5.336       | 0.728   | -          | -       | -          | -  | -          | -           | -          | -                | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |  | 5.336       | 0.728   | -          | -       | -          | -  | -          | -           | -          | -                | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location             | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Software Development Contract                          | C/CR                   | TBD : TBD                                  | 20.553      | -   | -          | -       | -          | -  | -          | -           | -          | -                | 0.000            | 20.553     | -                        |
| Developmental Engineering                              | MIPR                   | Various : Various                          | 3.873       | -   | -          | -       | -          | -  | -          | -           | -          | -                | Continuing       | Continuing | Continuing               |
| Product Development                                    | C/IDIQ                 | TBD : TBD                                  | 0.100       | 0.025   | -          | -       | -          | -  | -          | -           | -          | -                | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |  | 24.526      | 0.025   | -          | -       | -          | -  | -          | -           | -          | -                | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location             | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Engineering Support                                    | MIPR                   | Various : Ft. Belvoir, VA                  | 7.237       | 0.747   | -          | -       | -          | -  | -          | -           | -          | -                | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |  | 7.237       | 0.747   | -          | -       | -          | -  | -          | -           | -          | -                | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location             | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Test and Evaluation Activities                         | MIPR                   | USA Test and Eval Command : Alexandria, VA | 1.400       | -   | -          | -       | -          | -  | -          | -           | -          | -                | Continuing       | Continuing | Continuing               |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |   |            |         |            |  |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---|------------|---------|------------|--|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |            |         |            | Project (Number/Name)<br>B51 / Machine - Foreign Language Translation System |            |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location         | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Data Collection  | MIPR                   | Army Research Laboratory : Adelphi, MD | 0.308       | -   |            | -       |            | -  |            | -              |            | -                | 0.000            | 0.308      | -                        |
| Technology Readiness Assessment                        | MIPR                   | Army Research Laboratory : Adelphi, MD | 0.047       | -   |            | -       |            | -  |            | -              |            | -                | Continuing       | Continuing | Continuing               |
| Forensic Analysis                                      | MIPR                   | Pro Services : Trenton, NJ             | 0.032       | -   |            | -       |            | -  |            | -              |            | -                | Continuing       | Continuing | Continuing               |
| PM and Host Platform Test and Evaluation Activities    | MIPR                   | Various : Various                      | 0.186       | -   |            | -       |            | -  |            | -              |            | -                | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        | <b>1.973</b>                           | -           |   | -          |         | -          |  | -          |                | -          | -                | Continuing       | Continuing | N/A                      |
|  |                        |  | Prior Years | FY 2018   |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |  | 39.072      | 1.500   |            | 0.000   |            | -  |            | -              |            | -                | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>   |                        |  |             |   |            |         |            |  |            |                |            |                  |                  |            |                          |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army |         |   |   |   |   |   |   |   |         |  |   |   | Date: March 2019 |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
|---|---------|---|---|---|---|---|---|---|---------|--|---|---|------------------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5         |         |   |   |   | R-1 Program Element (Number/Name)<br>PE 0604321A / All Source Analysis System |   |   |   |         | Project (Number/Name)<br>B51 / Machine - Foreign Language Translation System |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| Event Name  | FY 2018 |   |   |   | FY 2019   |   |   |   | FY 2020 |  |   |   | FY 2021          |   |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   | FY 2024 |   |   |   |
|   | 1       | 2 | 3 | 4 | 1   | 2 | 3 | 4 | 1       | 2  | 3 | 4 | 1                | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |
| PD Support and Management Services                |         |   |   |   |   |   |   |   |         |  |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| Product Development and Engineering Support       |         |   |   |   |   |   |   |   |         |  |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
|   |         |   |   |   |   |   |   |   |         |  |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |  | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604321A / All Source Analysis System | <b>Project (Number/Name)</b><br>B51 / Machine - Foreign Language Translation System |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Initial Capability - Technology Development (TD) Phase | 4              | 2010        | 3              | 2013        |
| PD Support and Management Services                     | 1              | 2016        | 4              | 2019        |
| Product Development and Engineering Support            | 3              | 2017        | 4              | 2019        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |                                   |               |              |             |               |         | Date: March 2019 |            |  |  |  |  |  |
|---|-------------|---------|---------|--------------|-----------------------------------|---------------|--------------|-------------|---------------|---------|------------------|------------|--|--|--|--|--|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name) |               |              |             |               |         |                  |            |  |  |  |  |  |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)   |             |         |         |              | PE 0604328A / TRACTOR CAGE        |               |              |             |               |         |                  |            |  |  |  |  |  |
| COST (\$ in Millions)   | Prior Years | FY 2018 | 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   | -           | 30.252  | 29.050  | 0.000        | -                                 | 0.000         | 0.000        | 0.000       | 0.000         | 0.000   | 0.000            | 59.302     |  |  |  |  |  |
| C71: Tractor Cage   | -           | 30.252  | 29.050  | 0.000        | -                                 | 0.000         | 0.000        | 0.000       | 0.000         | 0.000   | 0.000            | 59.302     |  |  |  |  |  |
| <b>A. Mission Description and Budget Item Justification</b>   |             |         |         |              |                                   |               |              |             |               |         |                  |            |  |  |  |  |  |
| The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).  |             |         |         |              |                                   |               |              |             |               |         |                  |            |  |  |  |  |  |
| <b>B. Program Change Summary (\$ in Millions)</b>   |             |         |         |              | FY 2018                           | FY 2019       | FY 2020 Base | FY 2020 OCO | FY 2020 Total |         |                  |            |  |  |  |  |  |
| Previous President's Budget   |             |         |         |              | 17.252                            | 29.050        | 17.909       | -           | 17.909        |         |                  |            |  |  |  |  |  |
| Current President's Budget  |             |         |         |              | 30.252                            | 29.050        | 0.000        | -           | 0.000         |         |                  |            |  |  |  |  |  |
| Total Adjustments   |             |         |         |              | 13.000                            | 0.000         | -17.909      | -           | -17.909       |         |                  |            |  |  |  |  |  |
| <ul style="list-style-type: none"> <li>• Congressional General Reductions</li> <li>• Congressional Directed Reductions</li> <li>• Congressional Rescissions</li> <li>• Congressional Adds</li> <li>• Congressional Directed Transfers</li> <li>• Reprogrammings</li> <li>• SBIR/STTR Transfer</li> <li>• Adjustments to Budget Years</li> </ul> |             |         |         |              | -                                 | -             | -            | -           | -             |         |                  |            |  |  |  |  |  |
|   |             |         |         |              | 13.000                            | -             | -            | -17.909     | -17.909       |         |                  |            |  |  |  |  |  |
| <b>Change Summary Explanation</b>   |             |         |         |              |                                   |               |              |             |               |         |                  |            |  |  |  |  |  |
| The details of this program are reported in accordance with Title 10, United States Code, Section 119(a)(1).  |             |         |         |              |                                   |               |              |             |               |         |                  |            |  |  |  |  |  |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |         |         | Date: March 2019 |            |  |  |  |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|---------|------------------|------------|--|--|--|--|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)      |               |         |         |         |         |                  |            |  |  |  |  |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604601A / Infantry Support Weapons |               |         |         |         |         |                  |            |  |  |  |  |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                            | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |  |  |  |  |
| Total Program Element   | -           | 99.145  | 63.793  | 106.121      | -                                      | 106.121       | 107.166 | 75.740  | 68.849  | 58.101  | Continuing       | Continuing |  |  |  |  |
| CF3: Integrated Soldier Systems (SL CFT)  | -           | 0.000   | 0.000   | 4.504        | -                                      | 4.504         | 4.601   | 4.429   | 4.502   | 4.584   | 0.000            | 22.620     |  |  |  |  |
| ES9: Advanced Tactical Parachute System   | -           | 5.607   | 6.702   | 6.617        | -                                      | 6.617         | 1.829   | 2.965   | 2.964   | 3.000   | 0.000            | 29.684     |  |  |  |  |
| EW4: Crew Served Weapons Engineering Development  | -           | 12.999  | 11.102  | 2.589        | -                                      | 2.589         | 15.767  | 14.789  | 13.927  | 9.029   | 0.000            | 80.202     |  |  |  |  |
| FF2: Small Arms Fire Control  | -           | 17.914  | 10.188  | 21.463       | -                                      | 21.463        | 10.163  | 11.254  | 8.000   | 10.000  | 0.000            | 88.982     |  |  |  |  |
| FI2: Lightweight 30mm Cannon  | -           | 8.280   | 0.000   | 1.384        | -                                      | 1.384         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 9.664      |  |  |  |  |
| FL8: 84mm MAAWS Ammunition  | -           | 0.000   | 0.000   | 4.040        | -                                      | 4.040         | 3.134   | 3.000   | 0.000   | 0.000   | 0.000            | 10.174     |  |  |  |  |
| FM4: Next Generation Squad Weapons  | -           | 0.000   | 0.000   | 33.080       | -                                      | 33.080        | 36.880  | 13.780  | 15.470  | 16.060  | 0.000            | 115.270    |  |  |  |  |
| S58: Soldier Enhancement Program  | -           | 6.232   | 9.081   | 0.000        | -                                      | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 15.313     |  |  |  |  |
| S60: Clothing & Equipment   | -           | 6.780   | 8.348   | 6.453        | -                                      | 6.453         | 6.724   | 5.015   | 4.850   | 3.700   | 0.000            | 41.870     |  |  |  |  |
| S61: Acis Engineering Development   | -           | 3.908   | 3.608   | 2.988        | -                                      | 2.988         | 2.864   | 2.924   | 2.967   | 1.450   | Continuing       | Continuing |  |  |  |  |
| S62: Counter-Defilade Target Engagement - SDD   | -           | 0.000   | 1.998   | 0.000        | -                                      | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 1.998      |  |  |  |  |
| S63: Individual Weapons Engineering Development   | -           | 9.664   | 5.749   | 7.076        | -                                      | 7.076         | 15.377  | 7.918   | 6.284   | 0.974   | 0.000            | 53.042     |  |  |  |  |
| S64: Common Remotely Operated Wpn Sys (CROWS)   | -           | 24.753  | 0.000   | 9.300        | -                                      | 9.300         | 1.500   | 0.000   | 0.000   | 0.000   | 0.000            | 35.553     |  |  |  |  |
| S70: Personnel Recovery Support System (PRSS)   | -           | 1.283   | 0.967   | 0.000        | -                                      | 0.000         | 0.000   | 0.000   | 0.395   | 0.797   | Continuing       | Continuing |  |  |  |  |
| VS5: Soldier Protective Equipment   | -           | 1.725   | 6.050   | 6.627        | -                                      | 6.627         | 8.327   | 9.666   | 9.490   | 8.507   | 0.000            | 50.392     |  |  |  |  |

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Army   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |
| <b>Note</b><br>FY 2019 New starts include Next Generation Squad Automatic Rifle (NGSAR) and Increased Barrel Life Replace Chrome.   |   |
| <b>A. Mission Description and Budget Item Justification</b>   |   |
| Fiscal Year (FY) 2019 budget request funds Infantry Support Weapons. This Program Element (PE) Engineering and Manufacturing Development (EMD) manages the Soldier as a system, with the goal of increasing Soldiers' combat effectiveness, increasing survivability, and improving the Soldiers' quality of life. It develops and tests prototypes of weapons, clothing, equipment, and other items useful to support the Soldier. |   |
| Project CF3 (Integrated Soldier Systems (SL CFT)) supports the Adaptive Soldier Architecture (ASA) effort that will develop a full system architecture for the Soldier and the Squad. The focus will be full integration of all mission-specific equipment into the ASA as well as full configuration management of the Configuration Database, Architecture Assessment Tool and Squad Performance Model.                           |   |
| Project ES9 (Advanced Tactical Parachute System) supports efforts to improve Static Line (SL) and Military Free Fall (MFF) 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.                    |   |
| Project EW4 (Crew Served Weapons Engineering) supports efforts to transition components or prototypes from Small Arms Improvement, Project S54, Program Element 0603827A, (Budget Activity 4) and other domestic and foreign sources of small arms weapons to demonstrate, test and evaluate capability near or at planned operational requirements.  |   |
| Project FF2 (Small Arms Fire Control (SAFC)) supports optimized fire control devices to support Squad (S), Crew Served (CS) and Precision (P). SAFC shall increase the probability of hit and decrease time to engage across a range of small arms weapon systems, with a direct-view optic that allows for quicker and more accurate target detection and recognition.   |   |
| Project FI2 (Lightweight 30mm Cannon) provides increased lethality modification to Product Directorate Counter-Rocket Artillery Mortars (PD C-RAM) under a JUONS. An upgraded medium caliber weapon will be developed, tested and evaluated for integration into a modified remote weapon station under an Urgent Materiel Release (UMR).   |   |
| Project S58 (Soldier Enhancement Program) supports accelerated integration, modernization, and enhancement efforts of lighter, more lethal weapons, and improved Soldier items including lighter, more comfortable load-bearing equipment, field gear, survivability items, communications equipment, and navigational aids.  |   |
| Project S60 (Clothing and Equipment) supports pre-production development of state-of-the-art individual clothing and equipment to improve the survivability, mobility and sustainment affecting the quality of life of the individual Soldier.  |   |

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Army   | <b>Date:</b> March 2019   |                |                     |                    |                      |
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |                |                     |                    |                      |
| Project S61 (Aircrew Integrated Systems) provides System Development programs with improved aviator safety, survivability, and human performance that amplify the warfighting effectiveness and facilitates full-spectrum dominance of the Army aircraft including the AH-64 Apache/Longbow, CH-47 Chinook, UH/HH-60 Blackhawk, Light Utility Helicopter, and Armed Reconnaissance Helicopter.  |   |                |                     |                    |                      |
| Project S62 (Counter-Defilade Target Engagement) the XM25, Individual Airburst Weapon System (IAWS) delivers a 25mm programmable high explosive airburst (HEAB) round to defeat defilade and point area targets out to approximately 600 meters. Accurate and lethal engagement of defilade targets at the squad level is the number one capability gap identified by the United States Army Infantry Center (USAIC).   |   |                |                     |                    |                      |
| Project S63 (Small Arms Improvements) demonstrates engineering development models or integrated commercial items designed to enhance lethality, target acquisition, fire control, training effectiveness, and reliability for small arms weapon systems and ammunition. Programs include Improved Weapons Coatings, Personal Defense Weapon, 30 Round 5.56mm Magazine, Modular Handgun System (MHS), Precision Sniper Rifle (PSR), Sub Compact, and Interim Combat Service Rifle (ICR). |   |                |                     |                    |                      |
| Project S64 (CROWS) continues enhancing CROWS capability and reliability to increase its application across combat and tactical platforms. This capability enhances the Soldier's survivability, lethality and situational awareness.   |   |                |                     |                    |                      |
| Project S70 (Personnel Recovery Support System) provides system research, development and testing of the Personal Recovery Support System/Personnel Recovery Support Equipment supporting operations to report and locate isolated, missing, detained or captured Soldiers.   |   |                |                     |                    |                      |
| Project VS5 (Soldier Protective Equipment) supports engineering and manufacturing development of Individual Soldier Ballistic Protection equipment. It will leverage advancements in technology to continue incremental improvements to body armor (to include improved outer tactical vests, plate carriers, and helmets) and other personal protective equipment.   |   |                |                     |                    |                      |
| <b>B. Program Change Summary (\$ in Millions)</b>   | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |
| Previous President's Budget   | 87.643  | 83.155         | 82.105              | -                  | 82.105               |
| Current President's Budget  | 99.145  | 63.793         | 106.121             | -                  | 106.121              |
| Total Adjustments   | 11.502  | -19.362        | 24.016              | -                  | 24.016               |
| • Congressional General Reductions  | -0.062  | -0.062         |                     |                    |                      |
| • Congressional Directed Reductions   | -4.600  | -32.000        |                     |                    |                      |
| • Congressional Rescissions   | -   | -              |                     |                    |                      |
| • Congressional Adds  | 13.449  | 12.700         |                     |                    |                      |
| • Congressional Directed Transfers  | -   | -              |                     |                    |                      |
| • Reprogrammings  | 5.752   | -              |                     |                    |                      |
| • SBIR/STTR Transfer  | -3.037  | -              |                     |                    |                      |
| • Adjustments to Budget Years   | -   | -              | 24.016              | -                  | 24.016               |

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Army   |  | <b>Date:</b> March 2019   |                |
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>  |  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |                |
| <b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b><br><br>Project: EW4: <i>Crew Served Weapons Engineering Development</i><br><br>Congressional Add: FY 2019 Congressional Add: <i>Cannon Life Extension &amp; Shoulder launched munition evaluation</i><br><br>Congressional Add Subtotals for Project: EW4<br><br>Congressional Add Totals for all Projects |  | <b>FY 2018</b>  | <b>FY 2019</b> |
|   |  | -   | 3.500          |
|   |  | -   | 3.500          |
|   |  | -   | 3.500          |

**Change Summary Explanation**

FY 2019 \$2M Congressional Add for Shoulder launched munition evaluation & \$1.5M for Cannon life extension program  
FY 2020 funding increase is for the development of Next Generation Squad Automatic Rifle (NGSAR).

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |   | Date: March 2019 |                  |            |  |  |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---|------------------|------------------|------------|--|--|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)      |               |         |         | Project (Number/Name)                     |                  |                  |            |  |  |  |
| 2040 / 5  |             |         |         |              | PE 0604601A / Infantry Support Weapons |               |         |         | CF3 / Integrated Soldier Systems (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 |  |  |  |
| CF3: Integrated Soldier Systems (SL CFT)                | -           | 0.000   | 0.000   | 4.504        | -                                      | 4.504         | 4.601   | 4.429   | 4.502                                     | 4.584            | 0.000            | 22.620     |  |  |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -                                      | -             | -       | -       | -   | -                | -                |            |  |  |  |

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

The Adaptive Squad Architecture (ASA) and Squad Performance Model (SPM) are Program Executive Office Soldier (PEO S) led efforts which will allow optimization of the Soldier and the Squad. The focus of CF-3 will be the full integration of all mission-specific equipment (CF-2 incorporates Soldier base/ common kit) into the ASA and SPM as well as full configuration management of the Configuration Database (CD), Architecture Assessment Tool (AAT) and SPM. This will be accomplished by continued development of Interface Control Documents (ICDs) in order to provide common established interfaces for external stakeholders who will interface on or with the Soldier platform. The ASA and SPM will continue to refine a metrics-based approach that will include live, virtual, and constructive 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 \$4.504M will provide a fully integrated Adaptive Squad Architecture and Squad Performance Model by which Soldiers/ Squads equipped with new components can be tested, both in physical and virtual environments, for improved Squad performance.

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

|  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Integrated Soldier Systems | -       | -       | 4.504        | -           | 4.504         |

**Description:** Test, maintain and evolve a Soldier/squad equipment configuration baseline and conduct configuration management at the system level. Physically integrate components, improve compatibility and interoperability across programs. Establish and maintain tools that provide Systems Engineering, Configuration Management and Evaluation in a virtual and physical environment. Conduct Squad Performance Model (SPM) evaluations and integrate mission-specific equipment into the Adaptive Squad Architecture (ASA) with continued emphasis on development of ICDs, evaluations, and improved fidelity of the SPM.

**FY 2020 Base Plans:**

Integration of mission-specific equipment, other combat platforms into initial version of ASA. Conduct evaluations in support of the SPM.

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

New start. Critical task of Adaptive Squad Architecture will be to allow Army Futures Command, Soldier Lethality Cross Functional Team, and PEO Soldier leadership to make immediate quantitative analysis of proposed components (ie next-gen weapons, future body-armor, etc) for acquisition.

**Accomplishments/Planned Programs Subtotals**

|   |   |       |   |       |
|---|---|-------|---|-------|
| - | - | 4.504 | - | 4.504 |
|---|---|-------|---|-------|

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |         |         |                 |                |   |         |         |  |         | <b>Date:</b> March 2019 |            |
|---|---------|---------|-----------------|----------------|---|---------|---------|--|---------|-------------------------|------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |         |         |                 |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |         |         | <b>Project (Number/Name)</b><br>CF3 / <i>Integrated Soldier Systems (SL CFT)</i> |         |                         |            |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |         |                 |                |   |         |         |  |         |                         |            |
| Line Item   | FY 2018 | FY 2019 | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total  | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To<br>Complete     | Total Cost |
| • CF2: <i>Integrated Soldier Systems Prototyping (SL CFT)</i>   | -       | -       | 1.959           | -              | 1.959   | 2.543   | 3.152   | 3.774  | 3.847   | 0.000                   | 15.275     |
| <b>Remarks</b>  |         |         |                 |                |   |         |         |  |         |                         |            |
| <b>D. Acquisition Strategy</b><br>Assistant Program Executive Office, Futures and Integration (APEO F&I) will utilize available Adaptive Squad Architecture (ASA) and Squad Performance Model (SPM) tools, current Systems Engineering and Technical Assistance (SETA) contracts as well as tools/deliverables built under CF2 to validate, verify and operationally test the ASA and SPM, in both physical and virtual environments. APEO will utilize CF3 to leverage any data, architectural products or designs from the Army's Heads-up Display (HUD) v3.0 (a separate project). |         |         |                 |                |   |         |         |  |         |                         |            |
| <b>E. Performance Metrics</b><br>N/A  |         |         |                 |                |   |         |         |  |         |                         |            |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 | Project (Number/Name)<br>CF3 / Integrated Soldier Systems (SL CFT) |                |            |                  |                  |            |                          |
| Product Development (\$ in Millions)                   |                        |                                |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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 and SPM Engineering, Manufacturing, Development    | MIPR                   | TBD : Various                  | -           | -       |   | -       |            | 2.504           | Jan 2020   | -              |            | 2.504            | 0.000            | 2.504      | -                        |
| <b>Subtotal</b>  |                        |                                | -           | -       |   | -       |            | 2.504           |  | -              |            | 2.504            | 0.000            | 2.504      | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Physical evaluations to support ASA and SPM            | MIPR                   | Various : To Be Determined     | -           | -       |   | -       |            | 2.000           | Jan 2020   | -              |            | 2.000            | 0.000            | 2.000      | -                        |
| <b>Subtotal</b>  |                        |                                | -           | -       |   | -       |            | 2.000           |  | -              |            | 2.000            | 0.000            | 2.000      | N/A                      |
|  |                        |                                | Prior Years | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                | -           | -       |   | 0.000   |            | 4.504           |  | -              |            | 4.504            | 0.000            | 4.504      | N/A                      |

Remarks

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604601A / *Infantry Support Weapons***Project (Number/Name)**CF3 / *Integrated Soldier Systems (SL CFT)*

| <b>Event Name</b>         | <b>FY 2018</b> |   |   |   | <b>FY 2019</b> |   |   |   | <b>FY 2020</b> |   |   |   | <b>FY 2021</b> |   |   |   | <b>FY 2022</b> |   |   |   | <b>FY 2023</b> |   |   |   | <b>FY 2024</b> |   |   |   |  |  |
|---------------------------|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|--|--|
|                           | 1              | 2 | 3 | 4 | 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 |                |   |   |   |                |   |   |   |                |   |   |   |                |   |   |   |                |   |   |   |                |   |   |   |                |   |   |   |  |  |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |  |   | Date: March 2019 |
|--|--|---|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604601A / <i>Infantry Support Weapons</i> | Project (Number/Name)<br>CF3 / <i>Integrated Soldier Systems (SL CFT)</i> |                  |
| Schedule Details                                   |  |   |                  |
| Events   | Start  | End   |                  |
| Soldier Lethality Support                          | Quarter<br>2   | Year<br>2020  | Quarter<br>4     |
| Year<br>2024                                       |  |   |                  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>ES9 / Advanced Tactical Parachute 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 |  |
| ES9: Advanced Tactical Parachute System                 | -           | 5.607   | 6.702   | 6.617        | -   | 6.617         | 1.829   | 2.965   | 2.964   | 3.000   | 0.000            | 29.684     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                | -          |  |

**Note**

Funding line established in FY17 for the Advanced Tactical Parachute System. Efforts were previously executed in Program Element 0604601A S60.

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

Advance Tactical Parachute System funding supports efforts to improve Low Altitude and High Altitude personnel parachutes and associated equipment to include test and evaluation of items transitioning from Advanced Component Development and prototype (6.4) efforts, with the goal of enhancing the insertion capability of the airborne Soldier and increasing the performance, safety and durability of personnel airdrop equipment. Funds improvements and testing/evaluation of personnel parachute systems. Includes integration and interface on the Soldier system.

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

| FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---------|---------|--------------|-------------|---------------|
| 5.607   | 6.702   | 6.617        | -           | 6.617         |

**Title:** Advanced Tactical Parachute System

**Description:** Advance Tactical Parachute System funds improvements and testing/evaluation of personnel parachute systems. Project supports efforts to improve Low Altitude and High Altitude personnel parachutes and associated equipment to include test and evaluation of items transitioning from Advanced Component Development and prototype (6.4) efforts, 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:**

Complete down select and Developmental Test (DT) for Enhanced Electronic Automatic Activation Device (EEAAD) and prepare to move into operational test. Complete design validation for the T11-R, down select final configuration and complete DT. Obtain materiel development decision and conduct design validation testing of Parachutists Oxygen Device System (PODS) potential candidate systems in preparation for down select. Continue to conduct of testing to support modernization initiatives to parachute systems to include T-11 material upgrades; RA-1 Double Bag Static Line (DBSL) over the ramp jumps on C-17 aircraft; service life extension for RA-1, T-11, and MC-6 parachutes; glide modulation capability of the RA-1 parachute system; and automated parachute management tracking system development and integration for RA-1, T-11, and MC-6 parachute systems.

**FY 2020 Base Plans:**

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |         |   |                |                  |   |         |         |         | Date: March 2019    |            |              |             |               |  |  |  |
|---|---------|---------|---|----------------|------------------|---|---------|---------|---------|---------------------|------------|--------------|-------------|---------------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5   |         |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |                |                  | Project (Number/Name)<br>ES9 / Advanced Tactical Parachute System |         |         |         |                     |            |              |             |               |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |         |         |   |                |                  |   |         |         |         | FY 2018             | FY 2019    | FY 2020 Base | FY 2020 OCO | FY 2020 Total |  |  |  |
| Complete OT for EEAAD in support of MS C decision and full materiel release. Complete PODS DT and prepare to enter OT. Conduct DT for Military Altimeters. Continue to conduct testing for service life extension for RA-1, T-11, and MC-6 parachutes; glide modulation capability of the RA-1 parachute system; and automated parachute management tracking system development and integration for RA-1, T-11, and MC-6 parachute systems; and support modernization initiatives to parachute systems. |         |         |   |                |                  |   |         |         |         |                     |            |              |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Funding change in Advanced Tactical Parachute portfolio is due to anticipated requirement changes in FY19 and FY20.   |         |         |   |                |                  |   |         |         |         |                     |            |              |             |               |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |         |         |   |                |                  |   |         |         |         | 5.607               | 6.702      | 6.617        | -           | 6.617         |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |         |   |                |                  |   |         |         |         |                     |            |              |             |               |  |  |  |
| Line Item   | FY 2018 | FY 2019 | FY 2020<br>Base   | FY 2020<br>OCO | FY 2020<br>Total | FY 2021   | FY 2022 | FY 2023 | FY 2024 | Cost To<br>Complete | Total Cost |              |             |               |  |  |  |
| • MA7801: Advanced<br>Tactical Parachute System   | 28.440  | 41.104  | 43.622  | -              | 43.622           | 53.077  | 47.805  | 39.849  | 39.017  | 0.000               | 292.914    |              |             |               |  |  |  |
| • ET8: Personnel Airdrop<br>System Development  | 0.476   | 0.396   | 0.297   | -              | 0.297            | 1.267   | 1.265   | 1.813   | 1.000   | Continuing          | Continuing |              |             |               |  |  |  |
| <b>Remarks</b>  |         |         |   |                |                  |   |         |         |         |                     |            |              |             |               |  |  |  |
| <b>D. Acquisition Strategy</b>  |         |         |   |                |                  |   |         |         |         |                     |            |              |             |               |  |  |  |
| Acquisition strategies for these programs vary in methods, and range from: 1) Material Change programs that result in engineering changes to existing systems to; 2) Traditional development programs that include an Engineering and Manufacturing Development phase ranging in duration from 12 to 48 months, depending on the level of complexity and testing required.  |         |         |   |                |                  |   |         |         |         |                     |            |              |             |               |  |  |  |
| <b>E. Performance Metrics</b>   |         |         |   |                |                  |   |         |         |         |                     |            |              |             |               |  |  |  |
| N/A   |         |         |   |                |                  |   |         |         |         |                     |            |              |             |               |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |   |                 |                |                | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|-----------------|----------------|----------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |            | Project (Number/Name)<br>ES9 / Advanced Tactical Parachute System |                 |                |                |                  |                  |                  |                          |                          |
| Product Development (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |                 | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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 Contracts  | C/FFP                  | Various : Various              | 1.574       | 4.000   |            | 3.410   |            | 3.317   |                 | -              |                | 3.317            | 0.000            | 12.301           | Continuing               |                          |
| Dev Sys Engineering Spt                                | MIPR                   | Various : Various              | 0.200       | 0.200   |            | 0.200   |            | 0.200   |                 | -              |                | 0.200            | 0.000            | 0.800            | Continuing               |                          |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | TBD : TBD                      | -           | -   |            | 0.245   |            | -   |                 | -              |                | -                | 0.000            | 0.245            | -                        |                          |
| <b>Subtotal</b>  |                        |                                | 1.774       | 4.200   |            | 3.855   |            | 3.517   |                 | -              |                | 3.517            | 0.000            | 13.346           | N/A                      |                          |
| Support (\$ in Millions)                               |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |                 | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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                   | NSRDEC : Natick, MA            | 0.200       | 0.331   |            | 0.400   |            | 0.400   |                 | -              |                | 0.400            | 0.000            | 1.331            | Continuing               |                          |
| <b>Subtotal</b>  |                        |                                | 0.200       | 0.331   |            | 0.400   |            | 0.400   |                 | -              |                | 0.400            | 0.000            | 1.331            | N/A                      |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |                 | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date      | Cost           | Award Date     | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| DT/OT  | MIPR                   | various : various              | 0.884       | 1.076   |            | 2.447   |            | 2.700   |                 | -              |                | 2.700            | 0.000            | 7.107            | Continuing               |                          |
| <b>Subtotal</b>  |                        |                                | 0.884       | 1.076   |            | 2.447   |            | 2.700   |                 | -              |                | 2.700            | 0.000            | 7.107            | N/A                      |                          |
|  |                        |                                |             | Prior Years   | FY 2018    |         | FY 2019    |   | FY 2020<br>Base |                | FY 2020<br>OCO |                  | FY 2020<br>Total | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                | 2.858       | 5.607   |            | 6.702   |            | 6.617   |                 | -              |                | 6.617            | 0.000            | 21.784           | N/A                      |                          |
| <u>Remarks</u>   |                        |                                |             |   |            |         |            |   |                 |                |                |                  |                  |                  |                          |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

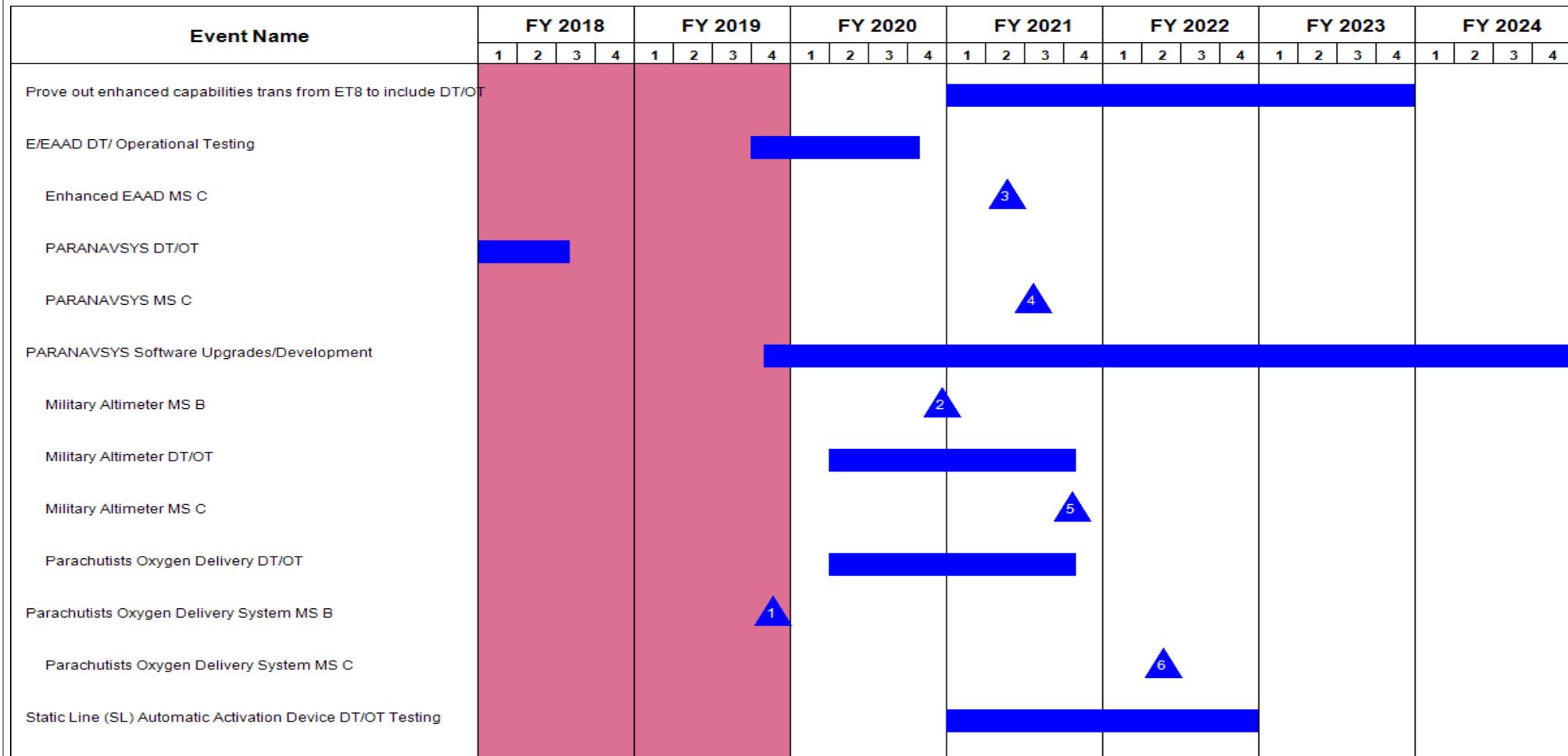
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604601A / Infantry Support Weapons

**Project (Number/Name)**

ES9 / Advanced Tactical Parachute System



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|   |   |  |
|---|---|--|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army<br><b>Appropriation/Budget Activity</b><br>2040 / 5 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Date:</b> March 2019<br><b>Project (Number/Name)</b><br>ES9 / <i>Advanced Tactical Parachute System</i> |
|---|---|--|

**Schedule Details**

| <b>Events</b>   | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Prove out enhanced capabilities trans from ET8 to include DT/OT | 1              | 2021        | 4              | 2023        |
| E/EAAD DT/ Operational Testing                                  | 4              | 2019        | 4              | 2020        |
| Enhanced EAAD MS C  | 2              | 2021        | 2              | 2021        |
| PARANAVSYS DT/OT  | 1              | 2017        | 3              | 2018        |
| PARANAVSYS MS C   | 3              | 2021        | 3              | 2021        |
| PARANAVSYS Software Upgrades/Development                        | 4              | 2019        | 4              | 2024        |
| Military Altimeter MS B   | 4              | 2020        | 4              | 2020        |
| Military Altimeter DT/OT  | 2              | 2020        | 4              | 2021        |
| Military Altimeter MS C   | 4              | 2021        | 4              | 2021        |
| Parachutists Oxygen Delivery DT/OT                              | 2              | 2020        | 4              | 2021        |
| Parachutists Oxygen Delivery System MS B                        | 4              | 2019        | 4              | 2019        |
| Parachutists Oxygen Delivery System MS C                        | 2              | 2022        | 2              | 2022        |
| Static Line (SL) Automatic Activation Device DT/OT Testing      | 1              | 2021        | 4              | 2022        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)      |               |         |         | Project (Number/Name)                             |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604601A / Infantry Support Weapons |               |         |         | EW4 / Crew Served Weapons Engineering Development |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                            | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| EW4: Crew Served Weapons Engineering Development        | -           | 12.999  | 11.102  | 2.589        | -                                      | 2.589         | 15.767  | 14.789  | 13.927  | 9.029   | 0.000            | 80.202     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -                                      | -             | -       | -       | -   | -       | -                |            |  |

**Note**

FY 2020 New starts include Individual Non-Lethal System, Current and Legacy Weapon Improvements, and Next Generation Optics.

Previously funded: Increased Barrel Life/Replace Chrome and Weapon Upgrades and Accessories are now funded under Current and Legacy Weapon Improvements. Mounted Machine Gun Optic and Optic Upgrades are now funded under Next Generation Optics.

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

The Crew Served Weapons Engineering and Manufacturing Development (EMD) program provides funds to transition components or prototypes from Small Arms Improvement, Project S54, Program Element 0603827A, (Budget Activity 4) and other domestic and foreign sources of small arms weapon systems to demonstrate, test and evaluate capability near or at planned operational requirements. Crew Served Weapons systems include weapons ranging up to 40 millimeter in caliber. Current and future efforts focus on system improvements designed to enhance lethality, target acquisition, 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 system development, integration (to include human-systems), demonstration, test and evaluate components, prototypes and operational system prototypes of small arms weapon systems and/or enhancements. Benefits include continuous improvements to small arms weapon systems, fire control equipment, optics, gun barrels, ancillary equipment, training devices, component mounts, weapon mounts, and weapon/ammunition interface of current small arms fleet or new weapon systems.

The AT4 Confined Space - Tandem Warhead (AT4CS-TW) will be a shoulder launched munition (SLM) capability for combat units at the individual Soldier level. As an improvement over existing SLM, the solution will allow Soldiers to conduct Urban Operations with an ability to defeat the enemy protected by a variety of field expedient, structural and lightly armored vehicles. This solution will be effective day or night at close ranges with an ability to safely engage targets from within enclosures using single hearing protection. This solution will combine the capability of multiple existing SLM which will allow for reduced Soldier load, training complexity and logistics burden for Light Infantry, Combat Engineers and Special Operations Forces. FY2019 funding will provide the Army the opportunity to reduce the weight of the AT4CS-TW, lightening the Soldier's load further.

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

|  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> New Weapon Systems                           | 10.198  | 5.029   | 1.230        | -           | 1.230         |
| <b>Description:</b> Development of new crew served weapons |         |         |              |             |               |

**FY 2019 Plans:**

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |  |  |         | Date: March 2019 |             |               |
|---|--|--|---------|------------------|-------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5   | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons  | Project (Number/Name)<br>EW4 / Crew Served Weapons Engineering Development |         |                  |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |  | FY 2018  | FY 2019 | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |
| Coordinate and develop the Capability Development Document (CDD), Acquisition Strategy, Capability Production Document (CPD), and provide data from various technologies to better inform stakeholders. Begin EMD phase for the Next Generation Squad Automatic Rifle with a single vendor.   | M3/M3E1 Multi-Role Anti-Armor Anti-Personnel Weapon System (MAAWS): Complete developmental testing and obtain Type Classification and Full Materiel Release for M3E1 w/Fire Control.   |  |         |                  |             |               |
| Precision Sniper Rifle (PSR): Continue supporting SOCOM source selection activities and testing of up-to three (3) PSR systems with a down-select decision to one (1). Will purchase PSRs and/or fund additional Army unique Production Qualification Testing, IOT&E, and airborne deployment testing. New Weapon Evaluations and Assessments: Will perform initial evaluation and assessment of new weapons. | <b>FY 2020 Base Plans:</b><br>Precision Sniper Rifle (PSR): Will support ammunition specific testing, development of a spare parts contract, Life Cycle sustainment planning efforts, and activities to support a Milestone C / Type Classification-Standard decision for PSR weapon system and two ammunition cartridges.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 Decrease in funding due to funds being moved to a new project line under same Program Element. |  |         |                  |             |               |
| <b>Title:</b> Crew Served Weapons Enhancements<br><b>Description:</b> Enhancements and developments of Crew Served weapons  | Compact Semi-Automated Sniper System (CSASS): Completes production Qualification testing (PQT) as an entry criteria for the Limited user Test (LUT). Conducts operational assessments and evaluations with a LUT as well as airborne drop testing. Completes LOG Demo, ILS assessments, technical manuals and fielding plan in preparation for Material Release Board and TC STD.  | 1.756  | 0.850   | 0.849            | -           | 0.849         |
| M2 Lightweight Program - Investigate alternative materials (i.e. titanium) in order to lighten the Warfighter's load, to improve Soldier mobility, respond to vehicle weight restrictions, improve weapon parts life, increase durability   |  |  |         |                  |             |               |

## UNCLASSIFIED

| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |  |         | Date: March 2019 |             |               |
|--|---|--|---------|------------------|-------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons   | Project (Number/Name)<br>EW4 / Crew Served Weapons Engineering Development |         |                  |             |               |
| <u>B. Accomplishments/Planned Programs (\$ in Millions)</u>  |   | FY 2018  | FY 2019 | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |
| and potentially increase performance. Manufacture lightweight titanium weapon parts, assemble improved parts into legacy weapons, conduct testing (production verification/reliability/user evaluation/air drop) on the improved weapon system and modify weapons based on test results.   | Small Business Innovation Research (SBIR) Enhancements: Continue to support Phase II Enhancement and/or initialization of Phase III SBIR activities.                  |  |         |                  |             |               |
| Gunner Integrated Protection and Restraint System, Objective Gunner Protection Kit (GIPRS/OGPK): Complete developmental verification testing and begin operational testing for the TOW Missile Objective Gunner Protection Kit (TOGPK) 2.0. Will begin work on technical publications and prepare for TOGPK 2.0 type classification. | Weapon Upgrades and Accessories: Will continue to test, evaluate and analyze ongoing and new activities to enhance Crew Served Weapons.                               |  |         |                  |             |               |
| <b>FY 2020 Base Plans:</b><br>FY 2020 New Start: Individual Non-Lethal System: Will work to address technical issues identified during prove out test, refine user requirements and initiate hardware contract for verification test in support of Type classification.  | FY 2020 New Start: Current and Legacy Weapon Improvements: Will assess and evaluate selected capabilities and improvements for all current and legacy weapon systems. |  |         |                  |             |               |
| Small Business Innovation Research (SBIR) Enhancements: Will continue to support Phase II Enhancement and/or initialization of Phase III SBIR activities.  |   |  |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 Increase in funding due to new start for Individual Non-Lethal System.   |   | -  | 0.100   | 0.025            | -           | 0.025         |
| <b>Title:</b> Ammunition<br><b>Description:</b> Improvement of Crew Served Weapons Ammunition  |   |  |         |                  |             |               |
| <b>FY 2019 Plans:</b>  |   |  |         |                  |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |  |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>EW4 / <i>Crew Served Weapons Engineering Development</i> |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| Ammunition Upgrades: Will continue to test, evaluate and analyze the effect of current and new ammunition on Crew Served Weapons. Specific focus on alignment of requirements between crew served fire control and 40mm air burst munitions.  |   |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Ammunition Upgrades: Will continue to test, evaluate and analyze the effect of current and new ammunition on Crew Served Weapons.   |   |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 Decrease in funding to support the National Defense Strategy.   |   |  |                |                     |                         |                      |
| <b>Title:</b> Combat Optics<br><b>Description:</b> Improvement of Combat Optics   |   | 1.045  | 0.539          | 0.460               | -                       | 0.460                |
| <b>FY 2019 Plans:</b><br>Mounted Machinegun Optic: Begin Mk19 MMO pre-planned product improvement (PPPI) R&D efforts for integration with airburst ammo programmer.<br><br>Optic Upgrades: Continue engineering evaluations, verification and validation of weapon optics performance requirements.   |   |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>FY 2020 New Start: Next Generation Optics: Will integrate current and emerging target acquisition component technologies into a variable magnification spotting scope and into binoculars.<br><br>Mounted Machinegun Optic: Will continue integration efforts with airburst ammo through engineering studies and evaluation of emerging technologies for Mk19 MMO PPPI. |   |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 Increase in funding to support Next Generation Optics.  |   |  |                |                     |                         |                      |
| <b>Title:</b> Research and Analysis<br><b>Description:</b> Market Research and Cost Benefit Analysis  |   | -  | 0.100          | 0.025               | -                       | 0.025                |
| <b>FY 2019 Plans:</b>   |   |  |                |                     |                         |                      |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |                |                |                         |   |                          |                |                |  |                | <b>Date:</b> March 2019     |                   |  |
|---|----------------|----------------|-------------------------|---|--------------------------|----------------|----------------|--|----------------|-----------------------------|-------------------|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                         | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |                          |                |                | <b>Project (Number/Name)</b><br>EW4 / <i>Crew Served Weapons Engineering Development</i> |                |                             |                   |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   | FY 2018        | FY 2019        | FY 2020<br>Base         | FY 2020<br>OCO  | FY 2020<br>Total         |                |                |  |                |                             |                   |  |
| Continue Market Research and Cost Benefit Analysis of new small arms weapon and/or enhancements for engineering and manufacturing development.  |                |                |                         |   |                          |                |                |  |                |                             |                   |  |
| <b>FY 2020 Base Plans:</b><br>Will continue Market Research and Cost Benefit Analysis of new small arms weapon systems and/or enhancements for engineering and manufacturing development. |                |                |                         |   |                          |                |                |  |                |                             |                   |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 Decrease in funding is due to the reduction in the crew served fire control requirement.                                |                |                |                         |   |                          |                |                |  |                |                             |                   |  |
| <b>Title:</b> FY2019 SBIR / STTR Transfer   |                | -              | 0.984                   | -   | -                        |                |                |  |                |                             |                   |  |
| <b>FY 2019 Plans:</b><br>FY2019 SBIR / STTR Transfer  |                |                |                         |   |                          |                |                |  |                |                             |                   |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY2019 SBIR / STTR Transfer   |                |                |                         |   |                          |                |                |  |                |                             |                   |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                         |   |                          | 12.999         | 7.602          | 2.589  | -              | 2.589                       |                   |  |
|   | FY 2018        | FY 2019        |                         |   |                          |                |                |  |                |                             |                   |  |
| <b>Congressional Add:</b> FY 2019 Congressional Add: Cannon Life Extension & Shoulder launched munition evaluation  |                | -              | 3.500                   |   |                          |                |                |  |                |                             |                   |  |
| <b>FY 2019 Plans:</b> FY 2019 Congressional Add: Cannon Life Extension & Shoulder launched munition evaluation  |                |                |                         |   |                          |                |                |  |                |                             |                   |  |
| <b>Congressional Adds Subtotals</b>   |                |                |                         |   |                          | -              | 3.500          |  |                |                             |                   |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  | FY 2018        | FY 2019        | FY 2020<br>Base         | FY 2020<br>OCO  | FY 2020<br>Total         | FY 2021        | FY 2022        | FY 2023  | FY 2024        | Cost To<br>Complete         | Total Cost        |  |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020<br/>Base</b> | <b>FY 2020<br/>OCO</b>  | <b>FY 2020<br/>Total</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>   | <b>FY 2024</b> | <b>Cost To<br/>Complete</b> | <b>Total Cost</b> |  |
| • S54: Small Arms Improvement   | 27.832         | 7.677          | 14.555                  | -   | 14.555                   | 16.097         | 19.232         | 17.439   | 10.487         | 0.000                       | 113.319           |  |
| • FL8: 84mm MAAWS Ammunition  | -              | -              | 4.040                   | -   | 4.040                    | 3.134          | 3.000          | -  | -              | 0.000                       | 10.174            |  |
| • FM4: Next Generation Squad Weapons  | -              | -              | 33.080                  | -   | 33.080                   | 36.880         | 13.780         | 15.470   | 16.060         | 0.000                       | 115.270           |  |
| • GZ1500: Sniper Rifles Modifications   | 1.488          | 2.747          | 2.426                   | -   | 2.426                    | 1.900          | 1.857          | 1.892  | 1.794          | Continuing                  | Continuing        |  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |         |         |                 |  |                  |         |         |   |         |                  | Date: March 2019 |  |
|--|---------|---------|-----------------|--|------------------|---------|---------|---|---------|------------------|------------------|--|
| Appropriation/Budget Activity  |         |         |                 | R-1 Program Element (Number/Name)      |                  |         |         | Project (Number/Name)                             |         |                  |                  |  |
| 2040 / 5   |         |         |                 | PE 0604601A / Infantry Support Weapons |                  |         |         | EW4 / Crew Served Weapons Engineering Development |         |                  |                  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |         |         |                 |  |                  |         |         |   |         |                  |                  |  |
| Line Item  | FY 2018 | FY 2019 | FY 2020<br>Base | FY 2020<br>OCO                         | FY 2020<br>Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost       |  |
| • GZ1290: M249 SAW Machine Gun MODS  | 3.339   | 3.924   | 0.000           | -                                      | 0.000            | -       | -       | -   | -       | Continuing       | Continuing       |  |
| • GZ1300: M240 Medium Machine Gun MODS   | 4.577   | 6.947   | 8.000           | -                                      | 8.000            | 8.000   | 8.000   | 8.000   | 8.000   | Continuing       | Continuing       |  |
| • GB3000: MK-19 Grenade Machine Gun MODS   | 2.000   | 1.684   | 3.737           | -                                      | 3.737            | 6.708   | 11.678  | 14.383  | -       | Continuing       | Continuing       |  |
| • GB4000: M2 50 Cal Machine Gun MODS   | 50.414  | 19.098  | 0.000           | 6.090                                  | 6.090            | -       | 0.849   | 0.849   | 0.857   | Continuing       | Continuing       |  |
| • GC0925: Modifications Less Than \$5.0m (WOCV-WTCV)   | 2.219   | 5.577   | 4.327           | -                                      | 4.327            | 2.606   | 2.362   | 2.338   | 2.716   | Continuing       | Continuing       |  |
| • GL3200: Items Less Than \$5.0m (WOCV-WTCV)   | 5.075   | 4.571   | 3.066           | -                                      | 3.066            | 2.766   | 2.869   | 2.977   | 3.174   | Continuing       | Continuing       |  |
| • G13000: M240 Medium Machine Gun (7.62mm)   | 9.874   | 14.581  | 0.000           | 0.900                                  | 0.900            | -       | -       | -   | -       | Continuing       | Continuing       |  |
| • G01506: Precision Sniper Rifle   | -       | -       | 7.977           | -                                      | 7.977            | 10.147  | 12.112  | 6.292   | 5.218   | Continuing       | Continuing       |  |
| • G13101: MULTI-ROLE ANTI-ARMOR ANTI-PERSONNEL WEAPON SYSTEM   | 26.520  | 19.880  | 19.420          | 2.400                                  | 21.820           | 20.282  | 26.716  | 26.035  | 0.866   | Continuing       | Continuing       |  |
| <b>Remarks</b>   |         |         |                 |  |                  |         |         |   |         |                  |                  |  |
| In support of Small Arms Requirements, components or prototypes developed in Small Arms Improvement, Project S54, Program Element 0603827A, (Budget Activity 4) is transitioned to Crew Served Weapons Engineering Development, Project EW4, Program Element 0604601A, (Budget Activity 5) to conduct engineering and manufacturing development. Once the component, prototype or operational prototype achieves Milestone C and type classification the item transitions to small arms weapon systems production or modification program. |         |         |                 |  |                  |         |         |   |         |                  |                  |  |
| <b>D. Acquisition Strategy</b>   |         |         |                 |  |                  |         |         |   |         |                  |                  |  |
| Primary strategy is to mature and finalize design efforts, award Research, Development, Test and Evaluation (RDT&E) hardware contracts, and test and evaluate systems that result in type classification and follow-on production contract awards.   |         |         |                 |  |                  |         |         |   |         |                  |                  |  |
| The AT4CS-TW will be included as a line item in the FY2019-FY2023 combined AT4-MAAWS production contract.  |         |         |                 |  |                  |         |         |   |         |                  |                  |  |
| <b>E. Performance Metrics</b>  |         |         |                 |  |                  |         |         |   |         |                  |                  |  |
| N/A  |         |         |                 |  |                  |         |         |   |         |                  |                  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |         |   |         |            |              |  |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---------|---|---------|------------|--------------|--|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |              | Project (Number/Name)<br>EW4 / Crew Served Weapons Engineering Development |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |  | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                           | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date   | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management                                     | Allot                  | PM Soldier Weapons, : Picatinny Arsenal                  | 0.200       | 0.851   | Mar 2018  | 0.220   | Mar 2019   | -            |  | -           |            | -                | Continuing       | Continuing | Continuing               |
| Travel   | MIPR                   | PM Soldier Weapons, : Picatinny Arsenal                  | 0.040       | 0.180   | Mar 2018  | 0.135   | Mar 2019   | 0.010        | Mar 2020   | -           |            | 0.010            | Continuing       | Continuing | Continuing               |
| FY2019 SBIR / STTR Transfer                            | FFRDC                  | Army Budget Office : Pentagon, Washington DC             | -           | -       |   | 0.984   | Nov 2018   | -            |  | -           |            | -                | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |  | 0.240       | 1.031   |   | 1.339   |            | 0.010        |  | -           |            | 0.010            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |  | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                           | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date   | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Fabrication  | Various                | Various : Multiple Contractors                           | 0.200       | 0.350   | Mar 2018  | 5.628   | Mar 2019   | 0.300        | Mar 2020   | -           |            | 0.300            | Continuing       | Continuing | Continuing               |
| Hardware Development                                   | MIPR                   | Army Research Development Engineers Centers : Multiple   | 0.074       | 4.200   | Mar 2018  | 1.900   | Mar 2019   | 0.050        | Mar 2020   | -           |            | 0.050            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |  | 0.274       | 4.550   |   | 7.528   |            | 0.350        |  | -           |            | 0.350            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |  | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                           | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date   | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Engineering  | MIPR                   | Army Research Development Engineering Centers : Multiple | 3.174       | 3.675   | Mar 2018  | 0.675   | Mar 2019   | 1.000        | Mar 2020   | -           |            | 1.000            | Continuing       | Continuing | Continuing               |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |              |   |            |              |            |  |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|---|--------------|---|------------|--------------|------------|--|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |              |            | Project (Number/Name)<br>EW4 / Crew Served Weapons Engineering Development |              |             |             |                  |                  |                  |                          |                          |
| 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 |                          |
| Logistics  | MIPR                   | Tank & Automotive Command (TACOM), : Warren                 | 0.269        | 0.230   | Mar 2018   | 0.070        | Mar 2019   | 0.050  | Mar 2020     | -           |             | 0.050            | Continuing       | Continuing       | Continuing               |                          |
| Human Research and Engineering                         | MIPR                   | Army Research Laboratory, : Aberdeen Proving Ground         | 0.269        | 0.168   | Mar 2018   | 0.070        | Mar 2019   | 0.050  | Mar 2020     | -           |             | 0.050            | Continuing       | Continuing       | Continuing               |                          |
| <b>Subtotal</b>  |                        | <b>3.712</b>  | <b>4.073</b> |   |            | <b>0.815</b> |            | <b>1.100</b>   |              |             | <b>-</b>    |                  | <b>1.100</b>     | Continuing       | Continuing               | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |   |              | FY 2018   |            | FY 2019      |            | FY 2020 Base   |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                              | Prior Years  | Cost  | Award Date | Cost         | Award Date | Cost   | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Developmental Testing                                  | MIPR                   | Army Developmental Test Command, : Aberdeen Proving Ground  | 1.365        | 1.850   | Mar 2018   | 0.850        | Mar 2019   | 1.000  | Mar 2020     | -           |             | 1.000            | Continuing       | Continuing       | Continuing               |                          |
| Operational Testing                                    | MIPR                   | Army Test and Evaluation Command, : Aberdeen Proving Ground | 1.848        | 1.220   | Mar 2018   | 0.500        | Mar 2019   | 0.080  | Mar 2020     | -           |             | 0.080            | Continuing       | Continuing       | Continuing               |                          |
| Validation Testing                                     | MIPR                   | Army Test and Evaluation Centers, : Multiple                | 0.269        | 0.275   | Mar 2018   | 0.070        | Mar 2019   | 0.049  | Mar 2020     | -           |             | 0.049            | Continuing       | Continuing       | Continuing               |                          |
| <b>Subtotal</b>  |                        | <b>3.482</b>  | <b>3.345</b> |   |            | <b>1.420</b> |            | <b>1.129</b>   |              |             | <b>-</b>    |                  | <b>1.129</b>     | Continuing       | Continuing               | N/A                      |
|  |                        |   |              | Prior Years   | FY 2018    |              | FY 2019    |  | FY 2020 Base |             | FY 2020 OCO |                  | FY 2020 Total    | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |   | 7.708        | 12.999  |            |              | 11.102     |  | 2.589        |             | -           |                  | 2.589            | Continuing       | Continuing               | N/A                      |
| <b>Remarks</b>   |                        |   |              |   |            |              |            |  |              |             |             |                  |                  |                  |                          |                          |

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| 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)                             |  |  |  |         |                  |  |  |         |  |  |  |
| 2040 / 5   |  |  |  | PE 0604601A / Infantry Support Weapons |  |  |  | EW4 / Crew Served Weapons Engineering Development |  |  |  |         |                  |  |  |         |  |  |  |
|  |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
|  |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
|  |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Event Name   |  |  |  | FY 2018                                |  |  |  | FY 2019   |  |  |  | FY 2020 |                  |  |  | FY 2021 |  |  |  |
|  |  |  |  | 1 2 3 4                                |  |  |  | 1 2 3 4   |  |  |  | 1 2 3 4 |                  |  |  | 1 2 3 4 |  |  |  |
| <b>NEW WEAPON SYSTEMS</b>                                    |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Next Generation Squad Weapon-Automatic Rifle                 |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| M3/M3E1 Multi-Role Anti-Armor Anti-Personnel Weapon System   |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Precision Sniper Rifle (PSR)                                 |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| New Weapon Systems Evaluations and Assessments               |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| <b>CREW SERVED WEAPON ENHANCEMENTS</b>                       |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Compact Semi-Automatic Sniper System (CSASS)                 |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Increased Barrel Life/Replace Chrome                         |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| M2 Lightweight Program                                       |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Weapons Upgrades and Accessories                             |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Gunner Integrated Protection and Restraint Systems (GIPRS/C) |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Individual Non-Lethal System                                 |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |
| Small Business Innovation Research (SBIR) Enhancements       |  |  |  |  |  |  |  |   |  |  |  |         |                  |  |  |         |  |  |  |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army |         |   |   |   |         |   |   |  |         |   |   |   | Date: March 2019 |   |   |   |         |   |   |   |         |   |   |   |
|---|---------|---|---|---|---------|---|---|--|---------|---|---|---|------------------|---|---|---|---------|---|---|---|---------|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5         |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |   |   | Project (Number/Name)<br>EW4 / Crew Served Weapons Engineering Development |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Event Name  | FY 2018 |   |   |   | FY 2019 |   |   |  | FY 2020 |   |   |   | FY 2021          |   |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |
|   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4  | 1       | 2 | 3 | 4 | 1                | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |
| Legacy Weapon Improvements                        |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| AMMUNITION  |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| XM1112 Airburst Non-Lethal Munition (ANLM)        |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Ammunition Upgrades                               |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| COMBAT OPTICS                                     |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Optic Upgrades                                    |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Next Generation Optics                            |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| RESEARCH AND ANALYSIS                             |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Research and Analysis                             |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| AT4 - TANDEM WARHEAD                              |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| DOTC Contract Award                               |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Preliminary Design Review                         |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |
| Detailed Design Effort                            |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |

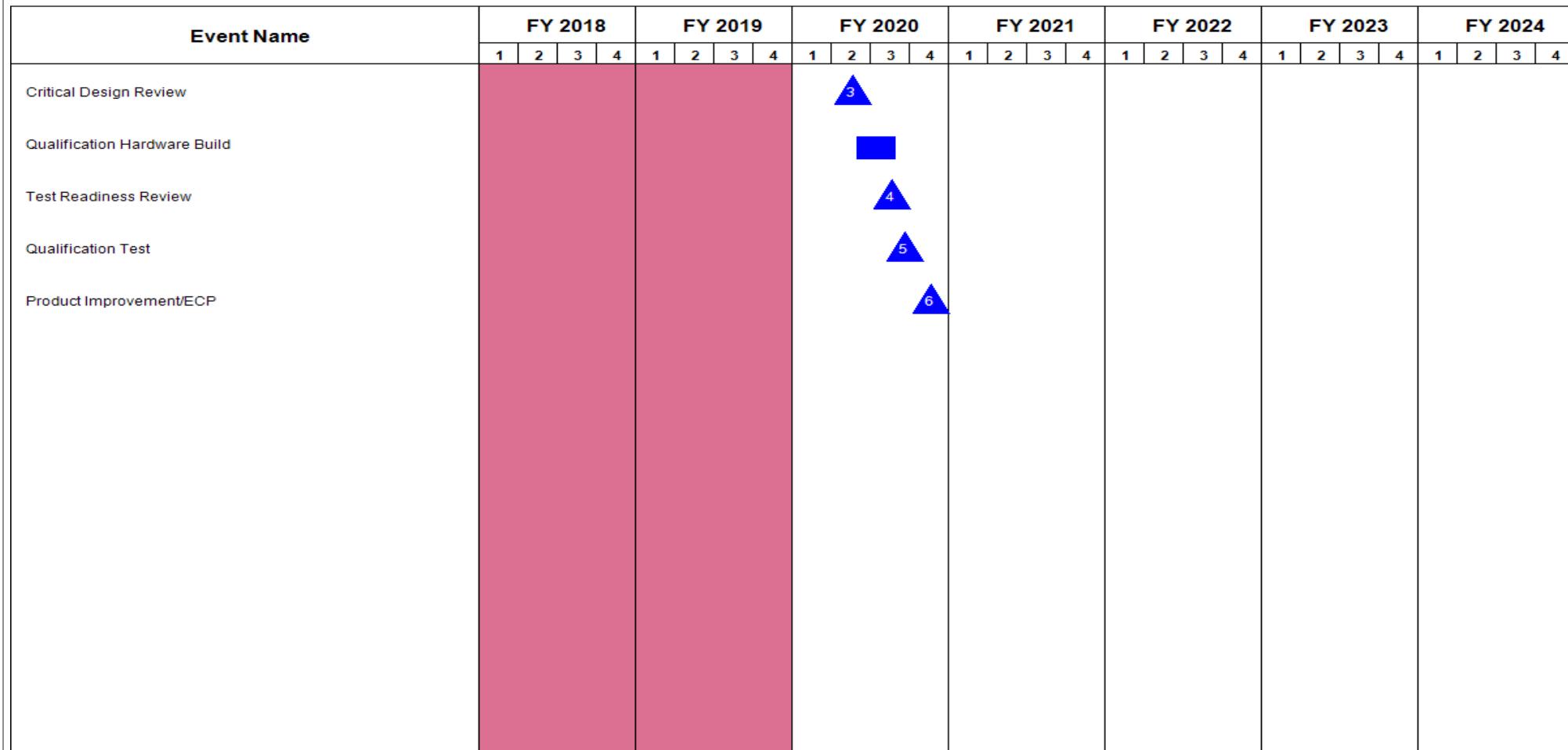
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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604601A / *Infantry Support Weapons***Project (Number/Name)**EW4 / *Crew Served Weapons Engineering Development*

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|   |   |  |
|---|---|--|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |   | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>EW4 / <i>Crew Served Weapons Engineering Development</i> |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| NEW WEAPON SYSTEMS   | 1              | 2017        | 4              | 2024        |
| Next Generation Squad Weapon-Automatic Rifle                       | 1              | 2019        | 4              | 2019        |
| M3/M3E1 Multi-Role Anti-Armor Anti-Personnel Weapon System (MAAWS) | 1              | 2017        | 4              | 2021        |
| Precision Sniper Rifle (PSR)                                       | 1              | 2017        | 4              | 2020        |
| New Weapon Systems Evaluations and Assessments                     | 1              | 2018        | 4              | 2024        |
| CREW SERVED WEAPON ENHANCEMENTS                                    | 1              | 2017        | 4              | 2024        |
| Compact Semi-Automatic Sniper System (CSASS)                       | 1              | 2017        | 4              | 2019        |
| Increased Barrel Life/Replace Chrome                               | 1              | 2019        | 4              | 2020        |
| M2 Lightweight Program   | 1              | 2018        | 4              | 2020        |
| Weapons Upgrades and Accessories                                   | 1              | 2017        | 4              | 2019        |
| Gunner Integrated Protection and Restraint Systems (GIPRS/OGPK)    | 1              | 2017        | 4              | 2023        |
| Individual Non-Lethal System                                       | 1              | 2021        | 4              | 2024        |
| Small Business Innovation Research (SBIR) Enhancements             | 1              | 2017        | 4              | 2024        |
| Legacy Weapon Improvements   | 1              | 2020        | 4              | 2024        |
| AMMUNITION   | 1              | 2017        | 4              | 2024        |
| XM1112 Airburst Non-Lethal Munition (ANLM)                         | 1              | 2017        | 4              | 2020        |
| Ammunition Upgrades  | 1              | 2017        | 4              | 2024        |
| COMBAT OPTICS  | 1              | 2017        | 4              | 2024        |
| Optic Upgrades   | 1              | 2017        | 4              | 2022        |
| Next Generation Optics   | 1              | 2020        | 4              | 2024        |
| FIRE CONTROL   | 1              | 2017        | 4              | 2017        |
| Advanced Fire Control with Hyperspectral Target                    | 1              | 2017        | 4              | 2017        |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |  |   |         | Date: March 2019 |
|--|--|---|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604601A / <i>Infantry Support Weapons</i> | Project (Number/Name)<br>EW4 / <i>Crew Served Weapons Engineering Development</i> |         |                  |
| Events   | Start  |   | End     |                  |
|  | Quarter  | Year  | Quarter | Year             |
|  | 1  | 2017  | 4       | 2017             |
|  | 1  | 2017  | 4       | 2017             |
|  | 1  | 2017  | 4       | 2024             |
|  | 1  | 2017  | 4       | 2024             |
|  | 3  | 2019  | 4       | 2020             |
|  | 3  | 2019  | 3       | 2019             |
|  | 4  | 2019  | 4       | 2019             |
|  | 4  | 2019  | 4       | 2020             |
|  | 2  | 2020  | 2       | 2020             |
|  | 2  | 2020  | 3       | 2020             |
|  | 3  | 2020  | 3       | 2020             |
|  | 4  | 2020  | 4       | 2020             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  | Date: March 2019 |                  |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|------------------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>FF2 / Small Arms Fire Control |                  |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024          | Cost To Complete | Total Cost |
| FF2: Small Arms Fire Control                            | -           | 17.914  | 10.188  | 21.463       | -   | 21.463        | 10.163  | 11.254  | 8.000  | 10.000           | 0.000            | 88.982     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -                | -                |            |

**Note**

Small Arms Fire Control - Squad and Crew are now referred to as Next Generation Fire Control (NGFC). This program Supports the Cross Functional Team (CFT).

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

Small Arms Fire Control (SAFC) is a requirement for optimized fire control devices with improved Size Weight and Power (SWAP) to support Squad (S), Crew Served (CS) and Precision (P) and hand held devices. SAFC shall increase the probability of hit and decrease time to engage across a range of small arms weapon systems, with a direct-view optic that allows for quicker and more accurate target detection and recognition. The SAFC will utilize an open system of systems architecture comprised of modular components, to deliver to current ground forces the initial increased core capability followed by increasing increments of capability/enhancements over time as technology matures and evolves. Small Arms Fire Control will culminate in multiple configurations to include but not limited to Small Arms Fire Control - Squad (SAFC-S), Small Arms Fire Control - Crew Served (SAFC-CS), Small Arms Fire Control - Precision (SAFC-P), as well as enhancements. They may include technology such as variable magnification direct view (day) optics, atmospheric sensors, an overlaid digital display, weapon orientation sensors, range determination, ballistic computer, disturbed reticle, and networked lethality.

FY2020 RDT&E funding in the amount of \$21.463 million will support integration, manufacture, and testing of Next Generation Fire Control technologies and continue the Engineering and Manufacturing Development (EMD) Phases for all EMD ready Fire Control configurations and other associated fire control efforts. FY2020 funding will be focused on bid sample contract awards, down selection, design/prototyping, developmental and initial operational testing and evaluation.

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

|  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Design, Develop and Fabricate  | 9.412   | 8.051   | 14.401       | -           | 14.401        |
| <b>Description:</b> Includes contract awards for the Engineering and Manufacturing Development of all Fire Control configurations, enhancements, and hand held devices.  |         |         |              |             |               |
| <b>FY 2019 Plans:</b><br>Will continue development and integration of various Fire Control configurations and transition NGFC variant, to conduct functional reviews and implement alternation plans for initial prototypes. Will award EMD Phase contracts NGFC and enhancements. |         |         |              |             |               |
| <b>FY 2020 Base Plans:</b>   |         |         |              |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |  |   |                |                     | <b>Date:</b> March 2019 |                      |
|---|--|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / Infantry Support Weapons | <b>Project (Number/Name)</b><br>FF2 / Small Arms Fire Control |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |  | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| Will continue development and integration of all EMD ready Fire Control configurations, conduct functional reviews and implement alternation plans for initial prototypes. Will award EMD Phase contracts.  |  |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Funded amount of contract increases for EMD contract award.   |  |   |                |                     |                         |                      |
| <b>Title:</b> Engineering Support<br><br><b>Description:</b> Government engineering support, providing oversight of design development, integration and contractor performance at labs/centers and government facilities.   |  | 3.330   | 0.260          | 1.480               | -                       | 1.480                |
| <b>FY 2019 Plans:</b><br>Will provide systems engineering support and oversight of design improvements and contractor performance.<br>Will complete developmental and operational test plans, source selection plan and evaluation criteria.  |  |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Will continue to provide engineering support and oversight of design improvements and contractor performance.<br>Will provide oversight of developmental and operational test activities, preliminary and critical design reviews.<br>Will participate in source selection activities and technical reviews.          |  |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 increase is due to additional funds required for preliminary and critical design reviews.   |  |   |                |                     |                         |                      |
| <b>Title:</b> Test and Evaluation<br><br><b>Description:</b> Government testing and evaluation of Commercial Off The Shelf / Non-Developmental Item (COTS/NDI) items, prototypes, articles and improvements.  |  | 3.391   | 0.743          | 4.122               | -                       | 4.122                |
| <b>FY 2019 Plans:</b><br>Will complete bid sample testing and conduct developmental and operational test activities for small arms fire control variants. Will conduct preliminary and critical design reviews. Will continue to assess and evaluate incorporating existing target acquisition/fire control component technologies into binoculars. |  |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Prototype systems will be tested both for technical capability as well as user evaluation. Will develop test and evaluation criteria, test and evaluate improvements of prototypes and document all results.  |  |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>  |  |   |                |                     |                         |                      |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                |                |                |  |                |                |                | <b>Date:</b> March 2019                                       |                    |                         |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
|---|----------------|----------------|----------------|--|----------------|----------------|----------------|---|--------------------|-------------------------|-------------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-------------------------|-------------------|--|-------------|------------|--------------|--|--|--|--|--|--|--|--|-------------------------------|--------|-------|--------|---|--------|--------|--------|--------|--------|-------|---------|-------------------------------------|---|---|-------|---|-------|--------|--------|--------|--------|------------|------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / Infantry Support Weapons |                |                |                | <b>Project (Number/Name)</b><br>FF2 / Small Arms Fire Control |                    |                         |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |                |  |                | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020 Base</b>   | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| FY 2020 increase is due to additional funds required for technical testing and user evaluations.  |                |                |                |  |                |                |                |   |                    |                         |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| <p><b>Title:</b> Program Management</p> <p><b>Description:</b> Program management office, providing oversight of contract actions, engineering support and test activities.</p> <p><b>FY 2019 Plans:</b><br/>Provides Program Management (PM) non-labor operations.</p> <p><b>FY 2020 Base Plans:</b><br/>Will provide program oversight of design, development, integration and testing, to include contract actions, engineering support and test activities throughout the fiscal year.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>FY2020 increase due to other fire control efforts requiring additional program management support.</p>   |                |                |                |  |                |                |                |   |                    |                         |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| <p><b>Title:</b> FY2019 SBIR / STTR Transfer</p> <p><b>FY 2019 Plans:</b><br/>FY2019 SBIR / STTR Transfer</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>FY2019 SBIR / STTR Transfer</p>   |                |                |                |  |                | -              | 0.694          | -   | -                  | -                       |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                |  |                | 17.914         | 10.188         | 21.463  | -                  | 21.463                  |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| <p><b>C. Other Program Funding Summary (\$ in Millions)</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><b>Line Item</b></th> <th style="text-align: center;"><b>FY 2018</b></th> <th style="text-align: center;"><b>FY 2019</b></th> <th style="text-align: center;"><b>FY 2020</b></th> <th style="text-align: center;"><b>FY 2020</b></th> <th style="text-align: center;"><b>FY 2020</b></th> <th style="text-align: center;"><b>FY 2021</b></th> <th style="text-align: center;"><b>FY 2022</b></th> <th style="text-align: center;"><b>FY 2023</b></th> <th style="text-align: center;"><b>FY 2024</b></th> <th style="text-align: center;"><b>Cost To Complete</b></th> <th style="text-align: center;"><b>Total Cost</b></th> </tr> <tr> <th></th> <th style="text-align: center;"><b>Base</b></th> <th style="text-align: center;"><b>OCO</b></th> <th style="text-align: center;"><b>Total</b></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> </tr> </thead> <tbody> <tr> <td>• S54: Small Arms Improvement</td> <td style="text-align: center;">27.832</td> <td style="text-align: center;">7.677</td> <td style="text-align: center;">14.555</td> <td style="text-align: center;">-</td> <td style="text-align: center;">14.555</td> <td style="text-align: center;">16.097</td> <td style="text-align: center;">19.232</td> <td style="text-align: center;">17.439</td> <td style="text-align: center;">10.487</td> <td style="text-align: center;">0.000</td> <td style="text-align: center;">113.319</td> </tr> <tr> <td>• G17200: Small Arms - Fire Control</td> <td style="text-align: center;">-</td> <td style="text-align: center;">-</td> <td style="text-align: center;">8.060</td> <td style="text-align: center;">-</td> <td style="text-align: center;">8.060</td> <td style="text-align: center;">12.230</td> <td style="text-align: center;">27.060</td> <td style="text-align: center;">59.020</td> <td style="text-align: center;">66.410</td> <td style="text-align: center;">Continuing</td> <td style="text-align: center;">Continuing</td> </tr> </tbody> </table> |                |                |                |  |                |                |                |   |                    |                         | <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b> | <b>FY 2024</b> | <b>Cost To Complete</b> | <b>Total Cost</b> |  | <b>Base</b> | <b>OCO</b> | <b>Total</b> |  |  |  |  |  |  |  |  | • S54: Small Arms Improvement | 27.832 | 7.677 | 14.555 | - | 14.555 | 16.097 | 19.232 | 17.439 | 10.487 | 0.000 | 113.319 | • G17200: Small Arms - Fire Control | - | - | 8.060 | - | 8.060 | 12.230 | 27.060 | 59.020 | 66.410 | Continuing | Continuing |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b>   | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>  | <b>FY 2024</b>     | <b>Cost To Complete</b> | <b>Total Cost</b> |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
|   | <b>Base</b>    | <b>OCO</b>     | <b>Total</b>   |  |                |                |                |   |                    |                         |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| • S54: Small Arms Improvement   | 27.832         | 7.677          | 14.555         | -  | 14.555         | 16.097         | 19.232         | 17.439  | 10.487             | 0.000                   | 113.319           |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| • G17200: Small Arms - Fire Control   | -              | -              | 8.060          | -  | 8.060          | 12.230         | 27.060         | 59.020  | 66.410             | Continuing              | Continuing        |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| <p><b>Remarks</b><br/>Small Arms Fire Control was previously funded on Program Element 0604601A Infantry Support Weapons, under Projects S63 and EW4.</p>   |                |                |                |  |                |                |                |   |                    |                         |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |
| <p><b>D. Acquisition Strategy</b><br/>The Small Arms Fire Control (SAFC) projects will use an incremental developmental acquisition strategy.</p>   |                |                |                |  |                |                |                |   |                    |                         |                   |                |                |                |                |                |                |                |                |                |                         |                   |  |             |            |              |  |  |  |  |  |  |  |  |                               |        |       |        |   |        |        |        |        |        |       |         |                                     |   |   |       |   |       |        |        |        |        |            |            |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  | <b>Date:</b> March 2019   |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>FF2 / <i>Small Arms Fire Control</i> |
| The Small Arms Fire Control - Squad (SAFC-S) also known as Next Generation Fire Control (NGFC) plans to award Engineering and Manufacturing Development contract(s) in FY2019. Iterative prototyping will be used to gather both technical and user feedback, and continuous technical improvements will be made on the system design. Based on test data and soldier touch points, an LRIP production option will be awarded in FY2020 followed by FRP FY2021. Total Army Procurement Objective (APO) for the SAFC-S is 188,698 systems. |   |  |
| Additional Small Arms Fire Control Projects: Other associated Fire Controls will be tested and evaluated simultaneously.  |   |  |
| <b>E. Performance Metrics</b><br>N/A  |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                         |                        |  |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                                      |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 | Project (Number/Name)<br>FF2 / Small Arms Fire Control |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                     | 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  | FFRDC                  | Army Budget<br>Office : Pentagon,<br>Washington DC | -           | -       |   | 0.694   | Nov 2018   | -               |  | -              |            | -                | 0.000            | 0.694      | -                        |
| <b>Subtotal</b>  |                        |  | -           | -       |   | 0.694   |            | -               |  | -              |            | -                | 0.000            | 0.694      | N/A                      |
| Product Development (\$ in Millions)   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                     | 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 & Manufacturing Development Contract - Precision Fire Control      | C/FFP                  | TBD : TBD  | -           | 6.712   | Mar 2019  | -       |            | 6.236           | Dec 2019   | -              |            | 6.236            | Continuing       | Continuing | -                        |
| Engineering & Manufacturing Development Contract #1 - Crew Served Fire Control | C/FFP                  | TBD : TBD  | -           | 0.600   | Aug 2018  | -       |            | -               |  | -              |            | -                | Continuing       | Continuing | -                        |
| Engineering & Manufacturing Development Contract #2 - Crew Served Fire Control | C/FFP                  | TBD : TBD  | -           | 0.600   | Aug 2018  | -       |            | -               |  | -              |            | -                | Continuing       | Continuing | -                        |
| Engineering & Manufacturing Development Contract #3 - Other                    | C/FFP                  | TBD : TBD  | -           | 1.500   | Mar 2019  | 1.051   | Feb 2019   | 2.600           | Feb 2020   | -              |            | 2.600            | Continuing       | Continuing | -                        |
| Engineering & Manufacturing Development Contract #4-Squad Fire Control         | C/FFP                  | TBD : TBD  | -           | -       |   | 7.000   | Aug 2019   | 5.565           | Nov 2019   | -              |            | 5.565            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>  |                        |  | -           | 9.412   |   | 8.051   |            | 14.401          |  | -              |            | 14.401           | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |         |   |         |            |                 |            |  |            |                  | Date: March 2019 |            |                          |
|--|------------------------|---|-------------|---------|---|---------|------------|-----------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 |            | Project (Number/Name)<br>FF2 / Small Arms Fire Control |            |                  |                  |            |                          |
| Support (\$ in Millions)                               |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location  | 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                   | US Army Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsenal, NJ | -           | 3.330   | Oct 2017  | 0.440   | Oct 2018   | 1.480           | Nov 2019   | -  |            | 1.480            | Continuing       | Continuing | -                        |
| Program Management (Non-Labor)                         | Allot                  | Project Manager Soldier Weapons (PMSW) /Non-Labor : Picatinny Arsenal, NJ                     | -           | 0.591   | Oct 2017  | 0.140   | Oct 2018   | 0.652           | Nov 2019   | -  |            | 0.652            | Continuing       | Continuing | -                        |
| Contractor Support                                     | C/FFP                  | TBD : TBD   | -           | 0.590   | Oct 2017  | 0.120   | Nov 2018   | 0.553           | Nov 2019   | -  |            | 0.553            | Continuing       | Continuing | -                        |
| Logistical Management                                  | MIPR                   | US Army Tank & Automotive Command (TACOM) : Warren, MI  | -           | 0.600   | Oct 2017  | -       |            | 0.255           | Dec 2019   | -  |            | 0.255            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>  |                        |   | -           | 5.111   |   | 0.700   |            | 2.940           |            | -  |            | 2.940            | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location  | 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                   | US Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD                      | -           | 1.418   | Apr 2019  | 0.743   | Nov 2018   | 1.720           | Mar 2020   | -  |            | 1.720            | Continuing       | Continuing | -                        |
| Test and Evaluation                                    | MIPR                   | US Army Research Laboratory : Aberdeen Proving Ground, MD                                     | -           | 0.650   | May 2019  | -       |            | 0.856           | Feb 2020   | -  |            | 0.856            | Continuing       | Continuing | -                        |
| Test and Evaluation                                    | MIPR                   | Maneuver Battle Lab, US Army Maneuver Center  | -           | 0.600   | May 2019  | -       |            | 0.726           | Feb 2020   | -  |            | 0.726            | Continuing       | Continuing | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 | Project (Number/Name)<br>FF2 / Small Arms Fire Control |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                            | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
|  |                        | of Excellence : FT Benning, GA                            |             |         |   |         |            |                 |  |                |            |                  |                  |            |                          |
| Test and Evaluation                                    | MIPR                   | White Sands Missile Range : White Sands Missile Range, NM | -           | 0.723   | May 2019  | -       |            | 0.820           | Mar 2020   | -              |            | 0.820            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>  |                        |   | -           | 3.391   |   | 0.743   |            | 4.122           |  | -              |            | 4.122            | Continuing       | Continuing | N/A                      |
|  |                        |   | Prior Years | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |   | -           | 17.914  |   | 10.188  |            | 21.463          |  | -              |            | 21.463           | Continuing       | Continuing | N/A                      |

Remarks

## UNCLASSIFIED

Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

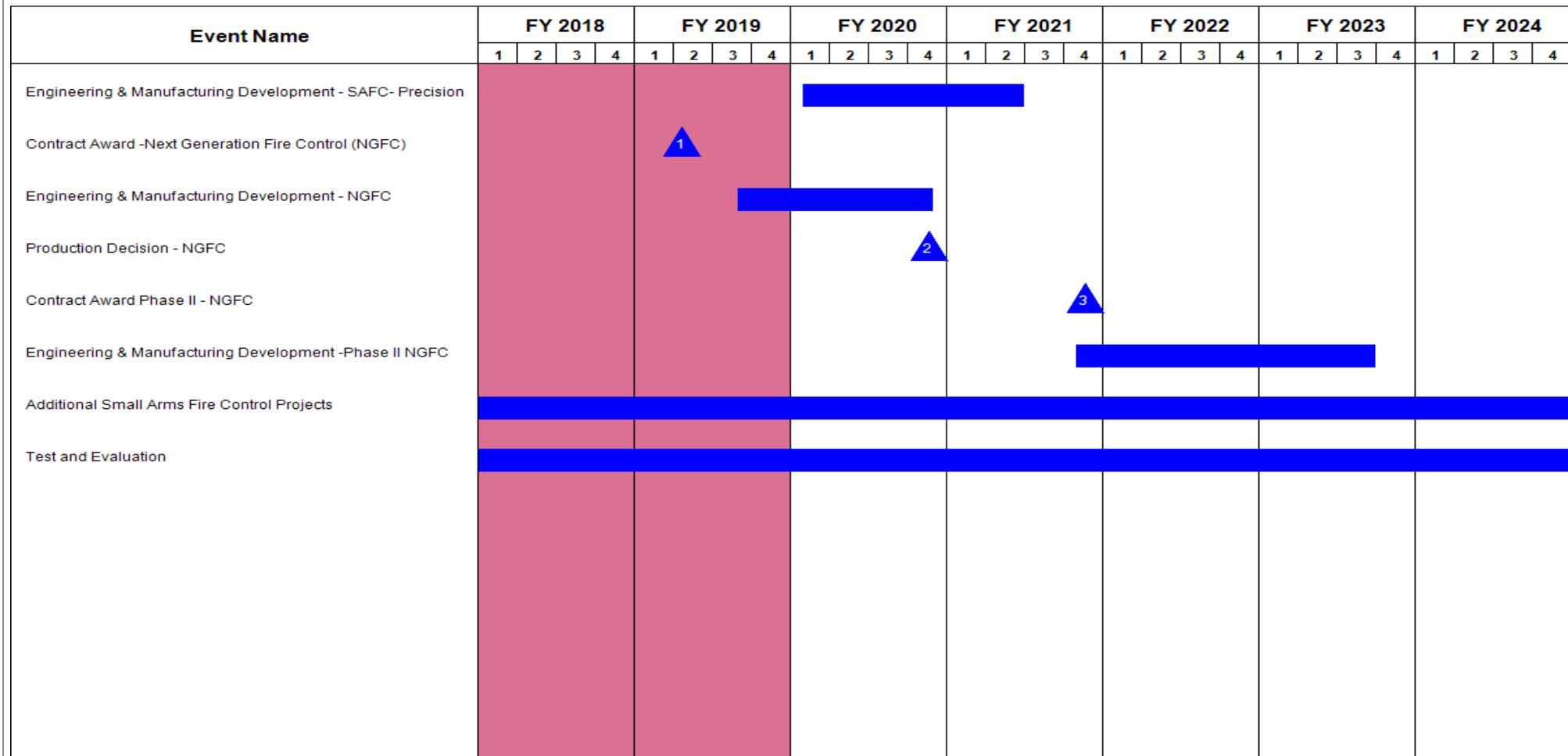
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604601A / Infantry Support Weapons

**Project (Number/Name)**

FF2 / Small Arms Fire Control



**UNCLASSIFIED**

| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army        |   |  |         | Date: March 2019 |
|---|---|--|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5                 | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons | Project (Number/Name)<br>FF2 / Small Arms Fire Control |         |                  |
| Schedule Details  |   |  |         |                  |
| Events  | Start   | End  | Quarter | Year             |
| Engineering & Manufacturing Development - SAFC- Precision | 1   | 2020   | 2       | 2021             |
| Contract Award -Next Generation Fire Control (NGFC)       | 2   | 2019   | 2       | 2019             |
| Engineering & Manufacturing Development - NGFC            | 3   | 2019   | 4       | 2020             |
| Production Decision - NGFC                                | 4   | 2020   | 4       | 2020             |
| Contract Award Phase II - NGFC                            | 4   | 2021   | 4       | 2021             |
| Engineering & Manufacturing Development -Phase II NGFC    | 4   | 2021   | 3       | 2023             |
| Additional Small Arms Fire Control Projects               | 1   | 2018   | 4       | 2024             |
| Test and Evaluation                                       | 1   | 2018   | 4       | 2024             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>FI2 / Lightweight 30mm Cannon |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To Complete | Total Cost |  |
| FI2: Lightweight 30mm Cannon                            | -           | 8.280   | 0.000   | 1.384        | -   | 1.384         | 0.000   | 0.000   | 0.000  | 0.000   | 0.000            | 9.664      |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -       | -                |            |  |

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

In support of an Army Joint Urgent Operational Need Statement (JUONS) CC-0558 to provide an increased lethality modification for Product Directorate Counter Rocket Artillery Mortars (PD C-RAM) and any future requirement that requires 30mm increased lethality.

The XM914 is an upgraded and modified version of the M230 cannon currently equipped on the AH-64 Apache advanced attack helicopter. The XM914 is a link fed, externally powered and electrically primed 30mm chain gun, capable of firing two hundred rounds per minute. The gun incorporates an anti-hangfire system and an extended barrel for enhanced muzzle velocity. The XM914 provides significant lethality improvements over the current M2 .50 caliber machine gun and MK19 grenade machine gun and provides the capability required for Soldiers in a combat environment to engage enemy personnel and light armored targets.

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

|  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Contractor Design and Prototype Fabrication  | 5.200   | -       | 0.859        | -           | 0.859         |
| <b>Description:</b> Includes contractor design, development and prototype fabrication for engineering and manufacturing development of the XM914 30mm autocannon.                        |         |         |              |             |               |
| <b>FY 2020 Base Plans:</b><br>Contractor will continue to develop and fabricate modifications and prototypes for engineering and manufacturing development of the XM914 30mm autocannon. |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase in contractor design and prototype fabrication for continued modification of the XM914 for ground combat application. |         |         |              |             |               |
| <b>Title:</b> Engineering Support  | 1.350   | -       | 0.400        | -           | 0.400         |
| <b>Description:</b> Government engineering support at lab/center, providing design, limited testing and oversight of development and contractor performance.                             |         |         |              |             |               |
| <b>FY 2020 Base Plans:</b><br>Government engineering support will continue to provide oversight of modifications, development and contractor performance.                                |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>   |         |         |              |             |               |

## UNCLASSIFIED

| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |   |                 |                |  |         | Date: March 2019 |         |              |                     |                       |  |  |  |
|---|---------|---|-----------------|----------------|--|---------|------------------|---------|--------------|---------------------|-----------------------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5   |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |                 |                | Project (Number/Name)<br>FI2 / Lightweight 30mm Cannon |         |                  |         |              |                     |                       |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |         |   |                 |                |  |         | FY 2018          | FY 2019 | FY 2020 Base | FY 2020 OCO         | FY 2020 Total         |  |  |  |
| Increase in government engineering support for continued modification of the XM914 for ground combat application.   |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |
| <b>Title:</b> Test and Evaluation   |         |   |                 |                |  |         | 1.650            | -       | 0.100        | -                   | 0.100                 |  |  |  |
| <b>Description:</b> Government testing and evaluation of weapon prototype, articles and system improvements.  |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |
| <b>FY 2020 Base Plans:</b><br>Government will continue to test and evaluation modifications, prototypes, test articles and system improvements.   |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase in government test and evaluation support for continued modification of the XM914 for ground combat application.   |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |
| <b>Title:</b> Program Management  |         |   |                 |                |  |         | 0.080            | -       | 0.025        | -                   | 0.025                 |  |  |  |
| <b>Description:</b> Program management office provides oversight of contract actions, engineering support and test activities.  |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |
| <b>FY 2020 Base Plans:</b><br>Program management office will continue to provide oversight of contractor development and fabrication, engineering support at government facilities, and test and evaluation of system modifications and improvements. |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase in program management support for continued modification of the XM914 for ground combat application.   |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |         |   |                 |                |  |         | 8.280            | -       | 1.384        | -                   | 1.384                 |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |
| Line Item   | FY 2018 | FY 2019   | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total                                       | FY 2021 | FY 2022          | FY 2023 | FY 2024      | Cost To<br>Complete | Cost To<br>Total Cost |  |  |  |
| • G13800: GUN<br>AUTOMATIC 30MM M230  | -       | -   | 20.000          | -              | 20.000   | 10.000  | -                | -       | -            | 0.000               | 30.000                |  |  |  |
| <b>Remarks</b>  |         |   |                 |                |  |         |                  |         |              |                     |                       |  |  |  |

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|---|---|--|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  | <b>Date:</b> March 2019   |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>FI2 / <i>Lightweight 30mm Cannon</i> |
| <b>D. Acquisition Strategy</b><br>The M230LF is currently considered a non-standard weapon that is being sold commercially to foreign customers by the vendor. As a modified version of the M230 30mm chain gun for the AH-64 Apache advanced attack helicopter, the government model requires safety confirmation/safety release and weapon qualification for vehicle mounted platforms. A long term Indefinite Delivery/Indefinite Quantity (IDIQ) type contract will be pursued once a production requirement is finalized.<br><br>The program supports new and emerging urgent requirements and will support integration with ground vehicle platforms. |   |  |
| <b>E. Performance Metrics</b><br>N/A  |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 | Project (Number/Name)<br>FI2 / Lightweight 30mm Cannon |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location  | 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 Soldier Weapons : Picatinny Arsenal, NJ                            | -           | 0.080   | May 2018  | -       |            | 0.025           | Oct 2019   | -              |            | 0.025            | 0.000            | 0.105      | -                        |
|  |                        | <b>Subtotal</b>   | -           | 0.080   |   | -       |            | 0.025           |  | -              |            | 0.025            | 0.000            | 0.105      | N/A                      |
| Product Development (\$ in Millions)                   |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location  | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Contractor Design and Prototype Fabrication            | SS/FFP                 | Northrop Grumman : Mesa, AZ   | -           | 5.200   | Jul 2018  | -       |            | 0.859           | Nov 2019   | -              |            | 0.859            | 0.000            | 6.059      | -                        |
|  |                        | <b>Subtotal</b>   | -           | 5.200   |   | -       |            | 0.859           |  | -              |            | 0.859            | 0.000            | 6.059      | N/A                      |
| Support (\$ in Millions)                               |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location  | 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                   | Multiple Other Government Agencies : Multiple                         | -           | 1.350   | May 2018  | -       |            | 0.400           | Oct 2019   | -              |            | 0.400            | 0.000            | 1.750      | -                        |
|  |                        | <b>Subtotal</b>   | -           | 1.350   |   | -       |            | 0.400           |  | -              |            | 0.400            | 0.000            | 1.750      | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location  | 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                   | Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD | -           | 1.650   | Aug 2018  | -       |            | 0.100           | Dec 2019   | -              |            | 0.100            | 0.000            | 1.750      | -                        |
|  |                        | <b>Subtotal</b>   | -           | 1.650   |   | -       |            | 0.100           |  | -              |            | 0.100            | 0.000            | 1.750      | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |             |         |   |         |  |              |  |             |  | Date: March 2019 |                  |            |                          |
|--|-------------|---------|---|---------|--|--------------|--|-------------|--|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |  |              | Project (Number/Name)<br>FI2 / Lightweight 30mm Cannon |             |  |                  |                  |            |                          |
| Project Cost Totals                                    | Prior Years | FY 2018 |   | FY 2019 |  | FY 2020 Base |  | FY 2020 OCO |  | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |
|  | -           | 8.280   |   | 0.000   |  | 1.384        |  | -           |  | 1.384            | 0.000            | 9.664      | N/A                      |
| <b>Remarks</b>   |             |         |   |         |  |              |  |             |  |                  |                  |            |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

## Appropriation/Budget Activity

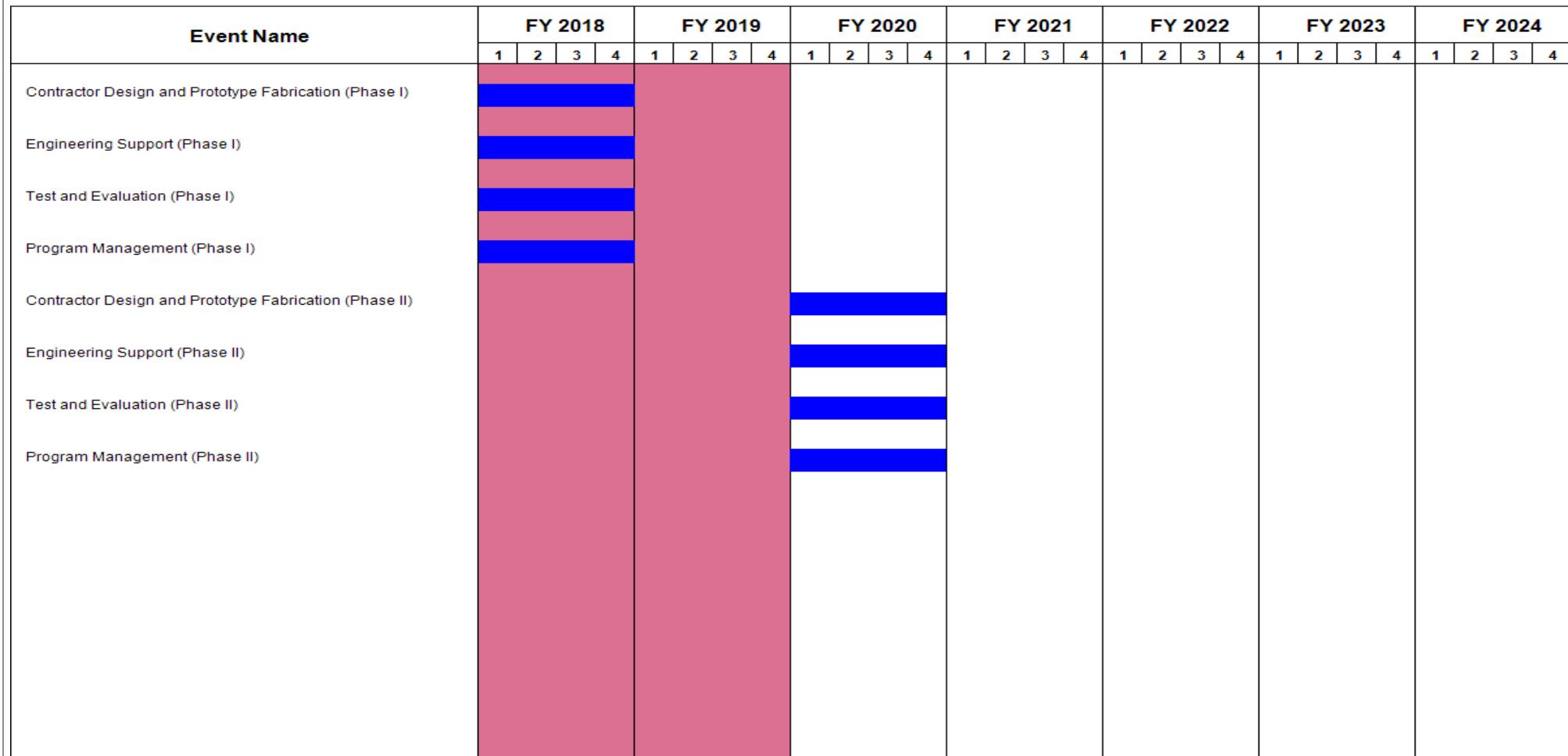
2040 / 5

## R-1 Program Element (Number/Name)

PE 0604601A / Infantry Support Weapons

## Project (Number/Name)

FI2 / Lightweight 30mm Cannon



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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army     |   |  |         | Date: March 2019 |
|--|---|--|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons | Project (Number/Name)<br>FI2 / Lightweight 30mm Cannon |         |                  |
| Schedule Details                                       |   |  |         |                  |
| Events   | Start   | End  | Quarter | Year             |
| Contractor Design and Prototype Fabrication (Phase I)  | 1   | 2018   | 4       | 2018             |
| Engineering Support (Phase I)                          | 1   | 2018   | 4       | 2018             |
| Test and Evaluation (Phase I)                          | 1   | 2018   | 4       | 2018             |
| Program Management (Phase I)                           | 1   | 2018   | 4       | 2018             |
| Contractor Design and Prototype Fabrication (Phase II) | 1   | 2020   | 4       | 2020             |
| Engineering Support (Phase II)                         | 1   | 2020   | 4       | 2020             |
| Test and Evaluation (Phase II)                         | 1   | 2020   | 4       | 2020             |
| Program Management (Phase II)                          | 1   | 2020   | 4       | 2020             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  | Date: March 2019 |                  |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|------------------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>FL8 / 84mm MAAWS 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 |
| FL8: 84mm MAAWS Ammunition                              | -           | 0.000   | 0.000   | 4.040        | -   | 4.040         | 3.134   | 3.000   | 0.000  | 0.000            | 0.000            | 10.174     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -                | -                |            |

**Note**

This effort transitions from Project EW4 to Project FL8 in FY 2020.

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

This project will test, evaluate and qualify up to seven (7) types of 84mm munitions for U.S. Army use with the M3/M3A1 Multi-Role Anti-Armor Anti-Personnel Weapon Systems (MAAWS). In addition to type classifying existing rounds, funds will also provide for the evaluation and qualification of the new High Explosive Programmable Airbursting Round. These rounds will provide improved lethality and a higher probability of hit in defilade positions for close combat forces against varying target sets and increased ranges in support of Infantry Squad formations. The M3/M3A1 is a HQDA G8 directed requirement scheduled for Full Material Release 4Qtr FY 2021.

FY 2020 funding in the amount of \$4.040 million will be used to acquire prototypes and support test and evaluation efforts for the new programmable round.

| B. Accomplishments/Planned Programs (\$ in Millions)   | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Munition Prototype Development & Demonstration   | -       | -       | 3.040        | -           | 3.040         |
| <b>Description:</b> Includes ammunition engineering and manufacturing, contract awards for prototypes, development and demonstration.  |         |         |              |             |               |
| <b>FY 2020 Base Plans:</b><br>Contract award will begin the development of the programmable round. Initial prototypes will be delivered, functional and critical design reviews will be conducted. |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This effort transitions from Project EW4 to Project FL8 in FY 2020.  |         |         |              |             |               |
| <b>Title:</b> Engineering Support  | -       | -       | 0.320        | -           | 0.320         |
| <b>Description:</b> Government engineering support, providing oversight of design development and contractor performance.  |         |         |              |             |               |
| <b>FY 2020 Base Plans:</b>   |         |         |              |             |               |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |  |         |   |                 |                |  |         |         |         | Date: March 2019 |                     |              |             |               |  |  |  |
|--|--|---------|---|-----------------|----------------|--|---------|---------|---------|------------------|---------------------|--------------|-------------|---------------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5  |  |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |                 |                | Project (Number/Name)<br>FL8 / 84mm MAAWS Ammunition |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  |         |   |                 |                |  |         |         |         | FY 2018          | FY 2019             | FY 2020 Base | FY 2020 OCO | FY 2020 Total |  |  |  |
| Provides engineering support and oversight of ammunition design and function. Participate in Integrated Product Team (IPT) and technical reviews.  |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This effort transitions from Project EW4 to Project FL8 in FY 2020.  |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>Title:</b> Test and Evaluation  |  |         |   |                 |                |  |         |         |         | -                | -                   | 0.110        | -           | 0.110         |  |  |  |
| <b>FY 2020 Base Plans:</b><br>Develop test and evaluation master plan to evaluate and analyze the effect of Commercial Off The Shelf (COTS) 84mm programmable round for type classification.   |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This effort transitions from Project EW4 to Project FL8 in FY 2020.  |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>Title:</b> Program Management   |  |         |   |                 |                |  |         |         |         | -                | -                   | 0.570        | -           | 0.570         |  |  |  |
| <b>FY 2020 Base Plans:</b><br>Provides for project oversight, program management, non-labor operations, and contractor support.  |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This effort transitions from Project EW4 to Project FL8 in FY 2020.  |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |  |         |   |                 |                |  |         |         |         | -                | -                   | 4.040        | -           | 4.040         |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>Line Item</b>   |  | FY 2018 | FY 2019   | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total                                     | FY 2021 | FY 2022 | FY 2023 | FY 2024          | Cost To<br>Complete | Total Cost   |             |               |  |  |  |
| • EW4: Crew Served Weapons<br><i>Engineering Development</i>   |  | 12.999  | 11.102  | 2.589           | -              | 2.589  | 15.767  | 14.789  | 13.927  | 9.029            | 0.000               | 80.202       |             |               |  |  |  |
| • G13101: MULTI-ROLE<br>ANTI-ARMOR ANTI-<br>PERSONNEL WEAPON SYSTEM  |  | 26.520  | 19.880  | 19.420          | 2.400          | 21.820   | 20.282  | 26.716  | 26.035  | 0.866            | Continuing          | Continuing   |             |               |  |  |  |
| <b>Remarks</b>   |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| <b>D. Acquisition Strategy</b>   |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |
| Will use Other Transaction Authority (OTA) via the DoD Ordnance Technology Consortium (DOTC) to obtain commercially available 84mm ammunition for test and evaluation purposes. A long term Indefinite Delivery/Indefinite Quantity (IDIQ) type contract will be pursued for follow on orders. |  |         |   |                 |                |  |         |         |         |                  |                     |              |             |               |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army | <b>Date:</b> March 2019   |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5                   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>FL8 / <i>84mm MAAWS Ammunition</i> |
| <b>E. Performance Metrics</b><br>N/A                               |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |             |   |         |            |                 |  |                |                | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|-------------|---|---------|------------|-----------------|--|----------------|----------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 | Project (Number/Name)<br>FL8 / 84mm MAAWS Ammunition |                |                |                  |                  |                  |                          |                          |
| Management Services (\$ in Millions)                   |                        |                                |             | FY 2018     |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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                   | PMSW : Picatinny Arsenal, NJ   | -           | -           |   | -       |            | 0.570           | Oct 2019   | -              |                | 0.570            | 0.000            | 0.570            | Continuing               |                          |
| <b>Subtotal</b>  |                        |                                |             | -           | -   | -       |            | 0.570           |  | -              |                | 0.570            | 0.000            | 0.570            | N/A                      |                          |
| Product Development (\$ in Millions)                   |                        |                                |             | FY 2018     |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost        | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date     | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Munitions Prototype                                    | SS/CPFF                | SAAB : Sweden                  | -           | -           |   | -       |            | 3.040           | Nov 2019   | -              |                | 3.040            | 0.000            | 3.040            | Continuing               |                          |
| <b>Subtotal</b>  |                        |                                |             | -           | -   | -       |            | 3.040           |  | -              |                | 3.040            | 0.000            | 3.040            | N/A                      |                          |
| Support (\$ in Millions)                               |                        |                                |             | FY 2018     |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost        | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date     | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Engineering Support                                    | MIPR                   | ARDEC : Picatinny Arsenal, NJ  | -           | -           |   | -       |            | 0.320           | Nov 2019   | -              |                | 0.320            | 0.000            | 0.320            | Continuing               |                          |
| <b>Subtotal</b>  |                        |                                |             | -           | -   | -       |            | 0.320           |  | -              |                | 0.320            | 0.000            | 0.320            | N/A                      |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018     |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost        | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date     | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Test & Evaluation                                      | MIPR                   | ATEC : Aberdeen, MD            | -           | -           |   | -       |            | 0.110           | Aug 2020   | -              |                | 0.110            | 0.000            | 0.110            | Continuing               |                          |
| <b>Subtotal</b>  |                        |                                |             | -           | -   | -       |            | 0.110           |  | -              |                | 0.110            | 0.000            | 0.110            | N/A                      |                          |
|  |                        |                                |             | Prior Years | FY 2018   |         | FY 2019    |                 | FY 2020<br>Base                                      |                | FY 2020<br>OCO |                  | FY 2020<br>Total | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                |             | -           | -   | 0.000   |            | 4.040           |  | -              |                | 4.040            | 0.000            | 4.040            | N/A                      |                          |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |             |         |   |              |             |  | Date: March 2019 |            |                          |
|--|-------------|---------|---|--------------|-------------|--|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |              |             | Project (Number/Name)<br>FL8 / 84mm MAAWS Ammunition |                  |            |                          |
|  | Prior Years | FY 2018 | FY 2019   | FY 2020 Base | FY 2020 OCO | FY 2020 Total  | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Remarks</b>   |             |         |   |              |             |  |                  |            |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

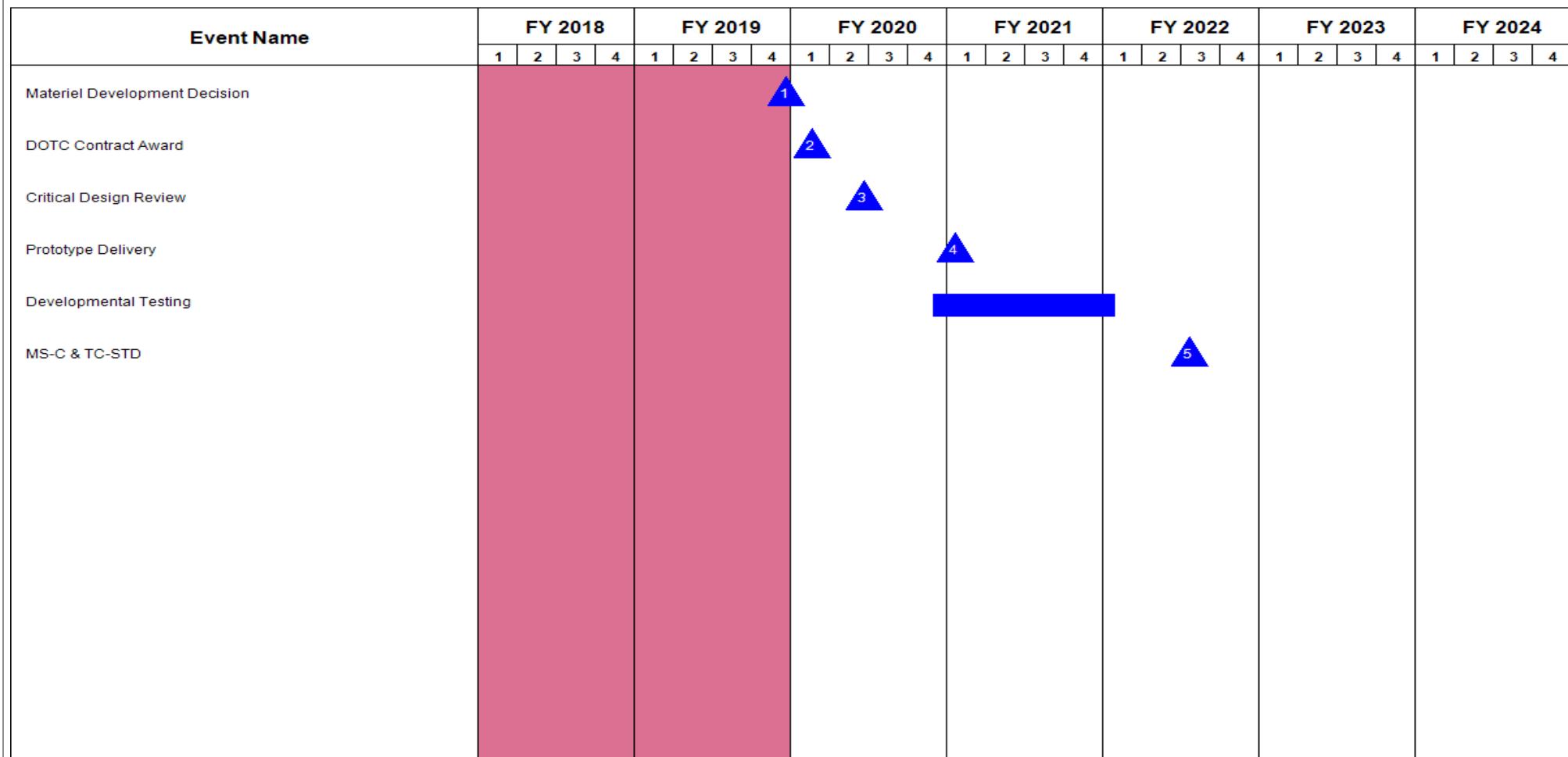
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604601A / Infantry Support Weapons

**Project (Number/Name)**

FL8 / 84mm MAAWS Ammunition



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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |   |  |      | Date: March 2019 |
|--|---|--|------|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons | Project (Number/Name)<br>FL8 / 84mm MAAWS Ammunition |      |                  |
| Schedule Details                                   |   |  |      |                  |
| Events   |   | Start  | End  |                  |
|  |   | Quarter  | Year | Quarter          |
| Materiel Development Decision                      |   | 4  | 2019 | 4                |
| DOTC Contract Award                                |   | 1  | 2020 | 1                |
| Critical Design Review                             |   | 2  | 2020 | 2                |
| Prototype Delivery                                 |   | 1  | 2021 | 1                |
| Developmental Testing                              |   | 4  | 2020 | 1                |
| MS-C & TC-STD                                      |   | 3  | 2022 | 3                |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>FM4 / Next Generation Squad Weapons |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To Complete | Total Cost |  |
| FM4: Next Generation Squad Weapons                      | -           | 0.000   | 0.000   | 33.080       | -   | 33.080        | 36.880  | 13.780  | 15.470   | 16.060  | 0.000            | 115.270    |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -       | -                |            |  |

**Note**

Funding line established in FY 2020 for the Next Generation Squad Weapons. Efforts were previously executed in Program Elements 0603827A S54/Small Arms Improvement, 0604601A EW4/Crew Served Weapons Engineering Development and S63/Individual Weapons Engineering Development. This program Supports the Cross Functional Team (CFT).

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

The Next Generation Squad Weapon (NGSW) program will develop weapon systems to maintain overmatch and meet future force warfighter needs.

The Next Generation Squad Weapon-Rifle (NGSW-R) is one variant of the Next Generation Squad Weapons. It is the planned replacement for the M4A1 Carbine and M16A2 Rifle in Close Combat Force and select support units during the next decade. The NGSW-R will provide capability improvements in accuracy, range, and lethality.

The Next Generation Squad Weapon-Automatic Rifle (NGSW-AR) is another variant of Next Generation Squad Weapons. It is the planned replacement for the M249 Squad Automatic Weapon (SAW) in Close Combat Force and select support units during the next decade. The NGSW-AR combines the firepower and range of a machine gun with the precision and ergonomics of a carbine, yielding capability improvements in accuracy, range, and lethality.

Development efforts for additional NGSW variants may follow to replace other legacy systems or provide additional enhanced capabilities.

| B. Accomplishments/Planned Programs (\$ in Millions)   | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <p><b>Title:</b> Contractor Design and Prototype Fabrication</p> <p><b>Description:</b> Contractor design, development and fabrication of prototypes.</p> <p><b>FY 2020 Base Plans:</b><br/>Includes contractor design, development and prototype fabrication for engineering and manufacturing development of the Next Generation Squad Weapons (NGSW). NGSW will interface with Squad Fire Control, Family of Weapon Sights - Individual, and other enablers. Up to three contractors will be delivering</p> | -       | -       | 26.348       | -           | 26.348        |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |  |   |                |                     | <b>Date:</b> March 2019 |                      |
|--|--|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / Infantry Support Weapons | <b>Project (Number/Name)</b><br>FM4 / Next Generation Squad Weapons |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| approximately 45 automatic prototype rifles, 24 prototype rifles and associated ammunition for Government testing.   |  |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Efforts were previously executed in Program Elements 0603827A S54/Small Arms Improvement, 0604601A EW4/Crew Served Weapons Engineering Development and S63/Individual Weapons Engineering Development. |  |   |                |                     |                         |                      |
| <b>Title:</b> Engineering Support  |  | -   | -              | 3.652               | -                       | 3.652                |
| <b>Description:</b> Government engineering support, providing oversight of design, development and contractor performance.   |  |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Government engineering support at lab/center, providing design, limited testing and oversight of development and contractor performance.   |  |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Efforts were previously executed in Program Elements 0603827A S54/Small Arms Improvement, 0604601A EW4/Crew Served Weapons Engineering Development and S63/Individual Weapons Engineering Development. |  |   |                |                     |                         |                      |
| <b>Title:</b> Test and Evaluation  |  | -   | -              | 2.830               | -                       | 2.830                |
| <b>Description:</b> Testing and evaluation at government ranges and facilities.  |  |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Government testing and evaluation of weapon prototype, articles and system improvements.   |  |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Efforts were previously executed in Program Elements 0603827A S54/Small Arms Improvement, 0604601A EW4/Crew Served Weapons Engineering Development and S63/Individual Weapons Engineering Development. |  |   |                |                     |                         |                      |
| <b>Title:</b> Program Management   |  | -   | -              | 0.250               | -                       | 0.250                |
| <b>Description:</b> Program office management and oversight of government and contractor efforts.  |  |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Program management office provides oversight of contract actions, engineering support and test activities.   |  |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>   |  |   |                |                     |                         |                      |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |         |         |   |             |               |         |  |         |         | Date: March 2019 |            |              |             |               |  |  |  |  |
|--|---------|---------|---|-------------|---------------|---------|--|---------|---------|------------------|------------|--------------|-------------|---------------|--|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5  |         |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |             |               |         | Project (Number/Name)<br>FM4 / Next Generation Squad Weapons |         |         |                  |            |              |             |               |  |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |         |         |   |             |               |         |  |         |         | FY 2018          | FY 2019    | FY 2020 Base | FY 2020 OCO | FY 2020 Total |  |  |  |  |
| Efforts were previously executed in Program Elements 0603827A S54/Small Arms Improvement, 0604601A EW4/Crew Served Weapons Engineering Development and S63/Individual Weapons Engineering Development.                       |         |         |   |             |               |         |  |         |         |                  |            |              |             |               |  |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |         |         |   |             |               |         |  |         |         | -                | -          | 33.080       | -           | 33.080        |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |         |         |   |             |               |         |  |         |         |                  |            |              |             |               |  |  |  |  |
| Line Item  | FY 2018 | FY 2019 | FY 2020 Base  | FY 2020 OCO | FY 2020 Total | FY 2021 | FY 2022  | FY 2023 | FY 2024 | Cost To Complete | Total Cost |              |             |               |  |  |  |  |
| • S54: Small Arms Improvement  | 27.832  | 7.677   | 14.555  | -           | 14.555        | 16.097  | 19.232   | 17.439  | 10.487  | 0.000            | 113.319    |              |             |               |  |  |  |  |
| • EW4: Crew Served Weapons Engineering Development   | 12.999  | 11.102  | 2.589   | -           | 2.589         | 15.767  | 14.789   | 13.927  | 9.029   | 0.000            | 80.202     |              |             |               |  |  |  |  |
| • S63: Individual Weapons Engineering Development  | 9.664   | 5.749   | 7.076   | -           | 7.076         | 15.377  | 7.918  | 6.284   | 0.974   | 0.000            | 53.042     |              |             |               |  |  |  |  |
| • FL4: Small Caliber Ammo for Next Gen Squad Weapons   | -       | -       | 22.880  | -           | 22.880        | 30.630  | 28.750   | 25.000  | 11.750  | 0.000            | 119.010    |              |             |               |  |  |  |  |
| • EP5: Adv Armor-Piercing (ADVAP) for Small Caliber Ammo   | 13.318  | 16.748  | 0.000   | -           | 0.000         | -       | -  | -       | -       | 0.000            | 30.066     |              |             |               |  |  |  |  |
| <b>Remarks</b>   |         |         |   |             |               |         |  |         |         |                  |            |              |             |               |  |  |  |  |
| <b>D. Acquisition Strategy</b>   |         |         |   |             |               |         |  |         |         |                  |            |              |             |               |  |  |  |  |
| The Next Generation Squad Weapons program will utilize competitively awarded development contracts to mature and finalize system designs and conduct test and evaluations resulting in follow on production contract awards. |         |         |   |             |               |         |  |         |         |                  |            |              |             |               |  |  |  |  |
| <b>E. Performance Metrics</b>  |         |         |   |             |               |         |  |         |         |                  |            |              |             |               |  |  |  |  |
| N/A  |         |         |   |             |               |         |  |         |         |                  |            |              |             |               |  |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |         |   |         |            |                 |            |  |            |                  | Date: March 2019 |            |                          |
|--|------------------------|--|-------------|---------|---|---------|------------|-----------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 |            | Project (Number/Name)<br>FM4 / Next Generation Squad Weapons |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location   | 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                                     | Allot                  | PM Soldier Weapons : Picatinny Arsenal, NJ   | -           | -       |   | -       |            | 0.250           | Oct 2019   | -  |            | 0.250            | 0.000            | 0.250      | -                        |
| <b>Subtotal</b>  |                        |  | -           | -       |   | -       |            | 0.250           |            | -  |            | 0.250            | 0.000            | 0.250      | N/A                      |
| Product Development (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location   | 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 Opportunity Notice                           | C/Various              | VENDOR 1 : NJ  | -           | -       |   | -       |            | 8.782           | Jan 2020   | -  |            | 8.782            | 0.000            | 8.782      | -                        |
| Prototype Opportunity Notice                           | C/Various              | VENDOR 2 : NJ  | -           | -       |   | -       |            | 8.782           | Jan 2020   | -  |            | 8.782            | 0.000            | 8.782      | -                        |
| Prototype Opportunity Notice                           | C/Various              | VENDOR 3 : NJ  | -           | -       |   | -       |            | 8.782           | Jan 2020   | -  |            | 8.782            | 0.000            | 8.782      | -                        |
| <b>Subtotal</b>  |                        |  | -           | -       |   | -       |            | 26.346          |            | -  |            | 26.346           | 0.000            | 26.346     | N/A                      |
| Support (\$ in Millions)                               |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO   |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location   | 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                   | US Army Armament Research, Development and Engineering Center (ARDEC) : Picatinny Arsnal, NJ | -           | -       |   | -       |            | 3.654           | Oct 2019   | -  |            | 3.654            | 0.000            | 3.654      | -                        |
| <b>Subtotal</b>  |                        |  | -           | -       |   | -       |            | 3.654           |            | -  |            | 3.654            | 0.000            | 3.654      | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 | Project (Number/Name)<br>FM4 / Next Generation Squad Weapons |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location  | 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                   | Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, ND | -           | -       |   | -       |            | 2.830           | Apr 2020   | -              |            | 2.830            | 0.000            | 2.830      | -                        |
| <b>Subtotal</b>  |                        |   | -           | -       | -   | 2.830   |            | -               |  | 2.830          | 0.000      | 2.830            | N/A              |            |                          |
|  |                        |   | Prior Years | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |   | -           | -       | 0.000   | 33.080  |            | -               |  | 33.080         | 0.000      | 33.080           | N/A              |            |                          |

Remarks

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

## Appropriation/Budget Activity

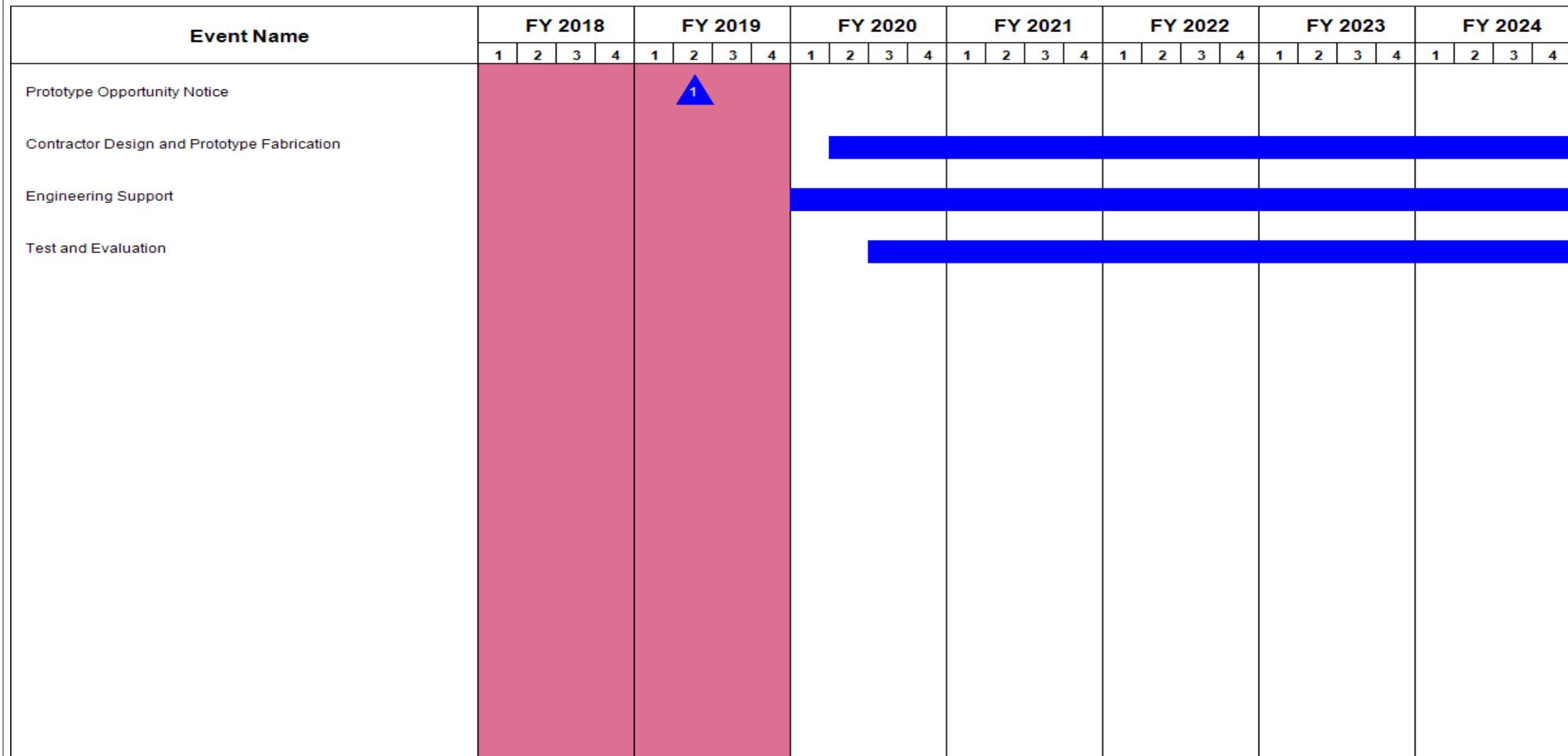
2040 / 5

## R-1 Program Element (Number/Name)

PE 0604601A / Infantry Support Weapons

## Project (Number/Name)

FM4 / Next Generation Squad Weapons



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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |   |  | <b>Date:</b> March 2019 |             |
|---|---|--|-------------------------|-------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>FM4 / <i>Next Generation Squad Weapons</i> |                         |             |
| <b>Schedule Details</b>                                       |   |  |                         |             |
| <b>Events</b>   | <b>Start</b>  |  | <b>End</b>              |             |
|   | <b>Quarter</b>  | <b>Year</b>  | <b>Quarter</b>          | <b>Year</b> |
| Prototype Opportunity Notice                                  | 2   | 2019   | 2                       | 2019        |
| Contractor Design and Prototype Fabrication                   | 2   | 2020   | 4                       | 2024        |
| Engineering Support   | 1   | 2020   | 4                       | 2024        |
| Test and Evaluation   | 3   | 2020   | 4                       | 2024        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>S58 / Soldier Enhancement Program |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To Complete | Total Cost |  |
| S58: Soldier Enhancement Program                        | -           | 6.232   | 9.081   | 0.000        | -   | 0.000         | 0.000   | 0.000   | 0.000  | 0.000   | 0.000            | 15.313     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -       | -                |            |  |

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

Description: The Soldier Enhancement Program (SEP) was established in the Fiscal Year 1990 National Defense Authorization Act. SEP provides an innovative rapid approach that includes procurement and evaluation of Commercial Off the Shelf (COTS)/Non Developmental Item (NDI)/Government Off the Shelf (GOTS) items that have the potential to enhance an Army Infantryman and Soldiers' ability to execute their combat mission. SEP provides significant savings and acceleration in the evaluation of items. The SEP program is managed jointly by Program Executive Office (PEO) Soldier and the Maneuver Center of Excellence. SEP suggestions are submitted by individual Soldiers, Field Commanders, commercial manufacturers, and others via the PEO Soldier SEP website. Viable suggestions are vetted by a Council of Colonels (CoC) and validated as SEP initiatives by Department of the Army, Deputy Chief of Staff, G8, Force Development. A limited number of validated SEP initiatives are procured and evaluated by Soldiers for feasibility and suitability. Based on the evaluation findings, the SEP CoC provides one or more of the following courses of action: (1) inform deliberate or urgent/emerging requirements generation, (2) initiate a new Program of Record (POR), (3) improve an existing POR, (4) transition to the Rapid Equipping Force or (5) add to the Rapid Fielding Initiative list, (6) provide a national stock number (NSN) for unit procurement or (7) the item did not meet objectives and no further action is necessary.

Justification: No FY2020 funding requested.

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

|   | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Soldier Enhancement Program (SEP) Evaluations<br><b>Description:</b> Procure and evaluate COTS/GOTS/NDI items that have the potential to enhance Soldier combat effectiveness.                          | 5.700   | 8.477   | -            | -           | -             |
| <b>FY 2019 Plans:</b><br>Funding supports evaluation of approximately 25-35 initiatives. Product evaluations includes safety testing, collection, and analysis of user feedback/results and documentation of results. |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>HQDA re-prioritization.   |         |         |              |             |               |
| <b>Title:</b> System Engineering/Program Management<br><b>Description:</b> Systems Engineering and Program Management.  | 0.532   | 0.512   | -            | -           | -             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                |                |                         |  |                          |                |                |   |                | Date: March 2019            |                   |
|--|----------------|----------------|-------------------------|--|--------------------------|----------------|----------------|---|----------------|-----------------------------|-------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |                |                |                         | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / Infantry Support Weapons |                          |                |                | <b>Project (Number/Name)</b><br>S58 / Soldier Enhancement Program |                |                             |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                |                |                         |  |                          | FY 2018        | FY 2019        | FY 2020<br>Base   | FY 2020<br>OCO | FY 2020<br>Total            |                   |
| <b>FY 2019 Plans:</b><br>(1) Coordinate with industry and TRADOC to ensure submitted proposals satisfy Army needs, (2) evaluate SEP initiatives and provide recommendations, (3) conduct Council of Colonels and IPRs, (4) manage and distribute funding for SEP initiatives, and (5) upon conclusion of the evaluations, the SEP team reviews results and document the closeout.  |                |                |                         |  |                          |                |                |   |                |                             |                   |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>HQDA re-prioritization   |                |                |                         |  |                          |                |                |   |                |                             |                   |
| <b>Title:</b> FY2019 SBIR / STTR Transfer  |                |                |                         |  |                          | -              | 0.092          | -   | -              | -                           |                   |
| <b>Description:</b> FY2019 SBIR / STTR Transfer  |                |                |                         |  |                          |                |                |   |                |                             |                   |
| <b>FY 2019 Plans:</b><br>FY2019 SBIR / STTR Transfer   |                |                |                         |  |                          |                |                |   |                |                             |                   |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY2019 SBIR / STTR Transfer  |                |                |                         |  |                          |                |                |   |                |                             |                   |
| <b>Accomplishments/Planned Programs Subtotals</b>  |                |                |                         |  |                          | 6.232          | 9.081          | -   | -              | -                           |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |                         |  |                          |                |                |   |                |                             |                   |
| <b>Line Item</b>   | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020<br/>Base</b> | <b>FY 2020<br/>OCO</b>   | <b>FY 2020<br/>Total</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>  | <b>FY 2024</b> | <b>Cost To<br/>Complete</b> | <b>Total Cost</b> |
| • MA6800: Soldier Enhancement  | 1.095          | 1.103          | 0.000                   | -  | 0.000                    | -              | -              | -   | -              | 0.000                       | 2.198             |
| • E99105: Soldier Enhancement Program Ammo   | 0.248          | 0.253          | 0.000                   | -  | 0.000                    | -              | -              | -   | -              | 0.000                       | 0.501             |
| • GC0076: Small Arms Equipment (Soldier Enh Prog)  | 1.573          | 1.640          | 0.000                   | -  | 0.000                    | -              | -              | -   | -              | Continuing                  | Continuing        |
| <b>Remarks</b>   |                |                |                         |  |                          |                |                |   |                |                             |                   |
| <b>D. Acquisition Strategy</b>   |                |                |                         |  |                          |                |                |   |                |                             |                   |
| SEP focuses on COTS/GOTS/NDI initiatives submitted by Soldiers and industry. SEP proposals are reviewed and approved semiannually. Procurement funds SEP COTS/GOTS/NDI items in quantities sufficient for Soldier evaluation. Research, Development, Test and Evaluation is used to conduct product evaluations which includes safety testing, data collection, analysis of Soldier feedback/results and documentation of results. Product Managers responsible for portfolio in which the SEP |                |                |                         |  |                          |                |                |   |                |                             |                   |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   | <b>Date:</b> March 2019   |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S58 / <i>Soldier Enhancement Program</i> |
| initiative falls develops the procurement and evaluation strategy and procures the items using a variety of means from Government purchase card to full contracts. Soldiers evaluations are performed by various means from Battle Lab surveys to full scale Army Test and Evaluation testing depending on the item. |   |  |
| <b>E. Performance Metrics</b><br>N/A   |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army  |                        |                                |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|---|------------------------|--------------------------------|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                        |                                |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 | Project (Number/Name)<br>S58 / Soldier Enhancement Program |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)  |                        |                                |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | 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   | MIPR                   | PEO Soldier : Ft. Belvoir, VA  | 13.777      | 0.532   | Dec 2017  | 0.512   | Dec 2018   | -               |  | -              |            | -                | 0.000            | 14.821     | -                        |
| <b>Subtotal</b>   |                        |                                | 13.777      | 0.532   |   | 0.512   |            | -               |  | -              |            | -                | 0.000            | 14.821     | N/A                      |
| <b>Remarks</b><br>Systems Engineering and Program Management includes engineering support, conducting technical evaluations, market research and program reviews.                         |                        |                                |             |         |   |         |            |                 |  |                |            |                  |                  |            |                          |
| Product Development (\$ in Millions)  |                        |                                |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | 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   | MIPR                   | Various : Various              | 39.573      | -       |   | -       |            | -               |  | -              |            | -                | 0.000            | 39.573     | -                        |
| <b>Subtotal</b>   |                        |                                | 39.573      | -       |   | -       |            | -               |  | -              |            | -                | 0.000            | 39.573     | N/A                      |
| <b>Remarks</b><br>Candidates for the Soldier Enhancement Program are received, reviewed, and approved semi-annually. Contractual efforts are focused on procuring prototypes for testing. |                        |                                |             |         |   |         |            |                 |  |                |            |                  |                  |            |                          |
| Support (\$ in Millions)  |                        |                                |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | 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   | MIPR                   | PEO Soldier : Ft. Belvoir, VA  | 6.424       | -       |   | -       |            | -               |  | -              |            | -                | 0.000            | 6.424      | -                        |
| FY2019 SBIR / STTR Transfer   | TBD                    | TBD : TBD                      | -           | -       |   | 0.092   | Nov 2018   | -               |  | -              |            | -                | 0.000            | 0.092      | -                        |
| <b>Subtotal</b>   |                        |                                | 6.424       | -       |   | 0.092   |            | -               |  | -              |            | -                | 0.000            | 6.516      | N/A                      |
| Test and Evaluation (\$ in Millions)  |                        |                                |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | 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   | MIPR                   | Various : Various              | 43.360      | 5.700   | Jan 2018  | 8.477   | Jan 2019   | -               |  | -              |            | -                | 0.000            | 57.537     | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army   |                        |                                |             |   |            |         |            |  |                 |                |                | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|--|-----------------|----------------|----------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5  |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |            | Project (Number/Name)<br>S58 / Soldier Enhancement Program |                 |                |                |                  |                  |                  |                          |                          |
| Test and Evaluation (\$ in Millions)   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base  |                 | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | 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                       | 43.360      | 5.700   |            | 8.477   |            | -  | -               | -              | -              | -                | 0.000            | 57.537           | N/A                      |                          |
| <b>Remarks</b><br>Testing costs vary annually depending on number and type of items being evaluated. |                        |                                |             |   |            |         |            |  |                 |                |                |                  |                  |                  |                          |                          |
|  |                        |                                |             | Prior Years   | FY 2018    |         | FY 2019    |  | FY 2020<br>Base |                | FY 2020<br>OCO |                  | FY 2020<br>Total | Cost To Complete | Total Cost               | Target Value of Contract |
| Project Cost Totals  |                        |                                |             | 103.134   | 6.232      |         | 9.081      |  | -               |                | -              |                  | -                | 0.000            | 118.447                  | N/A                      |
| <b>Remarks</b>   |                        |                                |             |   |            |         |            |  |                 |                |                |                  |                  |                  |                          |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

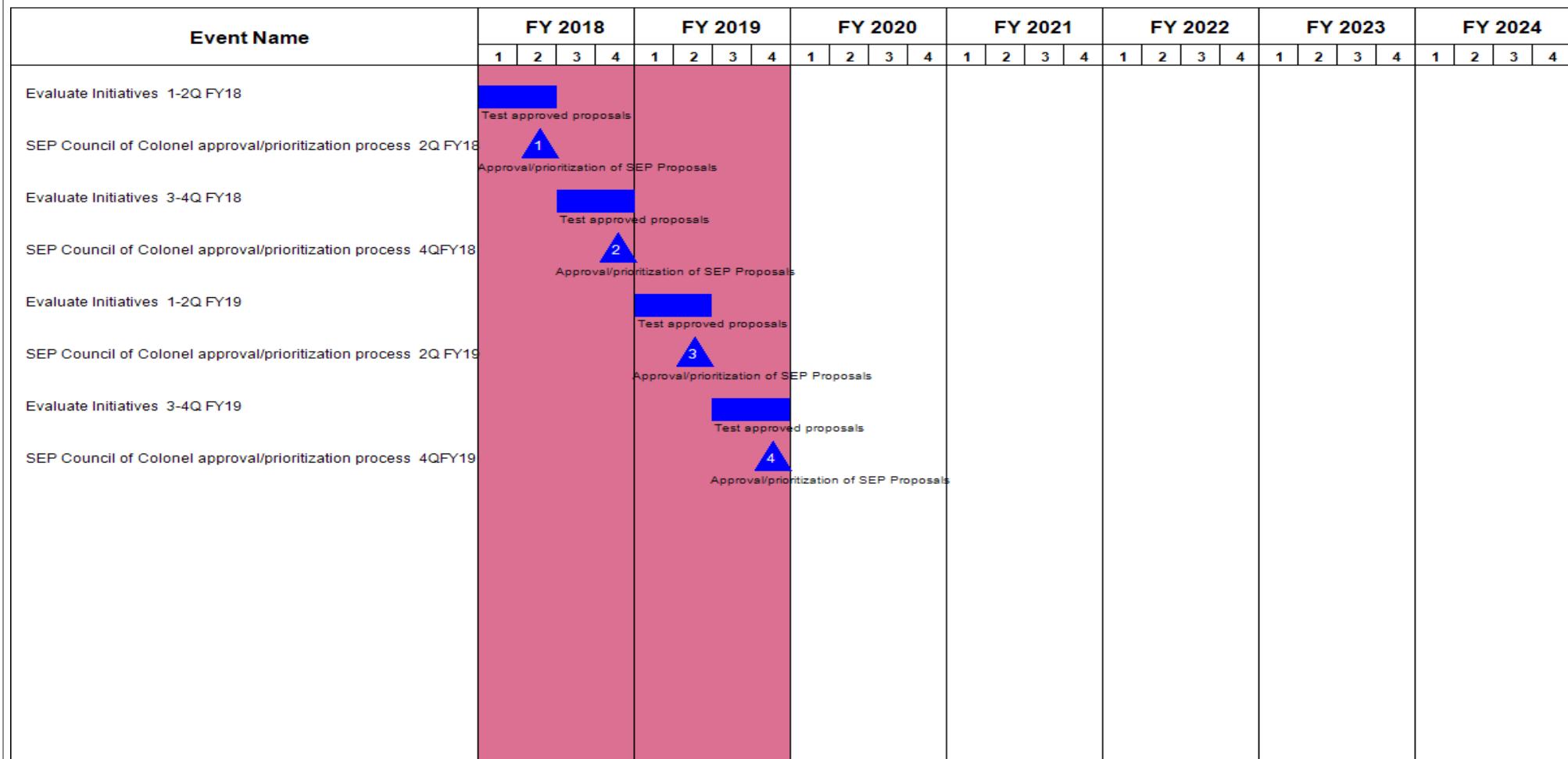
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604601A / Infantry Support Weapons

**Project (Number/Name)**

S58 / Soldier Enhancement Program



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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army             |   |  |      | Date: March 2019 |
|--|---|--|------|------------------|
| Appropriation/Budget Activity<br>2040 / 5                      | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons | Project (Number/Name)<br>S58 / Soldier Enhancement Program |      |                  |
| Schedule Details   |   |  |      |                  |
| Events   |   | Start  | End  |                  |
|  |   | Quarter  | Year | Quarter          |
| Evaluate Initiatives 3-4Q FY15                                 |   | 3  | 2015 | 4                |
| Evaluate Initiatives 1-2Q FY16                                 |   | 1  | 2016 | 2                |
| Evaluate Initiatives 1-2Q FY17                                 |   | 1  | 2017 | 2                |
| Evaluate Initiatives 3-4Q FY17                                 |   | 3  | 2017 | 4                |
| Evaluate Initiatives 1-2Q FY18                                 |   | 1  | 2018 | 2                |
| SEP Council of Colonel approval/prioritization process 2Q FY18 |   | 2  | 2018 | 2                |
| Evaluate Initiatives 3-4Q FY18                                 |   | 3  | 2018 | 4                |
| SEP Council of Colonel approval/prioritization process 4QFY18  |   | 4  | 2018 | 4                |
| Evaluate Initiatives 1-2Q FY19                                 |   | 1  | 2019 | 2                |
| SEP Council of Colonel approval/prioritization process 2Q FY19 |   | 2  | 2019 | 2                |
| Evaluate Initiatives 3-4Q FY19                                 |   | 3  | 2019 | 4                |
| SEP Council of Colonel approval/prioritization process 4QFY19  |   | 4  | 2019 | 4                |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>S60 / Clothing & 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 |  |
| S60: Clothing & Equipment                               | -           | 6.780   | 8.348   | 6.453        | -   | 6.453         | 6.724   | 5.015   | 4.850   | 3.700   | 0.000            | 41.870     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                |            |  |

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

This funding supports engineering and manufacturing development tasks related to individual clothing and equipment with the goal of enhancing the lethality survivability, and mobility as well as the quality of life of the individual Soldier. It funds formal Developmental Testing/Operational Testing of preproduction and production representative systems leveraging advancements in materials, fabrication techniques, moisture management, flame resistant, insect protection, extreme environmental protection and camouflage, to include evaluation, test, and conduct of Soldier evaluations of Organizational Clothing and Individual Equipment appropriate for use in extreme or multi-climate environments; not to be precluded other climates and environments. Goal is to increase the capabilities and durability of tactical and non-tactical clothing and individual equipment. Includes integration and interface on the Soldier system.

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

|  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Soldier Uniforms and Clothing<br><br><b>Description:</b> Evaluate superior and sustainable integrated clothing for the Soldier in a rapidly changing global environment.<br><br><b>FY 2019 Plans:</b><br>Conduct user evaluation on environmental protective handwear for use in varying weather environments (i.e. extreme cold weather, cold weather, etc). Continue modifications to support improved protection against insects and flame while increasing moisture management, signature management, breathability, and durability for tactical clothing. Continue to provide evaluation support of commercial offerings against the military product description for the athletic shoe in support of the Department of Defense and Congressional direction. Conduct flame testing on all FR clothing items using testing methodology transitioning from Science and Technology (S&T) community. Conduct a LUE on the Army Greens Service Uniform. Continue to conduct Cold Weather Combat Boot testing and complete MS C.<br><br><b>FY 2020 Base Plans:</b><br>Continue fabric and FR upgrades that support improved protection against insects and flame while increasing moisture management, signature management, breathability, and durability for tactical clothing. Continue Clothing Bag upgrades and evaluations. Conduct Modular Cold / Extreme Glove System MS C. Conduct sizing and body scanning study. Cold Weather Combat boot source selection verification testing.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> | 5.526   | 4.522   | 5.162        | -           | 5.162         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                |   |                |             |   |            |                | Date: March 2019 |                |                |                |                |                         |                   |  |
|--|----------------|---|----------------|-------------|---|------------|----------------|------------------|----------------|----------------|----------------|----------------|-------------------------|-------------------|--|
| Appropriation/Budget Activity<br>2040 / 5  |                | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |                |             | Project (Number/Name)<br>S60 / Clothing & Equipment |            |                |                  |                |                |                |                |                         |                   |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                |   |                |             |   |            |                | FY 2018          | FY 2019        | FY 2020 Base   | FY 2020 OCO    | FY 2020 Total  |                         |                   |  |
| Funding increase in Soldier Uniforms and Clothing portfolio is due to anticipated requirement changes in FY 2020.  |                |   |                |             |   |            |                |                  |                |                |                |                |                         |                   |  |
| <b>Title:</b> Individual Equipment<br><b>Description:</b> Develop and provide superior and sustainable integrated individual equipment for the Soldier in a rapidly changing global environment.   |                |   |                |             |   |            |                | 1.254            | 3.826          | 1.291          | -              | 1.291          |                         |                   |  |
| <b>FY 2019 Plans:</b><br>Procure assets and conduct limited user evaluation on government designed Modular Handgun System Holster. Test methodology provides three dimensional anthropometrically correct instruments for testing in flame environment. Perform safe to fly testing on Advanced Tactical Assault Panel. Test increased capacity capability for Multi-Purpose Hydration System (MPHS). Procure test assets, complete a user evaluation and then go out on contract for Improved Ghillie System (IGS) systems based on user eval and benchtop testing. Procure enough via contract to complete Initial operating capacity (IOC) and Full operating capacity (FOC). |                |   |                |             |   |            |                |                  |                |                |                |                |                         |                   |  |
| <b>FY 2020 Base Plans:</b><br>Continue on-the-move Hydration Operational Life Testing (TIC/TIM/Desalination). Complete development of increased capacity Multi-Purpose Hydration System (MPHS). Begin testing on Cold Weather Mobility items (i.e. skis, accessories, snow shoes, etc.). The parachutist flotation device MS C is schedule for 2Q FY20.  |                |   |                |             |   |            |                |                  |                |                |                |                |                         |                   |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Funding change in Individual Equipment portfolio is due to anticipated requirement changes in FY 2019 and FY 2020. Increase by \$2.797M  |                |   |                |             |   |            |                |                  |                |                |                |                |                         |                   |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |                |   |                |             |   |            |                | 6.780            | 8.348          | 6.453          | -              | 6.453          |                         |                   |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |   |                |             |   |            |                |                  |                |                |                |                |                         |                   |  |
| <u>Line Item</u>   | <u>FY 2018</u> | <u>FY 2019</u>  | <u>FY 2020</u> | <u>Base</u> | <u>FY 2020</u>                                      | <u>OCO</u> | <u>FY 2020</u> | <u>Total</u>     | <u>FY 2021</u> | <u>FY 2022</u> | <u>FY 2023</u> | <u>FY 2024</u> | <u>Cost To Complete</u> | <u>Total Cost</u> |  |
| • S53: Clothing And Equipment  | 2.532          | 1.823   | 2.466          | -           | 2.466   |            | 2.466          | 1.810            | 2.416          | 4.478          | 5.078          | Continuing     | Continuing              |                   |  |
| <b>Remarks</b>   |                |   |                |             |   |            |                |                  |                |                |                |                |                         |                   |  |
| <b>D. Acquisition Strategy</b>   |                |   |                |             |   |            |                |                  |                |                |                |                |                         |                   |  |
| Acquisition strategies for these programs vary in methods, and range from: 1) Material Change programs that result in engineering changes to existing systems to; 2) Traditional development programs that include an Engineering and Manufacturing Development phase ranging in duration from 12 to 48 months, depending on the level of complexity and testing required.   |                |   |                |             |   |            |                |                  |                |                |                |                |                         |                   |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army | <b>Date:</b> March 2019   |   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5                   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S60 / <i>Clothing &amp; Equipment</i> |
| <b>E. Performance Metrics</b>                                      |   |   |
| N/A  |   |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |   |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |            | Project (Number/Name)<br>S60 / Clothing & Equipment |            |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                     |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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 : Ft Belvoir           | 9.702       | 0.703   |            | 0.718   |            | 0.827   |            | -              |            | 0.827            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                | 9.702       | 0.703   |            | 0.718   |            | 0.827   |            | -              |            | 0.827            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                     |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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                                    | Various                | NSRDEC : Natick, MA            | 16.285      | 0.500   |            | -       |            | 0.589   |            | -              |            | 0.589            | Continuing       | Continuing | Continuing               |
| Development Contracts                                  | Various                | Various : Various              | 46.133      | 2.503   |            | 3.087   |            | 2.683   |            | -              |            | 2.683            | Continuing       | Continuing | Continuing               |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | TBD : TBD                      | -           | -   |            | 0.196   |            | -   |            | -              |            | -                | 0.000            | 0.196      | -                        |
| <b>Subtotal</b>  |                        |                                | 62.418      | 3.003   |            | 3.283   |            | 3.272   |            | -              |            | 3.272            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                     |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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                                     | Various                | Natick, MA : Natick, MA        | 16.486      | 0.400   |            | 1.624   |            | 0.476   |            | -              |            | 0.476            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                | 16.486      | 0.400   |            | 1.624   |            | 0.476   |            | -              |            | 0.476            | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                     |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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                   | Various : Various              | 25.527      | 2.674   |            | 2.723   |            | 1.878   |            | -              |            | 1.878            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                | 25.527      | 2.674   |            | 2.723   |            | 1.878   |            | -              |            | 1.878            | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                     |         |   |         |       |                 |   |                |   | Date: March 2019 |                     |               |                                |
|--|---------------------|---------|---|---------|-------|-----------------|---|----------------|---|------------------|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                     |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |       |                 | Project (Number/Name)<br>S60 / Clothing & Equipment |                |   |                  |                     |               |                                |
|  | Prior<br>Years      | FY 2018 |   | FY 2019 |       | FY 2020<br>Base |   | FY 2020<br>OCO |   | FY 2020<br>Total | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
|  | Project Cost Totals | 114.133 | 6.780   |         | 8.348 |                 | 6.453   |                | - | 6.453            | Continuing          | Continuing    | N/A                            |
| <b>Remarks</b>   |                     |         |   |         |       |                 |   |                |   |                  |                     |               |                                |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army           |         |   |   |   |         |   |   |   |         |   |   |   |         | Date: March 2019 |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|------------------|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|--|--|
| Appropriation/Budget Activity<br>2040 / 5                   |         |   |   |   |         |   | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |   |         |   | Project (Number/Name)<br>S60 / Clothing & Equipment |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Event Name  | FY 2018 |   |   |   | FY 2019 |   |   |   | FY 2020 |   |   |   | FY 2021 |                  |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   | FY 2024 |   |   |   |  |  |
|   | 1       | 2 | 3 | 4 | 1       | 2 | 3   | 4 | 1       | 2 | 3   | 4 | 1       | 2                | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |  |  |
| UNIFORM CLOTHING  |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Continue Fabric & FR Upgrades                               |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| FR Next Gen Materials Testing                               |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Clothing Bag Upgrades and Evaluations                       |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Cold/Extreme Cold Weather System MS C                       |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Cold/Extreme Cold Weather Boot MS C                         |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Modular Cold/Extreme Glove Sys MS C                         |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Military Free Fall Environmental Equipment MS C             |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Jungle Ensemble Transition to Production                    |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Jungle Boot Direct Requirement                              |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| INDIVIDUAL EQUIPMENT  |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| On-the-Move Hydration Operational Life Testing (TIC/TIM/Des |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |
| Tactical Holster Testing (interim)                          |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |

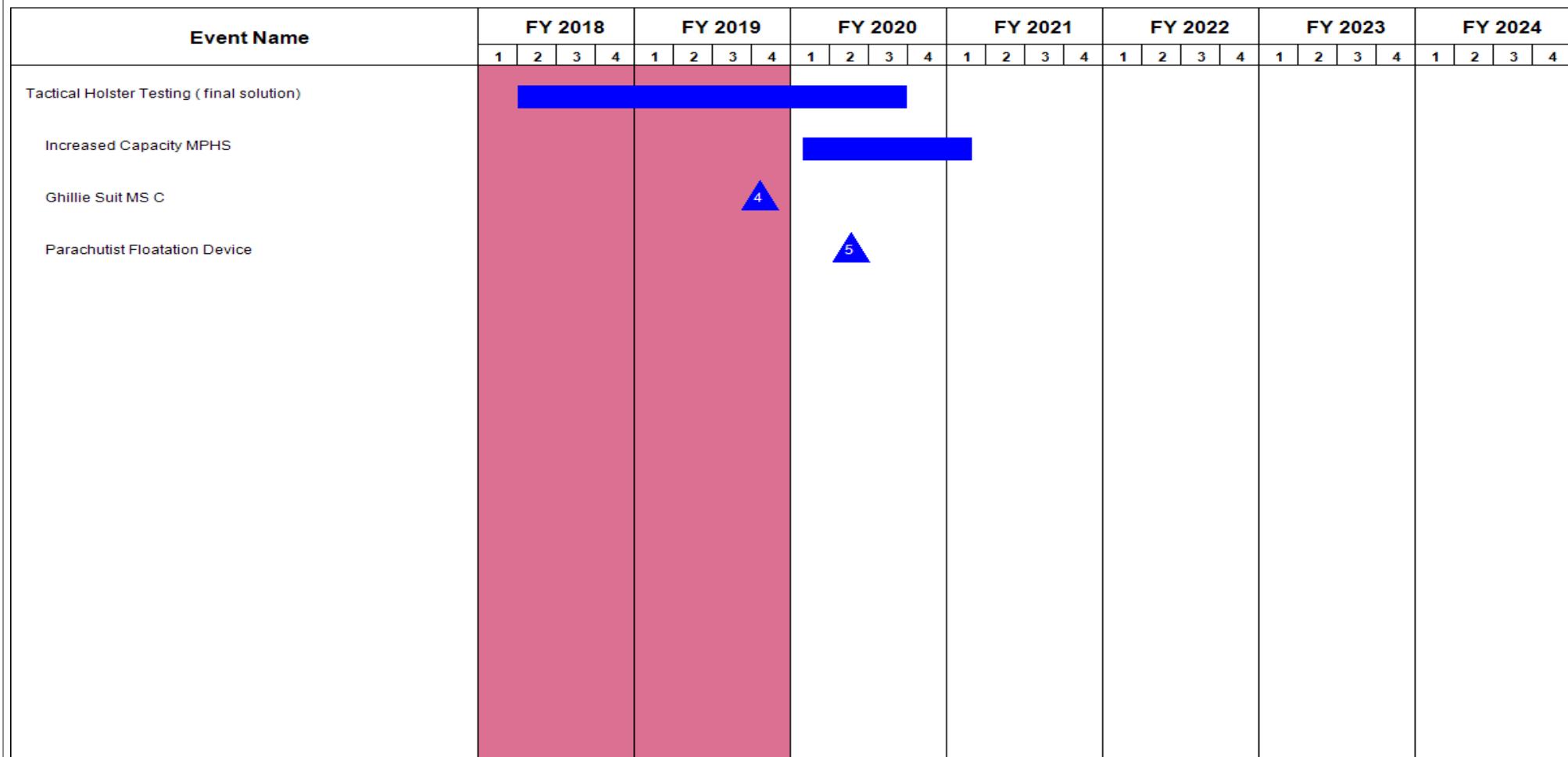
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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604601A / *Infantry Support Weapons***Project (Number/Name)**S60 / *Clothing & Equipment*

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army                      |   |   | Date: March 2019 |      |
|---|---|---|------------------|------|
| Appropriation/Budget Activity<br>2040 / 5                               | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons | Project (Number/Name)<br>S60 / Clothing & Equipment |                  |      |
| Schedule Details  |   |   |                  |      |
| Events  | Start   | End   |                  |      |
| Quarter   | Year  | Quarter   | Year             |      |
| UNIFORM CLOTHING  | 1   | 2011  | 4                | 2022 |
| Continue Fabric & FR Upgrades   | 3   | 2009  | 4                | 2024 |
| FR Next Gen Materials Testing   | 2   | 2021  | 4                | 2022 |
| Clothing Bag Upgrades and Evaluations                                   | 1   | 2013  | 4                | 2024 |
| Cold/Extreme Cold Weather System MS C                                   | 4   | 2023  | 4                | 2023 |
| Cold/Extreme Cold Weather Boot MS C                                     | 3   | 2019  | 3                | 2019 |
| Modular Cold/Extreme Glove Sys MS C                                     | 3   | 2020  | 3                | 2020 |
| Jungle Ensemble Transition to Production                                | 3   | 2018  | 3                | 2018 |
| Jungle Boot Direct Requirement  | 4   | 2018  | 4                | 2018 |
| INDIVIDUAL EQUIPMENT  | 2   | 2008  | 4                | 2022 |
| Poncho Liner/Field Tarp Testing   | 2   | 2016  | 2                | 2017 |
| On-the-Move Hydration Operational Life Testing (TIC/TIM/Desalinization) | 2   | 2017  | 4                | 2024 |
| Tactical Holster Testing (interim)                                      | 3   | 2017  | 2                | 2018 |
| Tactical Holster Testing ( final solution)                              | 2   | 2018  | 3                | 2020 |
| Increased Capacity MPHS   | 1   | 2020  | 1                | 2021 |
| Ghillie Suit MS C   | 4   | 2019  | 4                | 2019 |
| Parachutist Floatation Device   | 2   | 2020  | 2                | 2020 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>S61 / Acis Engineering Development |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| S61: Acis Engineering Development                       | -           | 3.908   | 3.608   | 2.988        | -   | 2.988         | 2.864   | 2.924   | 2.967   | 1.450   | Continuing       | Continuing |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                | -          |  |

**Note**

FY2020 Program - Funds will be used to conduct Windows 10 qualification test, developmental and operational test of Aircrew Combat Equipment, and operational test of the Common Helmet Mounted Display.

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

This project conducts Engineering and Manufacturing Development (EMD) for the Air Soldier System (Air SS). The Air SS is Army aircrew survival and mission equipment that improves safety, survivability, and human performance. The Air SS Capability Production Document (CPD) addresses capability gaps identified during combat operations in Iraq and Afghanistan including crew station compatibility challenges caused by equipment bulk, aircraft mishaps as a result of limited Situational Awareness (SA), and lack of functionally integrated aircrew mission and survival equipment. Air SS delivers reduced bulk and weight of survival equipment; improved crew station compatibility; and improved pilot SA and safety. The Air SS provides enhanced terrain, threat, and obstacle avoidance information; improved heads-up display (HUD) technologies that increase the aviator's SA; the capability to perform extended missions in extreme environmental and chemical/biological threat conditions; the capability to digitally replace paper-based DoD Flight Information Publications (Electronic Flight Bag); and develops and tests a modernized replacement for the Air Warrior survival vest that integrates with the Soldier Protection System body armor (Aircrew Combat Equipment).

This project also funds the development and test of deferred CPD capabilities including improved laser eye protection and tactile cueing that enhances aviator SA. This program does not duplicate any aircraft platform program efforts. Includes integration and interface of products on Soldiers.

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

| FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---------|---------|--------------|-------------|---------------|
| 3.908   | 3.492   | 2.988        | -           | 2.988         |

**Title:** Aircrew Integrated Systems (ACIS) Engineering Development

**Description:** Development, Integration, evaluation, testing, and qualification of Air Soldier System multi-phased capabilities as technologies mature.

**FY 2019 Plans:**

Continue Aircrew Combat Ensemble and Electronic Flight Bag Developmental Test and Operational Test as part of the developmental effort for the Air Soldier System Pre-planned Product Improvements Phase.

**FY 2020 Base Plans:**

Funds will be used to conduct Windows 10 qualification test, developmental and operational test of Aircrew Combat Equipment, and operational test of the Common Helmet Mounted Display.

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

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |   |              |             |   |         |         |         |         | Date: March 2019 |                         |              |                   |               |  |  |  |
|---|---------|---|--------------|-------------|---|---------|---------|---------|---------|------------------|-------------------------|--------------|-------------------|---------------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5   |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |              |             | Project (Number/Name)<br>S61 / Acis Engineering Development |         |         |         |         |                  |                         |              |                   |               |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |         |   |              |             |   |         |         |         |         | FY 2018          | FY 2019                 | FY 2020 Base | FY 2020 OCO       | FY 2020 Total |  |  |  |
| Changing aircrew safety and survivability program priorities.   |         |   |              |             |   |         |         |         |         | -                | 0.116                   | -            | -                 | -             |  |  |  |
| <b>Title:</b> FY2019 SBIR / STTR Transfer<br><b>Description:</b> Reflects FY2019 \$116,000 SBIR Title 15 USC ?638(f)(1) Transfer.<br><b>FY 2019 Plans:</b><br>Reflects FY2019 \$116,000 SBIR Title 15 USC ?638(f)(1) Transfer.<br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Reflects FY2019 \$116,000 SBIR Title 15 USC ?638(f)(1) Transfer.  |         |   |              |             |   |         |         |         |         |                  |                         |              |                   |               |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |         |   |              |             |   |         |         |         |         | 3.908            | 3.608                   | 2.988        | -                 | 2.988         |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |   |              |             |   |         |         |         |         |                  | <b>Cost To Complete</b> |              | <b>Total Cost</b> |               |  |  |  |
| Line Item   | FY 2018 | FY 2019   | FY 2020 Base | FY 2020 OCO | FY 2020 Total   | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete |                         |              |                   | Total Cost    |  |  |  |
| • AZ3110: Aircrew Integrated Systems  | 53.366  | 27.243  | 48.255       | -           | 48.255  | 48.303  | 52.814  | 24.698  | 24.834  | 0.000            |                         |              | 279.513           |               |  |  |  |
| <b>Remarks</b>  |         |   |              |             |   |         |         |         |         |                  |                         |              |                   |               |  |  |  |
| <b>D. Acquisition Strategy</b>  |         |   |              |             |   |         |         |         |         |                  |                         |              |                   |               |  |  |  |
| Engineering and Manufacturing Development efforts for the Air SS program include development, integration, test, and airworthiness qualification of aviator flight display symbology technologies that will increase crew member situational awareness, and aircrew protective and survival equipment that reduces bulk and weight and improves crew station compatibility and mission effectiveness. Air SS includes improvements to the current flight helmet; improvements to the survival gear carriage system; lightweight body armor; environmental protective clothing and personal survival equipment; and a day/night helmet-mounted flight symbology display for UH-60 and CH-47 aviators. Efforts continue to develop deferred capabilities as defined within the Capability Development Document (CDD) to include Common Operating Environment modernization initiatives and enhanced laser eye protection. |         |   |              |             |   |         |         |         |         |                  |                         |              |                   |               |  |  |  |
| Development efforts are conducted using a mix of both Cost and Firm Fixed Price Contracts with industry utilizing full and open competition. Each development effort is individually evaluated and the appropriate contract type is selected in order to appropriately share risk between industry and the government. Risk reduction, developmental, and operational testing are conducted utilizing Reimbursable orders placed with Other Government Agencies under either Project Order Law, Title 41, United States Code, section 6307 or the Economy Act, Title 31, United States Code, section 1535.  |         |   |              |             |   |         |         |         |         |                  |                         |              |                   |               |  |  |  |
| <b>E. Performance Metrics</b>   |         |   |              |             |   |         |         |         |         |                  |                         |              |                   |               |  |  |  |
| N/A   |         |   |              |             |   |         |         |         |         |                  |                         |              |                   |               |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |         |   |         |            |                 |            |   |            |                  | Date: March 2019 |            |                          |
|--|------------------------|--|-------------|---------|---|---------|------------|-----------------|------------|---|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 |            | Project (Number/Name)<br>S61 / Acis Engineering Development |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO  |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                 | 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 Administration                                      | Allot                  | Various Government : Huntsville, Alabama       | 3.601       | 0.396   |   | 0.197   |            | 0.197           |            | -   |            | 0.197            | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>                                | 3.601       | 0.396   |   | 0.197   |            | 0.197           |            | -   |            | 0.197            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO  |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                 | 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 Warrior and Air Soldier System Development         | C/CPFF                 | Various Government : Various Locations         | 60.625      | 1.665   |   | 1.469   |            | 0.725           |            | -   |            | 0.725            | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>                                | 60.625      | 1.665   |   | 1.469   |            | 0.725           |            | -   |            | 0.725            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO  |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                 | 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   | RO                     | Various Government : Various Locations         | 4.107       | 0.292   |   | 0.055   |            | 0.055           |            | -   |            | 0.055            | Continuing       | Continuing | Continuing               |
| FY2019 SBIR / STTR Transfer                            | Various                | SBIR / STTR Transfer : Title 15 USC ?638(f)(1) | -           | -       |   | 0.116   |            | -               |            | -   |            | -                | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>                                | 4.107       | 0.292   |   | 0.171   |            | 0.055           |            | -   |            | 0.055            | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO  |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                 | 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 and Operational Testing                  | RO                     | Various Activities : Various Locations         | 13.772      | 1.555   |   | 1.771   |            | 2.011           |            | -   |            | 2.011            | Continuing       | Continuing | Continuing               |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |   |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |            | Project (Number/Name)<br>S61 / Acis Engineering Development |            |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | 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                       | 13.772      | 1.555   |            | 1.771   |            | 2.011   |            | -              |            | 2.011            | Continuing       | Continuing | N/A                      |
|  |                        |                                | Prior Years | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
|  |                        | Project Cost Totals            | 82.105      | 3.908   |            | 3.608   |            | 2.988   |            | -              |            | 2.988            | Continuing       | Continuing | N/A                      |

**Remarks**

FY2019 R-2A Project Funding Total of \$3,492 reflects revised funding after FFRDC and SBIR Title 15 USC ?638(f)(1) adjustments.

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army            |         |   |   |   |         |   |   |   |         |   |   |   |         | Date: March 2019 |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|------------------|---|---|---------|---|---|---|---------|---|---|---|---|---|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5                    |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |   |   | Project (Number/Name)<br>S61 / Acis Engineering Development |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Event Name   | FY 2018 |   |   |   | FY 2019 |   |   |   | FY 2020 |   |   |   | FY 2021 |                  |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1 | 2 | 3 | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Air SS Full Rate Production (FRP) Decision                   |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Air SS Pre-planned Product Improv (P3I) Phase                |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Electronic Flight Bag (EFB) Integration & Qualification      |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Aircrew Combat Equipment (ACE) Integration and Qualification |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ACE Developmental Test/Operational Test (DT/OT)              |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| EFB Production Decision                                      |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| ACE Production Decision                                      |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Deferred Air SS Capabilities Develop & Qual                  |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army           |   |   |         | Date: March 2019 |
|--|---|---|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5                    | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons | Project (Number/Name)<br>S61 / Acis Engineering Development |         |                  |
| Schedule Details   |   |   |         |                  |
| Events   | Start   | End   | Quarter | Year             |
| Air Soldier System System (Air SS) Dev, Dem and Qual Test    | 1   | 2012  | 4       | 2015             |
| Air Soldier System Milestone B                               | 1   | 2012  | 1       | 2012             |
| Air SS Prelim Design Review(PDR)                             | 1   | 2013  | 1       | 2013             |
| Air SS Critical Design Review (CDR)                          | 4   | 2013  | 4       | 2013             |
| Air SS Developmental Testing (DT1)                           | 1   | 2014  | 4       | 2014             |
| Air SS Customer Test   | 4   | 2014  | 4       | 2014             |
| Air SS Milestone C/Low Rate Initial Production (LRIP)        | 1   | 2017  | 1       | 2017             |
| Air SS Added Capability Developmental Test                   | 3   | 2015  | 3       | 2015             |
| Air SS Initial Operational Test & Eval (IOT&E)               | 4   | 2015  | 1       | 2016             |
| Air SS Full Rate Production (FRP) Decision                   | 1   | 2019  | 1       | 2019             |
| Air SS Pre-planned Product Improv (P3I) Phase                | 1   | 2016  | 4       | 2024             |
| Electronic Flight Bag (EFB) Integration & Qualification      | 1   | 2017  | 4       | 2019             |
| Aircrew Combat Equipment (ACE) Integration and Qualification | 1   | 2017  | 1       | 2020             |
| EFB Preliminary Design and Platform Integration              | 3   | 2016  | 4       | 2016             |
| EFB Detailed Design & Qualification                          | 1   | 2017  | 3       | 2017             |
| ACE Developmental Test/Operational Test (DT/OT)              | 2   | 2020  | 4       | 2020             |
| EFB Production Decision                                      | 4   | 2019  | 4       | 2019             |
| ACE Production Decision                                      | 1   | 2021  | 1       | 2021             |
| Deferred Air SS Capabilities Develop & Qual                  | 1   | 2020  | 4       | 2024             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |  |         | Date: March 2019 |            |              |             |               |
|--|-------------|---------|---------|--------------|--|---------------|---------|---------|--|---------|------------------|------------|--------------|-------------|---------------|
| Appropriation/Budget Activity  |             |         |         |              | R-1 Program Element (Number/Name)      |               |         |         | Project (Number/Name)                          |         |                  |            |              |             |               |
| 2040 / 5   |             |         |         |              | PE 0604601A / Infantry Support Weapons |               |         |         | S62 / Counter-Defilade Target Engagement - SDD |         |                  |            |              |             |               |
| COST (\$ in Millions)  | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                            | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To Complete | Total Cost |              |             |               |
| S62: Counter-Defilade Target Engagement - SDD  | -           | 0.000   | 1.998   | 0.000        | -                                      | 0.000         | 0.000   | 0.000   | 0.000  | 0.000   | 0.000            | 1.998      |              |             |               |
| Quantity of RDT&E Articles   | -           | -       | -       | -            | -                                      | -             | -       | -       | -  | -       | -                |            |              |             |               |
| <b>A. Mission Description and Budget Item Justification</b>  |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |
| The Maneuver Center of Excellence (MCoE), FT Benning, GA (User Community) identifies the Counter Defilade Target Engagement (CDTE) as a critical capability gap for our Soldiers in combat. A Next Generation Counter Defilade Weapon to mitigate the critical capability gap (defeating defilade (hidden) targets from 35-500m) is required. The Next Generation Counter Defilade Weapon will provide the Infantry Soldier with a leap-ahead overmatch capability that allows the Soldier to engage defilade targets with a high degree of accuracy while posing minimal burden, in terms of weight and size. The system will integrate a weapon, ammunition, and a target acquisition/fire control subsystem that integrates thermal capability with direct-view optics, laser rangefinder, environmental sensors, ballistic computer, and internal display. |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |             |         |         |              |  |               |         |         |  |         | FY 2018          | FY 2019    | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| <b>Title:</b> Support Next Generation Counter Defilade Weapon Requirements Development   |             |         |         |              |  |               |         |         |  |         | -                | 1.934      | -            | -           | -             |
| <b>FY 2019 Plans:</b><br>Support Next Generation Counter Defilade Weapon Requirements Development.   |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This program has been terminated.  |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |
| <b>Title:</b> FY2019 SBIR / STTR Transfer  |             |         |         |              |  |               |         |         |  |         | -                | 0.064      | -            | -           | -             |
| <b>FY 2019 Plans:</b><br>FY2019 SBIR / STTR Transfer   |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>None   |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |
| <b>Accomplishments/Planned Programs Subtotals</b>  |             |         |         |              |  |               |         |         |  |         | -                | 1.998      | -            | -           | -             |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |
| N/A  |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |
| <b>Remarks</b>   |             |         |         |              |  |               |         |         |  |         |                  |            |              |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   | <b>Date:</b> March 2019   |   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S62 / <i>Counter-Defilade Target Engagement - SDD</i> |
| <b>D. Acquisition Strategy</b><br>Utilize existing hardware to conduct user requested demonstrations and analyses that will be used to inform counter defilade requirements. As counter defilade requirements are finalized for the Next Generation Counter Defilade Weapon, acquisition approaches will be explored and selected in order to provide this capability to the user. |   |   |
| <b>E. Performance Metrics</b><br>N/A   |   |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                              |                        |  |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|---|------------------------|--|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |            | Project (Number/Name)<br>S62 / Counter-Defilade Target Engagement - SDD |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)  |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location               | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management  | Various                | Performed by Government : Various Activities | 4.908       | -   |            | 0.334   | Mar 2019   | -   |            | -           |            | -                | 0.000            | 5.242      | -                        |
| Contract Management Services  | MIPR                   | ACC-APG : Aberdeen                           | 0.146       | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 0.146      | -                        |
| FY2019 SBIR / STTR Transfer   | FFRDC                  | Army Budget Office : Pentagon, Washington DC | -           | -   |            | 0.064   | Nov 2018   | -   |            | -           |            | -                | 0.000            | 0.064      | -                        |
| <b>Subtotal</b>   |                        | 5.054  | -           | 0.398   |            | -       |            | -   |            | -           |            | -                | 0.000            | 5.452      | N/A                      |
| <b>Remarks</b>  |                        |  |             |   |            |         |            |   |            |             |            |                  |                  |            |                          |
| Program is under review by the Army Acquisition Executive (AAE) for a path forward. |                        |  |             |   |            |         |            |   |            |             |            |                  |                  |            |                          |
| 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 |
| Contract Termination Costs  | SS/BA                  | ATK : Plymouth, MN                           | 135.840     | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 135.840    | -                        |
| <b>Subtotal</b>   |                        | 135.840                                      | -           | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 135.840    | N/A                      |
| Support (\$ in Millions)  |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location               | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Contractor Support  | Option/ FFP            | Various : PMSW, Picatinny Arsenal. NJ        | 0.620       | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 0.620      | -                        |
| Training Development Support  | MIPR                   | TACOM/PEO STRI : TACOM/PEO STRI              | 0.993       | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 0.993      | -                        |
| Engineering Support   | MIPR                   | Government : Various                         | 8.912       | -   |            | 0.350   | Mar 2019   | -   |            | -           |            | -                | 0.000            | 9.262      | -                        |
| <b>Subtotal</b>   |                        | 10.525                                       | -           | 0.350   |            | -       |            | -   |            | -           |            | -                | 0.000            | 10.875     | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |   |            |         |            |   |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---|------------|---------|------------|---|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |            | Project (Number/Name)<br>S62 / Counter-Defilade Target Engagement - SDD |            |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location               | 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/System Tests and Articles                | SS/CPFF                | Performed by Contractor : ATK, Plymouth, MN  | 19.604      | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 19.604     | -                        |
| Developmental/Operational Tests                        | Various                | Performed by Government : Various Activities | 15.445      | -   |            | 1.250   | Mar 2019   | -   |            | -              |            | -                | 0.000            | 16.695     | -                        |
| <b>Subtotal</b>  |                        | <b>35.049</b>                                | -           |   | 1.250      |         |            | -   |            | -              |            | -                | 0.000            | 36.299     | N/A                      |
|  |                        |  | Prior Years | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |  | 186.468     | -   |            | 1.998   |            | -   |            | -              |            | -                | 0.000            | 188.466    | N/A                      |
| <b>Remarks</b>   |                        |  |             |   |            |         |            |   |            |                |            |                  |                  |            |                          |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army            |         |   |   |   |         |   |   |   |         |   |   | Date: March 2019 |         |   |   |   |         |   |   |   |         |   |   |   |
|--|---------|---|---|---|---------|---|---|---|---------|---|---|------------------|---------|---|---|---|---------|---|---|---|---------|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5                    |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |   |   | Project (Number/Name)<br>S62 / Counter-Defilade Target Engagement - SDD |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Event Name   | FY 2018 |   |   |   | FY 2019 |   |   |   | FY 2020 |   |   |                  | FY 2021 |   |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |
|  | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4                | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |
| Program Management   |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Design, Develop, Engineer, Test & Manage Improvements        |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Production Qualification Test (PQT)                          |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Live Fire Test & Evaluation (LFT&E)                          |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Initial Operational Test & Evaluation (IOT&E)                |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Natural Environments/Airborne LUT                            |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Type Classification - Standard                               |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Full Rate Production (FRP)                                   |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Design, Develop & Fabricate Support Requirements Development |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Engineering Support  |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Test and Evaluation  |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |
| Program Management FY19                                      |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S62 / <i>Counter-Defilade Target Engagement - SDD</i> |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Design, Develop & Fabricate                                  | 1              | 2011        | 4              | 2017        |
| Engineering and Training Development                         | 1              | 2011        | 4              | 2017        |
| Development Tests & Evaluation                               | 1              | 2011        | 4              | 2017        |
| Program Management   | 1              | 2011        | 4              | 2018        |
| Design, Develop, Engineer, Test & Manage Improvements        | 1              | 2021        | 4              | 2021        |
| Pre-Production Qualification Testing (PPQT #2)               | 4              | 2016        | 2              | 2017        |
| Limited User Testing (LUT)                                   | 2              | 2017        | 2              | 2017        |
| Low Rate Initial Production (LRIP)-IOT&E                     | 3              | 2017        | 4              | 2017        |
| Production Qualification Test (PQT)                          | 3              | 2018        | 1              | 2019        |
| Live Fire Test & Evaluation (LFT&E)                          | 1              | 2019        | 2              | 2019        |
| Initial Operational Test & Evaluation (IOT&E)                | 3              | 2019        | 1              | 2020        |
| Natural Environments/Airborne LUT                            | 2              | 2019        | 1              | 2020        |
| Type Classification - Standard                               | 2              | 2020        | 2              | 2020        |
| Full Rate Production (FRP)                                   | 3              | 2020        | 4              | 2021        |
| Design, Develop & Fabricate Support Requirements Development | 1              | 2019        | 4              | 2019        |
| Engineering Support  | 1              | 2019        | 4              | 2019        |
| Test and Evaluation  | 1              | 2019        | 4              | 2019        |
| Program Management FY19                                      | 1              | 2019        | 4              | 2019        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)      |               |         |         | Project (Number/Name)                            |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604601A / Infantry Support Weapons |               |         |         | S63 / Individual Weapons Engineering Development |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                            | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To Complete | Total Cost |  |
| S63: Individual Weapons Engineering Development         | -           | 9.664   | 5.749   | 7.076        | -                                      | 7.076         | 15.377  | 7.918   | 6.284  | 0.974   | 0.000            | 53.042     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -                                      | -             | -       | -       | -  | -       | -                |            |  |

**Note**

FY 2019 Transition of Next Generation Carbine/Rifle work effort to Program Element 0604601A/Infantry Support Weapons EW4/Crew Served Weapons Engineering Development.

FY 2020 New starts include Next Generation Airburst, Current and Legacy Weapon Improvements, and Next Generation Optics.

Previously funded: Adaptive Lubricious Coatings and Weapon Upgrades and Accessories are now funded under Current and Legacy Weapon Improvements. Optic Upgrades are now covered under Next Generation Optics.

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

The Individual Weapons Engineering Development program provides funds to transition components or prototypes from Small Arms Improvement, Project S54, Program Element 0603827A, (Budget Activity 4) and other domestic and foreign sources of small arms weapon systems to demonstrate, test and evaluate capability near or at planned operational requirements. Small arms systems include weapons up to 40 millimeter in caliber. Current and future efforts focus on system improvements designed to enhance lethality, target acquisition, 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 system development, integration (to include human-systems), demonstration, test and evaluate components, prototypes and operational system prototypes of small arms weapon systems and/or enhancements. Benefits include continuous improvements to small arms weapon systems, fire control equipment, optics, gun barrels, ancillary equipment, training devices, component mounts, weapon mounts, and weapon/ammunition interface of current small arms fleet or new weapon systems.

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

|  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> New Weapon Systems<br><b>Description:</b> Description: Development of new weapon systems | 7.815   | 4.438   | 4.379        | -           | 4.379         |

**FY 2019 Plans:**

Will begin the development of the Next Generation Carbine/Rifle. BCTs require the capability to engage protected and unprotected threat personnel with aimed lethal and accurate fires exceeding the capability of current carbines available today.

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |   |   |                |                     | <b>Date:</b> March 2019 |                      |
|--|---|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S63 / <i>Individual Weapons Engineering Development</i> |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| Squad Designated Marksman Rifle (SDMR): Will continue to test and evaluate the Squad Designated Marksman Rifle, a highly accurate long range rifle system for Squad Designated Marksmen within BCTs.   |   |   |                |                     |                         |                      |
| New Weapon Evaluations and Assessments: Will continue to provide initial evaluation and assessment of new weapons.   |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>FY 2020 New Start: Next Generation Airburst: Will develop advanced technologies to incorporate into an airburst weapon system that will defeat targets behind cover, targets that are exposed, and counter unmanned aerial systems.  |   |   |                |                     |                         |                      |
| Weapon System Upgrades and Accessories: Will continue to test, evaluate, and analyze ongoing and new activities to enhance small arms weapon systems.  |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 Decrease to support the National Defense Strategy.   |   |   |                |                     |                         |                      |
| <b>Title:</b> Small Arms Weapon Systems Enhancements<br><b>Description:</b> Description: Enhancements and developments of small arms weapon Systems  |   | 0.180   | 0.900          | 2.497               | -                       | 2.497                |
| <b>FY 2019 Plans:</b><br>Adaptive Lubricious Coatings: Will continue to develop manufacturing technology to support production of super hydrophobic and other coatings in support of Small Arms Weapons. Will assess and evaluate current manufacturing process studies and assessments to adapt the coating technology into weapon Original Equipment Manufacturer manufacturing processes. |   |   |                |                     |                         |                      |
| Small Business Innovation Research (SBIR) Enhancements: Will continue to support Phase II Enhancement and/or initialization of Phase III SBIR activities.  |   |   |                |                     |                         |                      |
| Weapon Upgrades and Accessories: Will continue to test, evaluate, and analyze ongoing and new activities to enhance small arms weapons.  |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>FY 2020 New Start: Current and Legacy Weapon Improvements: Will assess and evaluate selected capabilities and improvements for all current and legacy weapon systems.  |   |   |                |                     |                         |                      |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   |   |                |                     | <b>Date:</b> March 2019 |                      |
|--|---|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S63 / <i>Individual Weapons Engineering Development</i> |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| Small Business Innovation Research (SBIR) Enhancements: Will continue to support Phase II Enhancement and/or initialization of Phase III SBIR activities.  |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 Increase to support the National Defense Strategy.   |   |   |                |                     |                         |                      |
| <b>Title:</b> Ammunition<br><b>Description:</b> Description: Improvement of small arms ammunition  |   | 0.050   | 0.050          | 0.050               | -                       | 0.050                |
| <b>FY 2019 Plans:</b><br>Ammunition Upgrades: Will continue to evaluate the effect of new ammunition on small arms weapons.  |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Ammunition Upgrades: Will continue to evaluate the effect of new ammunition on small arms weapon systems.  |   |   |                |                     |                         |                      |
| <b>Title:</b> Combat Optics<br><b>Description:</b> Description: Improvement of combat optics   |   | 1.569   | 0.100          | 0.100               | -                       | 0.100                |
| <b>FY 2019 Plans:</b><br>Optics Upgrades: Will continue to perform engineering evaluations, verification and validation of weapon optics performance requirements.                                     |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Next Generation Optics: Will continue to perform engineering, evaluations, verification and validation of weapon optics and electro-optic capabilities and improvements. |   |   |                |                     |                         |                      |
| <b>Title:</b> Research and Analysis<br><b>Description:</b> Market Research and Cost Benefit Analysis   |   | 0.050   | 0.050          | 0.050               | -                       | 0.050                |
| <b>FY 2019 Plans:</b><br>Will continue Market Research and Cost Benefit Analysis of new small arms weapon and/or enhancements for engineering and manufacturing development.                           |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b>   |   |   |                |                     |                         |                      |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                |                |                |   |                |                |                |   |                    | <b>Date:</b> March 2019 |                   |  |
|---|----------------|----------------|----------------|---|----------------|----------------|----------------|---|--------------------|-------------------------|-------------------|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |                |                |                | <b>Project (Number/Name)</b><br>S63 / <i>Individual Weapons Engineering Development</i> |                    |                         |                   |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |                |   |                | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020 Base</b>   | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |                   |  |
| Will continue Market Research and Cost Benefit Analysis of new small arms weapon systems and/or enhancements for engineering and manufacturing development.   |                |                |                |   |                | -              | 0.211          | -   | -                  | -                       |                   |  |
| <b>Title:</b> FY2019 SBIR / STTR Transfer   |                |                |                |   |                | -              |                |   |                    |                         |                   |  |
| <b>FY 2019 Plans:</b><br>FY2019 SBIR / STTR Transfer  |                |                |                |   |                |                |                |   |                    |                         |                   |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>None  |                |                |                |   |                |                |                |   |                    |                         |                   |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                |   |                | 9.664          | 5.749          | 7.076   | -                  | 7.076                   |                   |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                |   |                |                |                |   |                    |                         |                   |  |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b>  | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>  | <b>FY 2024</b>     | <b>Cost To Complete</b> | <b>Total Cost</b> |  |
| • S54: Small Arms Improvement   | 27.832         | 7.677          | 14.555         | -   | 14.555         | 16.097         | 19.232         | 17.439  | 10.487             | 0.000                   | 113.319           |  |
| • G01507: COMPACT SEMI-AUTOMATIC SNIPER SYSTEM  | -              | 46.236         | 9.860          | -   | 9.860          | -              | -              | -   | -                  | 0.000                   | 56.096            |  |
| • G13503: M4A1 CARBINE  | 43.150         | 69.606         | 30.331         | 1.183   | 31.514         | 7.883          | 4.345          | -   | -                  | 0.000                   | 156.498           |  |
| • GB3007: M4 Carbine Mods   | 31.069         | 38.075         | 17.595         | -   | 17.595         | 4.829          | 4.904          | 4.409   | 10.530             | Continuing              | Continuing        |  |
| • G01501: XM320 Grenade Launcher Module (GLM)   | 18.524         | 18.197         | 0.191          | 0.526   | 0.717          | 5.996          | 9.917          | 11.884  | 14.456             | Continuing              | Continuing        |  |
| • G15325: Handgun   | 8.326          | 48.251         | 6.174          | 0.248   | 6.422          | 4.915          | 5.131          | -   | -                  | Continuing              | Continuing        |  |
| • GL3200: Items Less Than \$5.0m (WOCV-WTCV)  | 5.075          | 4.571          | 3.066          | -   | 3.066          | 2.766          | 2.869          | 2.977   | 3.174              | Continuing              | Continuing        |  |
| • GC0925: Modifications Less Than \$5.0m (WOCV-WTCV)  | 2.219          | 5.577          | 4.327          | -   | 4.327          | 2.606          | 2.362          | 2.338   | 2.716              | Continuing              | Continuing        |  |
| <b>Remarks</b>  |                |                |                |   |                |                |                |   |                    |                         |                   |  |
| In support of Small Arms Requirements, components or prototypes developed in Small Arms Improvement, Project S54, Program Element 0603827A, (Budget Activity 4) is transitioned to Individual Weapons Engineering Development, Project S63, Program Element 0604601A, (Budget Activity 5) to conduct engineering and manufacturing development. Once the component, prototype or operational prototype achieves Milestone C and type classification the item transitions to small arms weapon systems production or modification program. |                |                |                |   |                |                |                |   |                    |                         |                   |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S63 / <i>Individual Weapons Engineering Development</i> |
| <b>D. Acquisition Strategy</b><br>Primary strategy is to mature and finalize design efforts, award Research, Development, Test and Evaluation (RDT&E) hardware contracts, and test and evaluate systems that result in type classification and follow-on production contract awards. |   |   |
| <b>E. Performance Metrics</b><br>N/A   |   |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |         |   |         |            |              |   |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|---------|---|---------|------------|--------------|---|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |              | Project (Number/Name)<br>S63 / Individual Weapons Engineering Development |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |   | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                            | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date  | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management                                     | Allot                  | PM Soldier Weapons, : Picatinny Arsenal                   | 9.726       | 0.405   | Mar 2018  | 0.300   | Mar 2019   | 0.050        | Mar 2020  | -           |            | 0.050            | Continuing       | Continuing | Continuing               |
| Travel   | MIPR                   | PM Soldier Weapons, : Picatinny Arsenal                   | 1.349       | 0.075   | Mar 2018  | 0.060   | Mar 2019   | 0.062        | Mar 2020  | -           |            | 0.062            | Continuing       | Continuing | Continuing               |
| FY2019 SBIR / STTR Transfer                            | FFRDC                  | Army Budget Office : Pentagon, Washington DC              | -           | -       |   | 0.211   | Nov 2018   | -            |   | -           |            | -                | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |   | 11.075      | 0.480   |   | 0.571   |            | 0.112        |   | -           |            | 0.112            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |   | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                            | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date  | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Fabrication  | Various                | Various : Multiple Contractors                            | 3.200       | 0.500   | Mar 2018  | 3.600   | Mar 2019   | 1.275        | Apr 2020  | -           |            | 1.275            | Continuing       | Continuing | Continuing               |
| Hardware Development                                   | MIPR                   | Army Research Development Engineering Centers, : Multiple | 8.065       | 0.035   | Mar 2018  | 0.150   | Mar 2019   | 1.035        | Apr 2020  | -           |            | 1.035            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |   | 11.265      | 0.535   |   | 3.750   |            | 2.310        |   | -           |            | 2.310            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |   |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |   | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                            | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date  | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Engineering  | MIPR                   | Army Research Development Engineering Centers, : Multiple | 62.100      | 5.521   | Mar 2018  | 0.320   | Mar 2019   | 2.346        | Mar 2020  | -           |            | 2.346            | Continuing       | Continuing | Continuing               |
| Logistics  | MIPR                   | TACOM, : Warren   | 4.846       | 0.124   | Mar 2018  | 0.100   | Mar 2019   | 0.124        | Mar 2020  | -           |            | 0.124            | Continuing       | Continuing | Continuing               |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |   |            |         |              |   |             |             |               | Date: March 2019 |                  |                          |                          |
|--|------------------------|---|-------------|---|------------|---------|--------------|---|-------------|-------------|---------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |              | Project (Number/Name)<br>S63 / Individual Weapons Engineering Development |             |             |               |                  |                  |                          |                          |
| 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 To Complete | Total Cost       | Target Value of Contract |                          |
| Human Research and Engineering                         | MIPR                   | Army Research Laboratory, : Aberdeen Proving Ground         | 3.721       | 0.124   | Mar 2018   | 0.100   | Mar 2019     | 0.124   | Mar 2020    | -           |               | 0.124            | Continuing       | Continuing               | Continuing               |
| <b>Subtotal</b>  |                        |   | 70.667      | 5.769   |            | 0.520   |              | 2.594   |             | -           |               | 2.594            | Continuing       | Continuing               | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |   |             | FY 2018   |            | FY 2019 |              | FY 2020 Base  |             | FY 2020 OCO |               | FY 2020 Total    |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                              | Prior Years | Cost  | Award Date | Cost    | Award Date   | Cost  | Award Date  | Cost        | Award Date    | Cost             | Cost To Complete | Total Cost               | Target Value of Contract |
| Developmental Testing                                  | MIPR                   | Army Developmental Test Command, : Aberdeen Proving Ground  | 25.544      | 0.785   | Mar 2018   | 0.500   | Mar 2019     | 0.700   | Mar 2020    | -           |               | 0.700            | Continuing       | Continuing               | Continuing               |
| Operational Testing                                    | MIPR                   | Army Test and Evaluation Command, : Aberdeen Proving Ground | 14.998      | 1.752   | Mar 2018   | 0.204   | Mar 2019     | 1.010   | Mar 2020    | -           |               | 1.010            | Continuing       | Continuing               | Continuing               |
| Validation Testing                                     | MIPR                   | Army Test and Evaluation Centers, : Multiple                | 9.519       | 0.343   | Mar 2018   | 0.204   | Mar 2019     | 0.350   | Mar 2020    | -           |               | 0.350            | Continuing       | Continuing               | Continuing               |
| <b>Subtotal</b>  |                        |   | 50.061      | 2.880   |            | 0.908   |              | 2.060   |             | -           |               | 2.060            | Continuing       | Continuing               | N/A                      |
|  |                        |   | Prior Years | FY 2018   |            | FY 2019 |              | FY 2020 Base  |             | FY 2020 OCO |               | FY 2020 Total    | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |   | 143.068     | 9.664   |            | 5.749   |              | 7.076   |             | -           |               | 7.076            | Continuing       | Continuing               | N/A                      |
| <b>Remarks</b>   |                        |   |             |   |            |         |              |   |             |             |               |                  |                  |                          |                          |

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| 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)                            |   |         |   |   |                  |   |   |         |   |         |
| 2040 / 5   |         |   |   | PE 0604601A / Infantry Support Weapons |   |   |         | S63 / Individual Weapons Engineering Development |   |         |   |   |                  |   |   |         |   |         |
| Event Name   | FY 2018 |   |   | FY 2019                                |   |   | FY 2020 |  |   | FY 2021 |   |   | FY 2022          |   |   | FY 2023 |   | FY 2024 |
|  | 1       | 2 | 3 | 4                                      | 1 | 2 | 3       | 4  | 1 | 2       | 3 | 4 | 1                | 2 | 3 | 4       | 1 | 2       |
| <b>NEW WEAPON SYSTEMS</b>                              |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| Next Generation Airburst                               |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| Modular Handgun System (MHS)                           |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| Squad Designated Marksman Rifle (SDMR)                 |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| New Weapon Systems Evaluations and Assessments         |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| <b>SMALL ARMS WEAPON SYSTEMS ENHANCEMENTS</b>          |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| Adaptive Lubricious Coatings                           |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| Small Business Innovation Research (SBIR) Enhancements |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| Weapon Upgrades and Accessories                        |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| Current and Legacy Weapon Improvements                 |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| <b>AMMUNITION</b>                                      |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| Ammunition Upgrades                                    |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |
| <b>COMBAT OPTICS</b>                                   |         |   |   |  |   |   |         |  |   |         |   |   |                  |   |   |         |   |         |

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| 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)                            |   |   |   |         |                  |   |   |         |   |
| 2040 / 5  |  |  |  | PE 0604601A / Infantry Support Weapons |   |   |   | S63 / Individual Weapons Engineering Development |   |   |   |         |                  |   |   |         |   |
|   |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |
|   |  |  |  | FY 2018                                |   |   |   | FY 2019  |   |   |   | FY 2020 |                  |   |   | FY 2021 |   |
|   |  |  |  | 1                                      | 2 | 3 | 4 | 1  | 2 | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 |
| Grenadier Sighting System (GSS) for the M320 Grenade Launcher |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |
| Rifle Combat Optic Technology Refresh                         |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |
| Intelligent Rail  |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |
| Optics Upgrades   |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |
| Next Generation Optics  |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |
| <b>RESEARCH AND ANALYSIS</b>                                  |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |
| Research and Analysis of Small Arms                           |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |         |   |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S63 / <i>Individual Weapons Engineering Development</i> |

**Schedule Details**

| <b>Events</b>   | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| NEW WEAPON SYSTEMS  | 1              | 2007        | 4              | 2024        |
| Next Generation Airburst                                      | 1              | 2020        | 4              | 2022        |
| Individual Carbine Competition                                | 1              | 2010        | 4              | 2013        |
| Modular Handgun System (MHS)                                  | 1              | 2012        | 4              | 2018        |
| Precision Sniper Rifle (PSR)                                  | 1              | 2015        | 4              | 2016        |
| Squad Designated Marksman Rifle (SDMR)                        | 1              | 2014        | 4              | 2019        |
| New Weapon Systems Evaluations and Assessments                | 1              | 2018        | 4              | 2024        |
| SMALL ARMS WEAPON SYSTMS ENHANCEMENTS                         | 1              | 2008        | 4              | 2024        |
| Compact Semi-Automatic Sniper System (CSASS)                  | 1              | 2015        | 4              | 2016        |
| Powered Rail now known as Intelligent Rail                    | 1              | 2013        | 4              | 2016        |
| Adaptive Lubricious Coatings                                  | 1              | 2018        | 4              | 2020        |
| Small Business Innovation Research (SBIR) Enhancements        | 1              | 2017        | 4              | 2024        |
| Weapon Upgrades and Accessories                               | 1              | 2008        | 4              | 2019        |
| Current and Legacy Weapon Improvements                        | 1              | 2020        | 4              | 2024        |
| AMMUNITION  | 1              | 2008        | 4              | 2024        |
| XM1112 40MM Airburst Non-Lethal Munitions                     | 1              | 2010        | 4              | 2016        |
| Ammunition Upgrades   | 1              | 2008        | 4              | 2024        |
| COMBAT OPTICS   | 1              | 2008        | 4              | 2024        |
| Mounted Machine Gun Optics (MMO)                              | 1              | 2015        | 4              | 2016        |
| Squad Fire Control Optic                                      | 1              | 2014        | 4              | 2015        |
| Grenadier Sighting System (GSS) for the M320 Grenade Launcher | 1              | 2009        | 4              | 2019        |
| Rifle Combat Optic Technology Refresh                         | 1              | 2017        | 4              | 2018        |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |  |  |         | Date: March 2019 |  |
|--|--|--|---------|------------------|--|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604601A / <i>Infantry Support Weapons</i> | Project (Number/Name)<br>S63 / <i>Individual Weapons Engineering Development</i> |         |                  |  |
| Events   | Start  |  | End     |                  |  |
|  | Quarter  | Year   | Quarter | Year             |  |
|  | 1  | 2017   | 4       | 2018             |  |
|  | 1  | 2018   | 4       | 2019             |  |
|  | 1  | 2020   | 4       | 2024             |  |
|  | 1  | 2012   | 4       | 2024             |  |
|  | 1  | 2015   | 4       | 2024             |  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>S64 / Common Remotely Operated Wpn Sys (CROWS) |         |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |
| S64: Common Remotely Operated Wpn Sys (CROWS)           | -           | 24.753  | 0.000   | 9.300        | -   | 9.300         | 1.500   | 0.000   | 0.000   | 0.000   | 0.000            | 35.553     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                |            |

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

The Maneuver Support Center of Excellence (MSCoE) at FT Leonard Wood, Missouri (user community) has identified continued development of the Common Remotely Operated Weapon Station (CROWS) as a critical improvement for the Soldier in a combat environment. By addressing the capability gap of non-turreted, lightly armored vehicles where the gunner is exposed to enemy fire, the current CROWS system provides the ability to rapidly and accurately locate and engage the enemy while allowing platform gunners to remain under armor, thereby providing greater protection and increasing overall lethality.

Next generation requirements for the CROWS are identified in the CROWS Increment II Capability Development Document (CDD). CROWS Increment II capability improvements will upgrade overall situational awareness, survivability and lethality. Increment II requirements include improved sensor systems for enhanced identification ranges; wider fields of view; improved on-the-move accuracy; training capability; battlefield obscurants; mission data recording for After Action Reviews (AAR); increased lethality using legacy and future anti-personnel and anti-materiel precision scalable lethal and non-lethal weapon systems; improved ballistics protection; adaptability to integrate on a variety of legacy and future platforms including ground vehicles, watercraft, semi-autonomous and autonomous platforms; precision targeting including visible and infrared (IR) pointers; target hand-off; slew-to-cue; escalation of force (EOF) capabilities; and other additional system modifications and improvements.

Obsolescence and Increment II requirements will address recommendations identified in the Operational Test Agency Milestone Assessment Report (OMAR) and user community feedback. These modifications include, but are not limited to: improved optics survivability; auto-zoom; improved auto-tracking; improved sensors for increased situational awareness; and improved rounds counter. Additionally, development efforts will include system and component level reliability improvements that will extend system life and reduce overall CROWS logistics footprint.

| B. Accomplishments/Planned Programs (\$ in Millions)   | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <p><b>Title:</b> Contractor Development and Prototype Fabrication</p> <p><b>Description:</b> Contractor development of system improvements, modifications, and fabrication of prototypes.</p> <p><b>FY 2020 Base Plans:</b><br/>Contractor will resume development of multiple system improvements and modifications to enhance situational awareness and lethality, escalation of force and non-lethal capabilities. These improvements will include a multi-user/multi-weapon capability, an embedded trainer to replace the current appended trainer device, and an</p> | 17.652  | -       | 6.975        | -           | 6.975         |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |   |   |                |                     | <b>Date:</b> March 2019 |                      |
|--|---|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S64 / <i>Common Remotely Operated Wpn Sys (CROWS)</i> |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| enhanced, digital, high definition visual imaging module. These improvements will also include the integration of new weapons and other effectors and the development and modification for integration into new vehicles and other platforms.                      |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase for contractor to resume development of system improvements and modifications.  |   |   |                |                     |                         |                      |
| <b>Title:</b> Engineering Support<br><br><b>Description:</b> Government engineering support and technical oversight.   |   | 4.455   | -              | 1.447               | -                       | 1.447                |
| <b>FY 2020 Base Plans:</b><br>Will provide government engineering support, technical oversight, and development of multiple system improvements and modifications to enhance situational awareness and lethality, escalation of force and non-lethal capabilities. |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase for government engineering support and technical oversight of system improvements.  |   |   |                |                     |                         |                      |
| <b>Title:</b> Test and Evaluation<br><br><b>Description:</b> Testing and evaluation at government ranges and facilities.   |   | 0.951   | -              | 0.258               | -                       | 0.258                |
| <b>FY 2020 Base Plans:</b><br>Will provide government testing and evaluation of system improvements and modifications to enhance situational awareness and lethality, escalation of force and non-lethal capabilities.   |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase for government testing and evaluation of system improvements and modifications.   |   |   |                |                     |                         |                      |
| <b>Title:</b> Program Management<br><br><b>Description:</b> Program office management and oversight of government and contractor efforts.  |   | 1.695   | -              | 0.620               | -                       | 0.620                |
| <b>FY 2020 Base Plans:</b>   |   |   |                |                     |                         |                      |

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|   |                |                |                |   |                |            |                |                |   |                         |                    |  |  |  |  |  |
|---|----------------|----------------|----------------|---|----------------|------------|----------------|----------------|---|-------------------------|--------------------|--|--|--|--|--|
| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |                |                |                |   |                |            |                |                |   | <b>Date:</b> March 2019 |                    |  |  |  |  |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |                |            |                |                | <b>Project (Number/Name)</b><br>S64 / <i>Common Remotely Operated Wpn Sys (CROWS)</i> |                         |                    |  |  |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |                |   |                |            |                |                |   | <b>FY 2018</b>          | <b>FY 2019</b>     |  |  |  |  |  |
| Program office will provide oversight and management of contractor and government efforts for system improvements and modifications to enhance situational awareness and lethality, escalation of force and non-lethal capabilities.  |                |                |                |   |                |            |                |                |   | <b>FY 2020 Base</b>     | <b>FY 2020 OCO</b> |  |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase to program office management for contractor and government efforts to development system improvements and modifications.   |                |                |                |   |                |            |                |                |   | <b>FY 2020 Total</b>    |                    |  |  |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                |   |                |            |                |                |   | 24.753                  | -                  |  |  |  |  |  |
|   |                |                |                |   |                |            |                |                |   | 9.300                   | -                  |  |  |  |  |  |
|   |                |                |                |   |                |            |                |                |   | 9.300                   |                    |  |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                |   |                |            |                |                |   |                         |                    |  |  |  |  |  |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>Base</b>   | <b>FY 2020</b> | <b>OCO</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b>  | <b>FY 2023</b>          | <b>FY 2024</b>     |  |  |  |  |  |
| • G04700: <i>Common Remotely Operated Weapons Station</i>   | 22.250         | 39.346         | 24.007         | 4.182   | 28.189         |            | 24.560         | -              | -   | -                       | 0.000              |  |  |  |  |  |
|   |                |                |                |   |                |            |                |                |   |                         | 114.345            |  |  |  |  |  |
| <b>Remarks</b>  |                |                |                |   |                |            |                |                |   |                         |                    |  |  |  |  |  |
| <b>D. Acquisition Strategy</b>  |                |                |                |   |                |            |                |                |   |                         |                    |  |  |  |  |  |
| The program objective is to continue developing, improving and fielding the current generation (Increment I) and next generation (Increment II) of CROWS on various platforms in accordance with the Basis of Issue Plan (BOIP). The program supports new and emerging urgent requirements like the integration of the Mine Resistant Ambush Protected (MRAP) family of vehicles, ground combat systems, Joint Lightweight Tactical Vehicles (JLTV) and fixed site mounting systems to support Integrated Base Defense (IBD). |                |                |                |   |                |            |                |                |   |                         |                    |  |  |  |  |  |
| <b>E. Performance Metrics</b>   |                |                |                |   |                |            |                |                |   |                         |                    |  |  |  |  |  |
| N/A   |                |                |                |   |                |            |                |                |   |                         |                    |  |  |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army         |                        |   |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                      |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |            | Project (Number/Name)<br>S64 / Common Remotely Operated Wpn Sys (CROWS) |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                           |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management   | MIPR                   | PM Soldier Weapons : Picatinny Arsenal, NJ    | 2.745       | 1.695   | Apr 2018   | -       |            | 0.620   | Oct 2019   | -           |            | 0.620            | 0.000            | 5.060      | -                        |
|  |                        | <b>Subtotal</b>                               | 2.745       | 1.695   |            | -       |            | 0.620   |            | -           |            | 0.620            | 0.000            | 5.060      | 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 |
| Technology Refresh, Obsolescence and Increment II Enhancements | C/FFP                  | Kongsberg Protech Systems USA : Johnstown, PA | 11.634      | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 11.634     | -                        |
| Contractor Development and Prototype Fabrication               | C/FFP                  | TBD : TBD                                     | 4.431       | 17.652  | Aug 2018   | -       |            | 6.975   | Nov 2019   | -           |            | 6.975            | 0.000            | 29.058     | -                        |
|  |                        | <b>Subtotal</b>                               | 16.065      | 17.652  |            | -       |            | 6.975   |            | -           |            | 6.975            | 0.000            | 40.692     | N/A                      |
| Support (\$ in Millions)                                       |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Engineering Support  | MIPR                   | ARDEC : Picatinny Arsenal, NJ                 | 6.365       | 4.455   | Apr 2018   | -       |            | 1.447   | Oct 2019   | -           |            | 1.447            | 0.000            | 12.267     | -                        |
|  |                        | <b>Subtotal</b>                               | 6.365       | 4.455   |            | -       |            | 1.447   |            | -           |            | 1.447            | 0.000            | 12.267     | N/A                      |
| Test and Evaluation (\$ in Millions)                           |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Test Planning and Execution                                    | MIPR                   | Multiple : Multiple                           | 0.807       | 0.951   | May 2018   | -       |            | 0.258   | Dec 2019   | -           |            | 0.258            | 0.000            | 2.016      | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |                 |                            |                |   |                |                     |                     |                    |                    | Date: March 2019  |                      |                  |                          |                          |
|--|------------------------|--------------------------------|-----------------|----------------------------|----------------|---|----------------|---------------------|---------------------|--------------------|--------------------|---|----------------------|------------------|--------------------------|--------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5       |                        |                                |                 |                            |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |                |                     |                     |                    |                    | <b>Project (Number/Name)</b><br>S64 / <i>Common Remotely Operated Wpn Sys (CROWS)</i> |                      |                  |                          |                          |
| <b>Test and Evaluation (\$ in Millions)</b>            |                        |                                |                 | <b>FY 2018</b>             |                | <b>FY 2019</b>  |                | <b>FY 2020 Base</b> |                     | <b>FY 2020 OCO</b> |                    | <b>FY 2020 Total</b>  |                      |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years     | Cost                       | Award Date     | Cost  | Award Date     | Cost                | Award Date          | Cost               | Award Date         | Cost  | Cost To Complete     | Total Cost       | Target Value of Contract |                          |
|  |                        |                                | <b>Subtotal</b> | 0.807                      | 0.951          | -   |                | 0.258               |                     | -                  |                    | 0.258   | 0.000                | 2.016            | N/A                      |                          |
|  |                        |                                |                 | Prior Years                | <b>FY 2018</b> |   | <b>FY 2019</b> |                     | <b>FY 2020 Base</b> |                    | <b>FY 2020 OCO</b> |   | <b>FY 2020 Total</b> | Cost To Complete | Total Cost               | Target Value of Contract |
|  |                        |                                |                 | <b>Project Cost Totals</b> | 25.982         | 24.753  | 0.000          | 9.300               |                     | -                  |                    | 9.300   | 0.000                | 60.035           | N/A                      |                          |

Remarks

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| 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)                          |   |   |   |                  |   |   |   |
| 2040 / 5  |         |   |   | PE 0604601A / Infantry Support Weapons |         |   |   |   | S64 / Common Remotely Operated Wpn Sys (CROWS) |   |   |   |                  |   |   |   |
| Event Name  | FY 2018 |   |   |  | FY 2019 |   |   |   | FY 2020  |   |   |   | FY 2021          |   |   |   |
|   | 1       | 2 | 3 | 4                                      | 1       | 2 | 3 | 4 | 1  | 2 | 3 | 4 | 1                | 2 | 3 | 4 |
| Contractor Design and Prototype Fabrication       |         |   |   |  |         |   |   |   |  |   |   |   |                  |   |   |   |
| Engineering Support (Government)                  |         |   |   |  |         |   |   |   |  |   |   |   |                  |   |   |   |
| Development Test & Evaluation                     |         |   |   |  |         |   |   |   |  |   |   |   |                  |   |   |   |
| Program Management                                |         |   |   |  |         |   |   |   |  |   |   |   |                  |   |   |   |
| Contractor Design and Prototype Fabrication (II)  |         |   |   |  |         |   |   |   |  |   |   |   |                  |   |   |   |
| Engineering Support (II)                          |         |   |   |  |         |   |   |   |  |   |   |   |                  |   |   |   |
| Test and Evaluation (II)                          |         |   |   |  |         |   |   |   |  |   |   |   |                  |   |   |   |
| Program Management (II)                           |         |   |   |  |         |   |   |   |  |   |   |   |                  |   |   |   |

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|---|---|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S64 / <i>Common Remotely Operated Wpn Sys (CROWS)</i> |

**Schedule Details**

| <b>Events</b>                                    | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Contractor Design and Prototype Fabrication      | 1              | 2016        | 4              | 2018        |
| Engineering Support (Government)                 | 3              | 2015        | 4              | 2018        |
| Development Test & Evaluation                    | 3              | 2015        | 4              | 2018        |
| Program Management                               | 3              | 2015        | 4              | 2018        |
| Increment II Product Improvement                 | 2              | 2017        | 4              | 2017        |
| Contractor Design and Prototype Fabrication (II) | 1              | 2020        | 4              | 2020        |
| Engineering Support (II)                         | 1              | 2020        | 4              | 2020        |
| Test and Evaluation (II)                         | 1              | 2020        | 4              | 2020        |
| Program Management (II)                          | 1              | 2020        | 4              | 2020        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>S70 / Personnel Recovery Support System (PRSS) |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| S70: Personnel Recovery Support System (PRSS)           | -           | 1.283   | 0.967   | 0.000        | -   | 0.000         | 0.000   | 0.000   | 0.395   | 0.797   | Continuing       | Continuing |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       |                  |            |  |

**Note**  
Not applicable for this item.

**A. Mission Description and Budget Item Justification**  
This project provides the continued maturation of PRSS products that enable operations to report and locate isolated Soldiers. The PRSS program consists of the enhancement of existing products to ensure continued successful interoperability within the relevant theater of operations and the Continental United States (CONUS), and testing of the encrypted Personnel Recovery Device (PRD) that operates over a secure architecture.

| B. Accomplishments/Planned Programs (\$ in Millions)  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Development of Personnel Recovery Support System (PRSS)<br><b>Description:</b> Integration, evaluation, testing and qualification of PRSS products to ensure continued successful interoperability within the relevant theater of operation, and development of a PRD that operates over a secure architecture. | 1.283   | 0.936   | -            | -           | -             |
| <b>FY 2019 Plans:</b><br>Develop and test an alternate PRD secure waveform to ensure continual cyber security is maintained.  |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Program decrease is due to realignment of funding to higher Army's modernization priorities in support of the National Defense Strategy.  |         |         |              |             |               |
| <b>Title:</b> FY2019 SBIR / STTR Transfer<br><b>FY 2019 Plans:</b><br>FY2019 SBIR / STTR Transfer.  | -       | 0.031   | -            | -           | -             |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY2019 SBIR/STTR Transfer reflected in FY2019 only.   |         |         |              |             |               |
| <b>Accomplishments/Planned Programs Subtotals</b>   | 1.283   | 0.967   | -            | -           | -             |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |                |                |                |             |                |   |                |                |   |                | <b>Date:</b> March 2019 |  |  |  |
|--|----------------|----------------|----------------|-------------|----------------|---|----------------|----------------|---|----------------|-------------------------|--|--|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |                |                |                |             |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |                |                | <b>Project (Number/Name)</b><br>S70 / <i>Personnel Recovery Support System (PRSS)</i> |                |                         |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |                |             |                |   |                |                |   |                |                         |  |  |  |
|  |                |                |                |             |                |   |                |                |   |                |                         |  |  |  |
| <u>Line Item</u>   | <u>FY 2018</u> | <u>FY 2019</u> | <u>FY 2020</u> | <u>Base</u> | <u>FY 2020</u> | <u>FY 2020</u>  | <u>FY 2021</u> | <u>FY 2022</u> | <u>FY 2023</u>  | <u>FY 2024</u> | <u>Cost To Complete</u> |  |  |  |
| • G01101: <i>Personnel Recovery Support System (PRSS)</i>  | 5.390          | 10.175         | 4.281          | 5.101       | 9.382          | 9.731   | 4.598          | 4.604          | 5.379   | Continuing     | Continuing              |  |  |  |
| <b>Remarks</b>   |                |                |                |             |                |   |                |                |   |                |                         |  |  |  |
| <b>D. Acquisition Strategy</b>   |                |                |                |             |                |   |                |                |   |                |                         |  |  |  |
| Execute PRSS program development effort for performance optimization through contracts with industry and Military Interdepartmental Purchase Requests to other Governmental agencies. Perform continuing development and test of new waveforms and hardware to ensure successful interoperability for personnel recovery, and to mitigate potential security compromises to the PRSS system. |                |                |                |             |                |   |                |                |   |                |                         |  |  |  |
| In FY 2023 PRSS products will be adapted and tested for integration onto various Army and sister service aerial platforms to increase coverage beyond current theaters of operation.   |                |                |                |             |                |   |                |                |   |                |                         |  |  |  |
| <b>E. Performance Metrics</b>  |                |                |                |             |                |   |                |                |   |                |                         |  |  |  |
| N/A  |                |                |                |             |                |   |                |                |   |                |                         |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army            |                        |   |             |         |            |  |            |              |            |             |            | Date: March 2019   |                  |            |                          |
|---|------------------------|---|-------------|---------|------------|--|------------|--------------|------------|-------------|------------|--|------------------|------------|--------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5                  |                        |   |             |         |            | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / Infantry Support Weapons |            |              |            |             |            | <b>Project (Number/Name)</b><br>S70 / Personnel Recovery Support System (PRSS) |                  |            |                          |
| <b>Management Services (\$ in Millions)</b>                       |                        |   |             |         |            |  |            |              |            |             |            |  |                  |            |                          |
|   |                        |   |             | FY 2018 |            | FY 2019  |            | FY 2020 Base |            | FY 2020 OCO |            | FY 2020 Total  |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location                        | Prior Years | Cost    | Award Date | Cost   | Award Date | Cost         | Award Date | Cost        | Award Date | Cost   | Cost To Complete | Total Cost | Target Value of Contract |
| PM Adminstration  | Allot                  | Various Government : Huntsville, Alabama              | 0.947       | 0.025   |            | 0.016  |            | -            |            | -           |            | -  | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>   |                        |   | 0.947       | 0.025   |            | 0.016  |            | -            |            | -           |            | -  | Continuing       | Continuing | N/A                      |
| <b>Product Development (\$ in Millions)</b>                       |                        |   |             |         |            |  |            |              |            |             |            |  |                  |            |                          |
|   |                        |   |             | 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 |
| Personnel Recovery Support System Development Systems Engineering | MIPR                   | Various Organizations : Various Locations             | 7.718       | 0.630   |            | 0.442  |            | -            |            | -           |            | -  | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>   |                        |   | 7.718       | 0.630   |            | 0.442  |            | -            |            | -           |            | -  | Continuing       | Continuing | N/A                      |
| <b>Support (\$ in Millions)</b>                                   |                        |   |             |         |            |  |            |              |            |             |            |  |                  |            |                          |
|   |                        |   |             | FY 2018 |            | FY 2019  |            | FY 2020 Base |            | FY 2020 OCO |            | FY 2020 Total  |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location                        | Prior Years | Cost    | Award Date | Cost   | Award Date | Cost         | Award Date | Cost        | Award Date | Cost   | Cost To Complete | Total Cost | Target Value of Contract |
| Matrix Support  | MIPR                   | Various Organizations : Various Locations             | 1.600       | 0.475   |            | 0.403  |            | -            |            | -           |            | -  | Continuing       | Continuing | Continuing               |
| FY2019 SBIR/STTR Transfer   | Various                | FY2019 SBIR/STTR Transfer : FY2019 SBIR/STTR Transfer | -           | -       |            | 0.031  |            | -            |            | -           |            | -  | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>   |                        |   | 1.600       | 0.475   |            | 0.434  |            | -            |            | -           |            | -  | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |   |            |         |            |   |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|---|------------|---------|------------|---|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |            |         |            | Project (Number/Name)<br>S70 / Personnel Recovery Support System (PRSS) |            |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location            | 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 / Operational Testing            | MIPR                   | Various Organizations : Various Locations | 3.181       | 0.153   |            | 0.075   |            | -   |            | -              |            | -                | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        | 3.181                                     | 0.153       |   | 0.075      |         | -          |   | -          |                | -          | -                | Continuing       | Continuing | N/A                      |
|  |                        |   | Prior Years | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |   | 13.446      | 1.283   |            | 0.967   |            | -   |            | -              |            | -                | Continuing       | Continuing | N/A                      |

Remarks

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army              |  |  |  |  |   |   |   |  |   |   |   |         | Date: March 2019 |   |   |                               |   |
|--|--|--|--|--|---|---|---|--|---|---|---|---------|------------------|---|---|-------------------------------|---|
| Appropriation/Budget Activity                                  |  |  |  | R-1 Program Element (Number/Name)      |   |   |   | Project (Number/Name)                          |   |   |   |         |                  |   |   |                               |   |
| 2040 / 5   |  |  |  | PE 0604601A / Infantry Support Weapons |   |   |   | S70 / Personnel Recovery Support System (PRSS) |   |   |   |         |                  |   |   |                               |   |
|  |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |                               |   |
|  |  |  |  | FY 2018                                |   |   |   | FY 2019  |   |   |   | FY 2020 |                  |   |   | FY 2021                       |   |
|  |  |  |  | 1                                      | 2 | 3 | 4 | 1  | 2 | 3 | 4 | 1       | 2                | 3 | 4 | 1                             | 2 |
| Personnel Recovery Support System (PRSS) Development Oversight |  |  |  | PRSS Oversight                         |   |   |   |  |   |   |   |         |                  |   |   |                               |   |
| Resume PRSS Development Oversight                              |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   | PRSS Oversight                |   |
| PRSS Development and Test                                      |  |  |  | PRSS Development and Test              |   |   |   |  |   |   |   |         |                  |   |   | PRSS Development and Test     |   |
| Resume PRSS Development and Test                               |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   | PRSS Development and Test     |   |
| PRSS LUT and Operational Testing                               |  |  |  | LUT and Operational Testing            |   |   |   |  |   |   |   |         |                  |   |   |                               |   |
| PRSS Upgrades and Adaptations to New Platforms                 |  |  |  | PRSS Upgrades and Adaptations          |   |   |   |  |   |   |   |         |                  |   |   | PRSS Upgrades and Adaptations |   |
| Resume PRSS Upgrades and Adaptations to New Platforms          |  |  |  |  |   |   |   |  |   |   |   |         |                  |   |   |                               |   |

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|---|---|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> | <b>Project (Number/Name)</b><br>S70 / <i>Personnel Recovery Support System (PRSS)</i> |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Personnel Recovery Support System (PRSS) Development Oversight | 1              | 2010        | 4              | 2019        |
| Resume PRSS Development Oversight                              | 1              | 2023        | 4              | 2024        |
| PRSS Development and Test                                      | 1              | 2010        | 4              | 2019        |
| Resume PRSS Development and Test                               | 1              | 2023        | 4              | 2024        |
| PRSS Prototype Hardware Build and Integration                  | 3              | 2010        | 2              | 2016        |
| PRSS LUT and Operational Testing                               | 3              | 2018        | 1              | 2019        |
| PRSS Upgrades and Adaptations to New Platforms                 | 1              | 2015        | 4              | 2019        |
| Resume PRSS Upgrades and Adaptations to New Platforms          | 1              | 2023        | 4              | 2024        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |             |              |             |               |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|--------------|-------------|---------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5   |             |              |             |               | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |               |         |         | Project (Number/Name)<br>VS5 / 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 |  |
| VS5: Soldier Protective Equipment   | -           | 1.725        | 6.050       | 6.627         | -   | 6.627         | 8.327   | 9.666   | 9.490   | 8.507   | 0.000            | 50.392     |  |
| Quantity of RDT&E Articles  | -           | -            | -           | -             | -   | -             | -       | -       | -   | -       | -                |            |  |
| <b>A. Mission Description and Budget Item Justification</b>   |             |              |             |               |   |               |         |         |   |         |                  |            |  |
| This funding supports Engineering and Manufacturing Development (EMD) and full rate production decision reviews of Soldier Protective Equipment. It leverages advancements in technology to continue improvements to the Army's Personal Protective Equipment (PPE) portfolio to include hard and soft body armor components (Vital Torso Protection (VTP) and Torso and Extremity Protection (TEP) respectfully), helmets (Integrated Head Protection System (IHPS) and other personal protective equipment (Transition Combat Eye Protection (TCEP).  |             |              |             |               |   |               |         |         |   |         |                  |            |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |             |              |             |               |   |               |         |         |   |         |                  |            |  |
| <b>Title:</b> Soldier Protective Equipment<br><br><b>Description:</b> Project VS5 (Soldier Protective Equipment) supports engineering and manufacturing development of Individual Soldier Ballistic Protection equipment. It will leverage advancements in technology to continue incremental improvements to Personal Protective Equipment (PPE).<br><br><b>FY 2019 Plans:</b><br>Continue to evaluate and develop system and subsystem technologies across the PPE portfolio from emerging ballistic/blast threats. Begin development of laser eye protection for the Transition Combat Eye Protection (TCEP) system. Continue to test ballistic properties of current PPE after exposure to extreme storage conditions for better shelf and service life predictions. Continue SPS system human factors and environmental/exposure testing.<br><br><b>FY 2020 Base Plans:</b><br>Continue to evaluate and develop system and subsystem technologies across the PPE portfolio from emerging ballistic/blast threats. Continue to test ballistic properties of current PPE after exposure to extreme storage conditions for better shelf and service life predictions. Continue Soldier Protection System (SPS) system human factors and environmental/exposure testing, including Cold & Tropical regions, durability, etc.). Plan to conduct First Article Test (FAT) of Next GEN IHPS. Plan for introducing advanced Technology and materials into production processes as these technologies mature.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> |             |              |             |               |   |               |         |         |   |         |                  |            |  |
| FY 2018   | FY 2019     | FY 2020 Base | FY 2020 OCO | FY 2020 Total |   |               |         |         |   |         |                  |            |  |
| 1.725   | 6.050       | 6.627        | -           | 6.627         |   |               |         |         |   |         |                  |            |  |

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|---|----------------|----------------|----------------|---|------------|----------------------|----------------|---|--------------------|-------------------------|-----------------|---------------------------|
| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |                |                |                |   |            |                      |                |   |                    | <b>Date:</b> March 2019 |                 |                           |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604601A / <i>Infantry Support Weapons</i> |            |                      |                | <b>Project (Number/Name)</b><br>VS5 / <i>Soldier Protective Equipment</i> |                    |                         |                 |                           |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |                |   |            | <b>FY 2018</b>       | <b>FY 2019</b> | <b>FY 2020 Base</b>   | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |                 |                           |
| Funding increase in Soldier Protective Equipment portfolio is due to anticipated requirement changes in FY20.   |                |                |                |   |            |                      |                |   |                    |                         |                 |                           |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                |   |            | 1.725                | 6.050          | 6.627   | -                  | 6.627                   |                 |                           |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                |   |            |                      |                |   |                    |                         |                 |                           |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>Base</b>   | <b>OCO</b> | <b>FY 2020 Total</b> | <b>FY 2021</b> | <b>FY 2022</b>  | <b>FY 2023</b>     | <b>FY 2024</b>          | <b>Complete</b> | <b>Cost To Total Cost</b> |
| • VS4: <i>Soldier Protective Equipment</i>  | 29.934         | 21.126         | 2.836          | -   |            | 2.836                | 4.444          | 4.909   | 6.488              | 8.150                   | Continuing      | Continuing                |
| <b>Remarks</b>  |                |                |                |   |            |                      |                |   |                    |                         |                 |                           |
| <b>D. Acquisition Strategy</b>  |                |                |                |   |            |                      |                |   |                    |                         |                 |                           |
| Acquisition strategies for these programs vary in methods, and range from: 1) Material Change programs that result in engineering changes to existing systems to; 2) Traditional development programs that include an Engineering and Manufacturing Development phase ranging in duration from 12 to 48 months, depending on the level of design complexity and testing required. |                |                |                |   |            |                      |                |   |                    |                         |                 |                           |
| <b>E. Performance Metrics</b>   |                |                |                |   |            |                      |                |   |                    |                         |                 |                           |
| N/A   |                |                |                |   |            |                      |                |   |                    |                         |                 |                           |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                       |             |         |   |         |            |                 |   |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---------------------------------------|-------------|---------|---|---------|------------|-----------------|---|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                       |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |            |                 | Project (Number/Name)<br>VS5 / Soldier Protective Equipment |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                       |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |   | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location        | 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                  | Various SPIE : Various                | 0.317       | 0.119   |   | 0.583   |            | 0.427           |   | -              |            | 0.427            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                       | 0.317       | 0.119   |   | 0.583   |            | 0.427           |   | -              |            | 0.427            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |                                       |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |   | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location        | 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 Contracts                                    | Various                | Various : Various                     | 32.413      | 1.247   |   | 1.346   |            | 1.000           |   | -              |            | 1.000            | Continuing       | Continuing | Continuing               |
| Prod Sys Engineering Spt                               | MIPR                   | Various : Various                     | 8.109       | -       |   | -       |            | 2.000           |   | -              |            | 2.000            | Continuing       | Continuing | Continuing               |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | TBD : TBD                             | -           | -       |   | 0.221   |            | -               |   | -              |            | -                | 0.000            | 0.221      | -                        |
| <b>Subtotal</b>  |                        |                                       | 40.522      | 1.247   |   | 1.567   |            | 3.000           |   | -              |            | 3.000            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |                                       |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |   | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location        | 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 Engineering Spt                                 | MIPR                   | Various : Various                     | 2.867       | 0.235   |   | 1.881   |            | 0.500           |   | -              |            | 0.500            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                       | 2.867       | 0.235   |   | 1.881   |            | 0.500           |   | -              |            | 0.500            | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |                                       |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |   | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location        | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date  | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Environmental/HFE                                      | MIPR                   | Various DTC & OTC : Various DTC & OTC | 10.686      | 0.124   |   | 2.019   |            | 2.700           |   | -              |            | 2.700            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                       | 10.686      | 0.124   |   | 2.019   |            | 2.700           |   | -              |            | 2.700            | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |             |         |   |         |  |              |   |             |  | Date: March 2019 |                  |            |                          |
|--|-------------|---------|---|---------|--|--------------|---|-------------|--|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |             |         | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |  |              | Project (Number/Name)<br>VS5 / Soldier Protective Equipment |             |  |                  |                  |            |                          |
| Project Cost Totals                                    | Prior Years | FY 2018 |   | FY 2019 |  | FY 2020 Base |   | FY 2020 OCO |  | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |
|  | 54.392      | 1.725   |   | 6.050   |  | 6.627        |   | -           |  | 6.627            | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>   |             |         |   |         |  |              |   |             |  |                  |                  |            |                          |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army |         |   |   |   |         |   |   |   |         |   |   | Date: March 2019 |         |   |   |   |         |   |   |   |         |   |   |   |  |
|---|---------|---|---|---|---------|---|---|---|---------|---|---|------------------|---------|---|---|---|---------|---|---|---|---------|---|---|---|--|
| Appropriation/Budget Activity<br>2040 / 5         |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons |         |   |   | Project (Number/Name)<br>VS5 / Soldier Protective Equipment |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Event Name  | FY 2018 |   |   |   | FY 2019 |   |   |   | FY 2020 |   |   |                  | FY 2021 |   |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |  |
|   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4                | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |  |
| Test and Qualify Improvements to SPS through FY23 |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| VTP LRIP Production                               |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| VTP RFP Submission                                | 1       |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| VTP SSEB  |         | 2 |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| VTP FRP Decision                                  |         |   | 3 |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| IHPS FRP  |         |   | 4 |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| IHPS Contract FRP Contract Award                  |         |   |   | 7   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| TCEP Authorized Protective Eyeware (APEL) Update  |         |   | 5 |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| TCEP Durability/Cold Weather Test                 |         |   |   | 6   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| SPS System Level Test Technology Insertions       |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Next Gen IHPS Contract Award                      |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Next Gen IHPS Deliveries                          |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |   |   |         | Date: March 2019 |
|--|---|---|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604601A / Infantry Support Weapons | Project (Number/Name)<br>VS5 / Soldier Protective Equipment |         |                  |
| Schedule Details                                   |   |   |         |                  |
| Events   | Start   | End   | Quarter | Year             |
| Test and Qualify Improvements to SPS through FY23  | 1   | 2015  | 4       | 2023             |
| VTP LRIP Production                                | 1   | 2017  | 4       | 2020             |
| VTP RFP Submission                                 | 2   | 2018  | 2       | 2018             |
| VTP SSEB   | 4   | 2018  | 4       | 2018             |
| VTP FRP Decision                                   | 2   | 2019  | 2       | 2019             |
| IHPS FRP   | 2   | 2019  | 2       | 2019             |
| IHPS Contract FRP Contract Award                   | 1   | 2020  | 1       | 2020             |
| TCEP Authorized Protective Eyeware (APEL) Update   | 2   | 2019  | 2       | 2019             |
| TCEP Durability/Cold Weather Test                  | 2   | 2019  | 1       | 2020             |
| SPS System Level Test Technology Insertions        | 1   | 2017  | 4       | 2023             |
| Next Gen IHPS Contract Award                       | 2   | 2019  | 2       | 2019             |
| Next Gen IHPS Deliveries                           | 2   | 2021  | 4       | 2023             |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |  |               |             |               |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|-------------|---------------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)      |               |             |               |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)   |             |         |         |              | PE 0604604A / Medium Tactical Vehicles |               |             |               |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | 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   | -           | 5.798   | 3.699   | 2.152        | -                                      | 2.152         | 3.325       | 3.360         | 3.458   | 3.475   | 0.000            | 25.267     |
| H07: Family Of Med Tac Veh  | -           | 5.798   | 3.699   | 2.152        | -                                      | 2.152         | 3.325       | 3.360         | 3.458   | 3.475   | 0.000            | 25.267     |
| <b>A. Mission Description and Budget Item Justification</b>   |             |         |         |              |  |               |             |               |         |         |                  |            |
| This Program Element (PE) supports continued modernization of the Army's medium Tactical Wheeled Vehicle fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Victory Architecture, autonomous operations and other emerging technologies. Furthermore, the PE supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.   |             |         |         |              |  |               |             |               |         |         |                  |            |
| The Family of Medium Tactical Vehicles (FMTV) includes Cargo, Tractor, Load Handling System (LHS), Wrecker, Expandible Van, Shop Van, and Dump variants with payloads ranging from 2 1/2-tons to 10-tons and associated companion trailers. FMTV trucks perform over 55 percent of the Army's local haul, line haul, and unit resupply missions. It operates throughout theater as multi-purpose transportation vehicles in combat, combat support, and combat service support units.   |             |         |         |              |  |               |             |               |         |         |                  |            |
| Funding from this Program Element will be used to support the continued evolution of the future FMTV fleet as well as tech insertion opportunities to keep the current FMTV fleet relevant on today's battlefield. This includes upgrades in survivability and crew protection, improved safety by leveraging advancements in commercial active safety technologies, modernizing the aging Low Velocity Air Drop (LVAD) fleet of vehicles, improved utilization through modularity, integration of advanced high efficiency powertrains and fuel saving technologies, and insertion of autonomous vehicle capabilities that will change the way transportation missions are conducted around the world. |             |         |         |              |  |               |             |               |         |         |                  |            |
| FY 2020 Project H07 Base funds in the amount of \$2.152 million will be used to conduct Operational Testing of the FMTVA2 truck and design and development of an LVAD Technical Demonstrator.   |             |         |         |              |  |               |             |               |         |         |                  |            |
| <b>B. Program Change Summary (\$ in Millions)</b>   |             |         |         | FY 2018      | FY 2019                                | FY 2020 Base  | FY 2020 OCO | FY 2020 Total |         |         |                  |            |
| Previous President's Budget   |             |         |         | 6.039        | 3.704                                  | 2.152         | -           | 2.152         |         |         |                  |            |
| Current President's Budget  |             |         |         | 5.798        | 3.699                                  | 2.152         | -           | 2.152         |         |         |                  |            |
| Total Adjustments   |             |         |         | -0.241       | -0.005                                 | 0.000         | -           | 0.000         |         |         |                  |            |
| • Congressional General Reductions  |             |         |         | -0.005       | -0.005                                 |               |             |               |         |         |                  |            |
| • Congressional Directed Reductions   |             |         |         | -            | -                                      |               |             |               |         |         |                  |            |
| • Congressional Rescissions   |             |         |         | -            | -                                      |               |             |               |         |         |                  |            |
| • Congressional Adds  |             |         |         | -            | -                                      |               |             |               |         |         |                  |            |
| • Congressional Directed Transfers  |             |         |         | -            | -                                      |               |             |               |         |         |                  |            |
| • Reprogrammings  |             |         |         | -            | -                                      |               |             |               |         |         |                  |            |
| • SBIR/STTR Transfer  |             |         |         | -0.236       | -                                      |               |             |               |         |         |                  |            |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  | Date: March 2019 |                  |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|------------------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604604A / Medium Tactical Vehicles |               |         |         | Project (Number/Name)<br>H07 / Family Of Med Tac Veh |                  |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024          | Cost To Complete | Total Cost |
| H07: Family Of Med Tac Veh                              | -           | 5.798   | 3.699   | 2.152        | -   | 2.152         | 3.325   | 3.360   | 3.458  | 3.475            | 0.000            | 25.267     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -                | -                |            |

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

The FMTVA2 production and ECP modernization effort restores vehicle performance that was lost due to the addition of armor protection kits as the threat to tactical vehicles and the FMTV has increased. The FMTVA2 also addresses Space, Weight, Power, and Cooling (SWaP-C) constraints from having to host an increasing amount of C4ISR and Counter-IED equipment. PD MTV is executing the FMTVA2 effort documented in a signed Acquisition Decision Memorandum by the AAE on 16 November 2015. FY 2020 Project H07 Base funds in the amount of \$1.850 million will be used to conduct Operational Testing required per Chapter 141, Title 10 USC.

The FMTVA1P2 represents the FMTV model currently in production with over 40,000 vehicles fielded to date. The FMTVA1P2 will remain in the tactical vehicle fleet until 2040 and beyond. To keep the A1P2 fleet viable into the future and able to perform its mission in austere environments, upgrades to Survivability and Crew Protection Kits will be required as the threat on the battlefield evolves.

The three FMTV LVAD models (M1081, M1093, M1094) ended production in 2009 and represent the oldest vehicles in the FMTV fleet. Updates to the LVAD are needed to address obsolescence issues and bring the configuration up to today's standards. FY 2020 Project H07 Base funds in the amount of \$0.302 million will be used for testing of an LVAD Technical Demonstrator developed using FY 2019 Project H07 funds.

To ensure supportability of the FMTVA1P2 through FY 2040 and beyond, the PD MTV, as lifecycle managers for the system, shall address potential obsolescence issues with the powertrain and Material Handling Equipment used on the FMTV.

Increasing survivability and crew protection of the FMTVA1P2 comes at the expense of decreased vehicle mobility and performance in soft soil and winter environments. The A1P2 is being asked to carry more weight than what it was originally designed for. Low risk, highly commercial improvements to the A1P2 driveline, suspension, and tires can be made to minimize the loss in mobility performance.

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

| B. Accomplishments/Planned Programs (\$ in Millions)  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> FMTVA2 Production and ECP Modernization Effort  | 1.290   | 1.000   | 1.850        | -           | 1.850         |
| <b>Description:</b> Live Fire test assets are needed to support Live Fire Testing required per Chapter 139, Title 10 USC. Operational Testing required per Chapter 141, Title 10 USC. |         |         |              |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |       |  |   | <b>Date:</b> March 2019 |                    |                      |
|--|-------|--|---|-------------------------|--------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |       | <b>R-1 Program Element (Number/Name)</b><br>PE 0604604A / Medium Tactical Vehicles | <b>Project (Number/Name)</b><br>H07 / Family Of Med Tac Veh |                         |                    |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |       |  |   |                         |                    |                      |
|  |       | <b>FY 2018</b>   | <b>FY 2019</b>  | <b>FY 2020 Base</b>     | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |
| <b>FY 2019 Plans:</b><br>Funding will be used to conduct Live Fire Testing on four FMTV M1078A2 vehicles.  |       |  |   |                         |                    |                      |
| <b>FY 2020 Base Plans:</b><br>Funding will be used to conduct Operational Testing of ten FMTVA2 vehicles.  |       |  |   |                         |                    |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase from FY 2019 due to additional vehicle testing requirements in FY 2020.   |       |  |   |                         |                    |                      |
| <b>Title:</b> FMTVA1P2 Underbody Armor Kit Improvement<br><br><b>Description:</b> Development and testing of improvements to the FMTVA1P2 Underbody Armor Kit that simplifies the design and reduces installation cost and complexity.               |       | 2.874  | -   | -                       | -                  | -                    |
| <b>Title:</b> Next Generation FMTV LVAD Model<br><br><b>Description:</b> Analysis to determine updates to the FMTV Low Velocity Air Drop (LVAD) which are needed to address obsolescence issues and bring the configuration up to today's standards. |       | -  | 0.750   | -                       | -                  | -                    |
| <b>FY 2019 Plans:</b><br>Funding will be used for analysis to support configuration options for the next generation FMTV LVAD model.   |       |  |   |                         |                    |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>The analysis to determine updates to the FMTV LVAD is unique to FY19 funding.  |       |  |   |                         |                    |                      |
| <b>Title:</b> FMTV Obsolescence Concerns<br><br><b>Description:</b> Address potential obsolescence issues with the powertrain and Material Handling Equipment (MHE) used on the FMTV.  |       | -  | 0.500   | -                       | -                  | -                    |
| <b>FY 2019 Plans:</b><br>Funding is for Analysis of Alternative engine and MHE options to address future obsolescence issues.  |       |  |   |                         |                    |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FMTV obsolescence concerns is a study unique to FY19 funding.  |       |  |   |                         |                    |                      |
| <b>Title:</b> Systems Engineering/Program Management<br><br><b>Description:</b> Includes Program Management, Engineering and Budget support for FMTV A1P2 and FMTVA2   | 0.009 | -  | -   | -                       | -                  | -                    |
| <b>Title:</b> FMTV Armor Kit Testing   | -     | 0.700  | -   | -                       | -                  | -                    |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |  |         |              | Date: March 2019 |               |
|--|---|--|---------|--------------|------------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604604A / Medium Tactical Vehicles | Project (Number/Name)<br>H07 / Family Of Med Tac Veh |         |              |                  |               |
| <u>B. Accomplishments/Planned Programs (\$ in Millions)</u>  |   | FY 2018  | FY 2019 | FY 2020 Base | FY 2020 OCO      | FY 2020 Total |
| <b>Description:</b> Testing of the FMTV Armor Kit improvements to support Full Material Release.   |   |  |         |              |                  |               |
| <b>FY 2019 Plans:</b><br>Funds will be for Live Fire Testing of the FMTVA1P2 Underbody Armor Kit improvements to support Full Material Release.                |   |  |         |              |                  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This funding line will not be used for testing of the FMTV Armor Kit in FY 2020.                     |   |  |         |              |                  |               |
| <b>Title:</b> FMTV LVAD Technical Demonstrator Vehicle Design and Build  |   | -  | -       | 0.302        | -                | 0.302         |
| <b>Description:</b> Updates to the Low Velocity Air Drop (LVAD) are needed to address obsolescence issues and bring the configuration up to today's standards. |   |  |         |              |                  |               |
| <b>FY 2020 Base Plans:</b><br>Funding will be used for design and development of the FMTV LVAD technical demonstrator.   |   |  |         |              |                  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease from FY 2019 is because only testing will be conducted during FY 2020.                      |   |  |         |              |                  |               |
| <b>Title:</b> FMTVA1P2 Mobility Improvement Study  | 1.556   | -  | -       | -            | -                | -             |
| <b>Description:</b> Study to improve soft soil and winter mobility of the FMTVA1P2 fleet   |   |  |         |              |                  |               |
| <b>Title:</b> FMTV Fuel Tank Fire Suppression kit testing  | 0.069   | -  | -       | -            | -                | -             |
| <b>Description:</b> FMTV Fuel Tank Fire Suppression kit testing  |   |  |         |              |                  |               |
| <b>Title:</b> FMTV LVAD/A1R Replacement Cab Redesign   | -   | 0.630  | -       | -            | -                | -             |
| <b>Description:</b> Develop concept, prototype and test of an LVAD/A1R replacement cab to support SLEP Sustainment   |   |  |         |              |                  |               |
| <b>FY 2019 Plans:</b><br>Develop concept, prototype and test of an LVAD/A1R replacement cab to support SLEP sustainment.                                       |   |  |         |              |                  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>The LVAD/A1R replacement cab redesign is unique to FY19 funding.                                     |   |  |         |              |                  |               |
| <b>Title:</b> FY2019 SBIR/STTR Transfer  | -   | 0.119  | -       | -            | -                | -             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                |                |                         |  |                          |                |                |                         |                        | Date: March 2019  |                   |  |
|--|----------------|----------------|-------------------------|--|--------------------------|----------------|----------------|-------------------------|------------------------|---|-------------------|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |                |                |                         | <b>R-1 Program Element (Number/Name)</b><br>PE 0604604A / Medium Tactical Vehicles |                          |                |                |                         |                        | <b>Project (Number/Name)</b><br>H07 / Family Of Med Tac Veh |                   |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                |                |                         |  |                          | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020<br/>Base</b> | <b>FY 2020<br/>OCO</b> | <b>FY 2020<br/>Total</b>                                    |                   |  |
| <b>FY 2019 Plans:</b><br>SIBR/STTR Transfer  |                |                |                         |  |                          |                |                |                         |                        |   |                   |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>SIBR/STTR Transfer   |                |                |                         |  |                          |                |                |                         |                        |   |                   |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |                |                |                         |  |                          | 5.798          | 3.699          | 2.152                   | -                      | 2.152   |                   |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |                         |  |                          |                |                |                         |                        |   |                   |  |
| <u>Line Item</u>   | <u>FY 2018</u> | <u>FY 2019</u> | <u>FY 2020<br/>Base</u> | <u>FY 2020<br/>OCO</u>   | <u>FY 2020<br/>Total</u> | <u>FY 2021</u> | <u>FY 2022</u> | <u>FY 2023</u>          | <u>FY 2024</u>         | <u>Cost To<br/>Complete</u>                                 | <u>Total Cost</u> |  |
| • D15500: <i>Family Of Medium<br/>Tactical Veh (FMTV)</i>  | 232.750        | 123.464        | 72.057                  | -  | 72.057                   | 80.153         | 91.227         | 40.567                  | 39.678                 | 0.000   | 679.896           |  |
| • D04016: <i>MEDIUM TACTICAL<br/>VEHICLE PROTECTION KITS</i>   | 17.916         | 38.328         | 19.370                  | 24.649   | 44.019                   | 44.562         | 49.767         | 37.933                  | 33.622                 | 0.000   | 266.147           |  |
| <b>Remarks</b>   |                |                |                         |  |                          |                |                |                         |                        |   |                   |  |
| <b>D. Acquisition Strategy</b><br>The strategy for the FMTVA2 Production and ECP Modernization Effort led to award of a Firm-Fixed Price Requirements contract that will have a base award of five years (two years for vehicle testing and three production years) with two, one-year option production periods and to conduct FMTVA2 Live Fire and Operational Testing. These efforts will utilize Government test facilities. |                |                |                         |  |                          |                |                |                         |                        |   |                   |  |
| The strategy for the Next Generation FMTV LVAD Model Configuration is to address obsolescence issues and bring the configuration up to today's standards. This effort will utilize a System Technical Support contract with the current FMTV OEM.  |                |                |                         |  |                          |                |                |                         |                        |   |                   |  |
| <b>E. Performance Metrics</b><br>N/A   |                |                |                         |  |                          |                |                |                         |                        |   |                   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                    |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|------------------------------------|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                    |             |         | R-1 Program Element (Number/Name)<br>PE 0604604A / Medium Tactical Vehicles |         |            |                 | Project (Number/Name)<br>H07 / Family Of Med Tac Veh |                |            |                  |                  |            |                          |
| Product Development (\$ in Millions)                   |                        |                                    |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location     | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| FMTVA1P2 Underbody Armor Kit Improvement.              | C/FFP                  | Oshkosh Defense Corp : Oshkosh, WI | -           | 2.874   | Sep 2018  | -       | -          | -               | -  | -              | -          | 0.000            | 2.874            | -          |                          |
| FMTV LVAD Next Generation Model Analysis               | TBD                    | TBD : TBD                          | -           | -       |   | 0.750   | Jan 2019   | -               | -  | -              | -          | 0.000            | 0.750            | -          |                          |
| FMTV Obsolescence Concerns                             | TBD                    | TBD : TBD                          | -           | -       |   | 0.500   | Sep 2019   | -               | -  | -              | -          | 0.000            | 0.500            | -          |                          |
| FMTVA1P2 Mobility Improvement Study                    | C/FFPLOE               | NATC : Stagecoach, NV              | -           | 1.556   | Jan 2019  | -       | -          | -               | -  | -              | -          | 0.000            | 1.556            | -          |                          |
| FMTV LVAD/A1R Replacement Cab Redesign                 | TBD                    | TBD : TBD                          | -           | -       |   | 0.630   | Apr 2019   | -               | -  | -              | -          | 0.000            | 0.630            | -          |                          |
| FY 2019 SBIR/STTR Transfer                             | TBD                    | TBD : TBD                          | -           | -       |   | 0.119   |            | -               | -  | -              | -          | 0.000            | 0.119            | -          |                          |
| <b>Subtotal</b>  |                        |                                    | -           | 4.430   |   | 1.999   |            | -               | -  | -              | -          | 0.000            | 6.429            | N/A        |                          |
| Support (\$ in Millions)                               |                        |                                    |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location     | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| System Engineering/Program Management (SEPM)           | MIPR                   | PM MTV : TACOM LCMC, Warren, MI    | -           | 0.009   | May 2018  | -       | -          | -               | -  | -              | -          | 0.000            | 0.009            | -          |                          |
| <b>Subtotal</b>  |                        |                                    | -           | 0.009   |   | -       | -          | -               | -  | -              | -          | 0.000            | 0.009            | N/A        |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                    |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location     | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| FMTVA2 Live Fire Vehicle Test Assets                   | C/FFP                  | Oshkosh Defense : Oshkosh, WI      | -           | 1.290   | Jun 2018  | -       | -          | -               | -  | -              | -          | 0.000            | 1.290            | -          |                          |
| FMTVA2 Live Fire Testing                               | MIPR                   | ATC : Aberdeen Proving Ground, MD  | -           | -       |   | 1.000   | Jul 2019   | -               | -  | -              | -          | 0.000            | 1.000            | -          |                          |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                   |             |         |   |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|-----------------------------------|-------------|---------|---|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                   |             |         | R-1 Program Element (Number/Name)<br>PE 0604604A / Medium Tactical Vehicles |         |            |                 | Project (Number/Name)<br>H07 / Family Of Med Tac Veh |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                   |             | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location    | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| FMTVA2 Operational Testing                             | MIPR                   | ATC : Aberdeen Proving Ground, MD | -           | -       |   | -       |            | 1.850           | Mar 2020   | -              |            | 1.850            | 0.000            | 1.850      | -                        |
| FMTV Armor Kit Testing                                 | MIPR                   | ATC : Aberdeen Proving Ground, MD | -           | -       |   | 0.700   | Apr 2019   | -               |  | -              |            | -                | 0.000            | 0.700      | -                        |
| FMTV LVAD Technical Demonstrator Testing               | SS/FFP                 | NATC : Stagecoach, NV             | -           | -       |   | -       |            | 0.302           | Mar 2020   | -              |            | 0.302            | 0.000            | 0.302      | -                        |
| FMTV Fuel Tank Fire Suppression kit testing            | TBD                    | ATC : Aberdeen, MD                | -           | 0.069   | Jun 2018  | -       |            | -               |  | -              |            | -                | 0.000            | 0.069      | -                        |
| <b>Subtotal</b>  |                        |                                   | -           | 1.359   |   | 1.700   |            | 2.152           |  | -              |            | 2.152            | 0.000            | 5.211      | N/A                      |
|  |                        |                                   | Prior Years | FY 2018 |   | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                   | -           | 5.798   |   | 3.699   |            | 2.152           |  | -              |            | 2.152            | 0.000            | 11.649     | N/A                      |
| <b>Remarks</b>   |                        |                                   |             |         |   |         |            |                 |  |                |            |                  |                  |            |                          |

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## **Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army**

Date: March 2019

## **Appropriation/Budget Activity**

2040 / 5

### **R-1 Program Element (Number/Name)**

PE 0604604A / Medium Tactical Vehicles

**Project (Number/Name)**

## H07 / Family Of Med Tac Veh

The Gantt chart illustrates the project timeline across five years (FY 2018 to FY 2024) for two main contracts: FMTVA2 and FMTVA1P2.

**FMTVA2 Activities:**

- Milestones:** Contract Award/DO1 (FY 2018 Q1), ABR (FY 2018 Q2), PBR (FY 2018 Q3), DO2 (FY 2019 Q4), DO3 (FY 2020 Q1), OT (FY 2020 Q2), TC/MR (FY 2021 Q3), and FUE (FY 2022 Q4).
- Activities:** PVT (FY 2019 Q1-Q2), LFT&E (FY 2019 Q3-Q4), and FY18 Vehicle Delivery (FY 2018 Q4-FY 2019 Q1).

**FMTVA1P2 Activity:**

- Activity:** FY18 Vehicle Delivery (FY 2018 Q4-FY 2019 Q1).

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army         |         |   |   |   |         |   |   |  |         |   |   |   |         | Date: March 2019 |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
|---|---------|---|---|---|---------|---|---|--|---------|---|---|---|---------|------------------|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|--|
| Appropriation/Budget Activity<br>2040 / 5                 |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604604A / Medium Tactical Vehicles |         |   |   | Project (Number/Name)<br>H07 / Family Of Med Tac Veh |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Event Name  | FY 2018 |   |   |   | FY 2019 |   |   |  | FY 2020 |   |   |   | FY 2021 |                  |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   | FY 2024 |   |   |   |  |
|   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4  | 1       | 2 | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |  |
| FMTVA1P2 UNDERBODY ARMOR KIT (UAK)                        |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| FMTVA1P2 Underbody Armor Kit Improvement Development      |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| FMTVA1P2 Underbody Armor Kit Improvement Test             |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| FMTV LVAD NEXT GENERATION MODEL                           |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| FMTV LVAD Next Generation Model                           |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| FMTV LVAD Technical Demonstrator Vehicle Design and Build |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| FMTV LVAD Technical Demonstrator Testing                  |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |

The Gantt chart displays the timeline for various RDT&E tasks across four fiscal years (FY 2018 to FY 2024). The tasks are color-coded: UAK Development (blue), UAK Test (blue), LVAD Feasibility Study (blue), LVAD Tech Demonstrator Design/Build (blue), and LVAD Tech Demonstrator Testing (blue). The tasks are listed on the left, and their duration and timing are indicated by horizontal bars.

| Task                                | Start Year | End Year | Description  |
|-------------------------------------|------------|----------|--|
| UAK Development                     | FY 2019    | FY 2020  | Underbody Armor Kit Improvement Development          |
| UAK Test                            | FY 2020    | FY 2021  | Underbody Armor Kit Improvement Test                 |
| LVAD Feasibility Study              | FY 2020    | FY 2021  | LVAD Next Generation Model                           |
| LVAD Tech Demonstrator Design/Build | FY 2021    | FY 2022  | LVAD Technical Demonstrator Vehicle Design and Build |
| LVAD Tech Demonstrator Testing      | FY 2022    | FY 2023  | LVAD Technical Demonstrator Testing                  |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army        |   |  |         | Date: March 2019 |
|---|---|--|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5                 | R-1 Program Element (Number/Name)<br>PE 0604604A / Medium Tactical Vehicles | Project (Number/Name)<br>H07 / Family Of Med Tac Veh |         |                  |
| Schedule Details  |   |  |         |                  |
| Events  | Start   | End  | Quarter | Year             |
| FMTVA2  | 1   | 2019   | 4       | 2024             |
| FMTVA2 Contract Award/Delivery Order 1                    | 2   | 2018   | 2       | 2018             |
| FMTVA2 Allocated Baseline Review (ABR)                    | 3   | 2018   | 3       | 2018             |
| FMTVA2 Product Baseline Review (PBR)                      | 4   | 2018   | 4       | 2018             |
| FMTVA2 Delivery Order 2 (DO2)                             | 2   | 2020   | 2       | 2020             |
| FMTVA2 Production Validation Testing (PVT)                | 3   | 2019   | 2       | 2020             |
| FMTVA2 Live Fire Test & Evaluation (LFT&E)                | 3   | 2019   | 4       | 2019             |
| FMTVA2 Delivery Order 3 (DO3)                             | 3   | 2020   | 3       | 2020             |
| FMTVA2 Operational Testing (OT)                           | 4   | 2020   | 1       | 2021             |
| FMTVA2 Type Classification and Material Release (TC/MR)   | 1   | 2022   | 1       | 2022             |
| FMTVA2 First Unit Equipped (FUE)                          | 2   | 2022   | 2       | 2022             |
| FMTVA1P2  | 1   | 2019   | 4       | 2019             |
| FMTVA1P2 FY18 Vehicle Delivery                            | 4   | 2018   | 4       | 2019             |
| FMTVA1P2 UNDERBODY ARMOR KIT (UAK)                        | 4   | 2018   | 4       | 2022             |
| FMTVA1P2 Underbody Armor Kit Improvement Development      | 4   | 2018   | 3       | 2020             |
| FMTVA1P2 Underbody Armor Kit Improvement Test             | 1   | 2020   | 3       | 2020             |
| FMTV LVAD NEXT GENERATION MODEL                           | 4   | 2019   | 4       | 2023             |
| FMTV LVAD Next Generation Model                           | 4   | 2019   | 1       | 2021             |
| FMTV LVAD Technical Demonstrator Vehicle Design and Build | 4   | 2020   | 1       | 2022             |
| FMTV LVAD Technical Demonstrator Testing                  | 3   | 2021   | 1       | 2022             |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |                                   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|-----------------------------------|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name) |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604611A / JAVELIN             |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                       | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 20.252  | 5.616   | 17.897       | -                                 | 17.897        | 7.500   | 7.500   | 7.500   | 7.500   | 0.000            | 73.765     |
| 499: Javelin (AAWS-M)   | -           | 20.252  | 5.616   | 17.897       | -                                 | 17.897        | 7.500   | 7.500   | 7.500   | 7.500   | 0.000            | 73.765     |

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

Javelin is a man-portable, fire-and-forget, medium-range missile with enhanced situational awareness and precision direct-fire effects to defeat armored vehicles, fortifications, and soft targets in a range of military operations. Javelin uses a modular design to allow the system to evolve to meet changing threats and requirements via both software and hardware upgrades. The system consists of a reusable Command Launch Unit (CLU) with a built-in-test (BIT), and a modular missile encased in a disposable launch tube assembly. The system also includes training devices for tactical training and classroom training.

FY 2020 Base dollars in the amount of \$17.897 million will continue development engineering of the Javelin Lightweight Command Launch Unit (CLU). Compared to the Block I CLU, Lightweight CLU will double target identification range while providing a minimum of 25% reduction in weight and 30% reduction in size. Javelin Lightweight CLU is a result of user feedback on weight and bulk, and addresses the Close Combat Missile System - Medium Capability Production Document objective system weight requirement.

**B. Program Change Summary (\$ in Millions)**

|                                     | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|-------------------------------------|---------|---------|--------------|-------------|---------------|
| Previous President's Budget         | 21.095  | 10.623  | 11.897       | -           | 11.897        |
| Current President's Budget          | 20.252  | 5.616   | 17.897       | -           | 17.897        |
| Total Adjustments                   | -0.843  | -5.007  | 6.000        | -           | 6.000         |
| • Congressional General Reductions  | -0.017  | -0.007  |              |             |               |
| • Congressional Directed Reductions | -       | -5.000  |              |             |               |
| • Congressional Rescissions         | -       | -       |              |             |               |
| • Congressional Adds                | -       | -       |              |             |               |
| • Congressional Directed Transfers  | -       | -       |              |             |               |
| • Reprogrammings                    | -       | -       |              |             |               |
| • SBIR/STTR Transfer                | -0.826  | -       |              |             |               |
| • Adjustments to Budget Years       | -       | -       | 6.000        | -           | 6.000         |

**Change Summary Explanation**

The FY 2020 increase of \$6.0 million is to complete design/build of qualification units and begin qualification testing.

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |   | Date: March 2019 |                  |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---|------------------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN |               |         |         | Project (Number/Name)<br>499 / Javelin (AAWS-M) |                  |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024          | Cost To Complete | Total Cost |
| 499: Javelin (AAWS-M)                                   | -           | 20.252  | 5.616   | 17.897       | -  | 17.897        | 7.500   | 7.500   | 7.500   | 7.500            | 0.000            | 73.765     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -   | -                | -                |            |

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

Javelin is a man-portable, fire-and-forget, medium-range missile with enhanced situational awareness and precision direct-fire effects to defeat armored vehicles, fortifications, and soft targets in a range of military operations. Javelin uses a modular design to allow the system to evolve to meet changing threats and requirements via both software and hardware upgrades. The system consists of a reusable Command Launch Unit (CLU) with a built-in-test (BIT), and a modular missile encased in a disposable launch tube assembly. The system also includes training devices for tactical training and classroom training.

FY 2020 Base dollars in the amount of \$17.897 million will continue development engineering of the Javelin Lightweight Command Launch Unit (CLU). Compared to the Block I CLU, Lightweight CLU will double target identification range while providing a minimum of 25% reduction in weight and 30% reduction in size. Javelin Lightweight CLU is a result of user feedback on weight and bulk, and addresses the Close Combat Missile System - Medium Capability Production Document objective system weight requirement.

| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |  |  |  |  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |
|---|--|--|--|--|----------------|----------------|---------------------|--------------------|----------------------|
| <b>Title:</b> Javelin System Improvements   |  |  |  |  | 20.252         | 5.250          | 17.897              | -                  | 17.897               |
| <b>Description:</b> Develop Lightweight Command Launch Unit.  |  |  |  |  |                |                |                     |                    |                      |
| <b>FY 2019 Plans:</b><br>Conduct Lightweight CLU Design Review. Begin design, build and integration of Qualification Units.   |  |  |  |  |                |                |                     |                    |                      |
| <b>FY 2020 Base Plans:</b><br>Continue design/build of qualification units. Begin qualification tests to include portability, maintenance, and logistics demonstrations.            |  |  |  |  |                |                |                     |                    |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>The FY 2020 increase of \$6.0 million is to complete design/build of qualification units and begin qualification testing. |  |  |  |  |                |                |                     |                    |                      |
| <b>Title:</b> FY 2019 SBIR/STTR Transfer  |  |  |  |  | -              | 0.366          | -                   | -                  | -                    |
| <b>Description:</b> FY 2019 SBIR / STTR Transfer  |  |  |  |  |                |                |                     |                    |                      |
| <b>FY 2019 Plans:</b>   |  |  |  |  |                |                |                     |                    |                      |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                |                |  |                        |                          |                |   |                |                | Date: March 2019            |                   |                 |                |                  |  |  |  |  |
|--|----------------|----------------|--|------------------------|--------------------------|----------------|---|----------------|----------------|-----------------------------|-------------------|-----------------|----------------|------------------|--|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5  |                |                | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN |                        |                          |                | Project (Number/Name)<br>499 / Javelin (AAWS-M) |                |                |                             |                   |                 |                |                  |  |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                |                |  |                        |                          |                |   |                |                | FY 2018                     | FY 2019           | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total |  |  |  |  |
| FY 2019 SBIR / STTR Transfer   |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>   |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| FY 2019 SBIR / STTR Transfer   |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |                |                |  |                        |                          |                |   |                |                | 20.252                      | 5.616             | 17.897          | -              | 17.897           |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| <u>Line Item</u>   | <u>FY 2018</u> | <u>FY 2019</u> | <u>FY 2020<br/>Base</u>                                    | <u>FY 2020<br/>OCO</u> | <u>FY 2020<br/>Total</u> | <u>FY 2021</u> | <u>FY 2022</u>                                  | <u>FY 2023</u> | <u>FY 2024</u> | <u>Cost To<br/>Complete</u> | <u>Total Cost</u> |                 |                |                  |  |  |  |  |
| • CC0007: Javelin (AAWS-M) System Summary  | 265.535        | 245.485        | 0.000  | 142.794                | 142.794                  | 147.643        | 141.924   | 209.591        | 199.926        | 0.000                       | 1,352.898         |                 |                |                  |  |  |  |  |
| • H06103: Javelin Lightweight Command Launch Unit (CLU)  | -              | 22.500         | 0.000  | -                      | 0.000                    | 30.000         | 60.000  | 70.000         | 70.000         | 0.000                       | 252.500           |                 |                |                  |  |  |  |  |
| <b>Remarks</b>   |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| FY 2018-2020 procurement funds are to procure missiles and Block I CLU retrofits. No CLUs will be procured with FY 2018-2020 funds. Missiles, Lightweight CLUs, and associated training devices will be procured with FY 2021-2024 procurement funds.  |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| <b>D. Acquisition Strategy</b>   |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| Javelin Lightweight CLU development is Sole Source to the Javelin Joint Venture (Raytheon, Tucson, AZ, and Lockheed Martin, Orlando, FL). A Cost Plus contract with the Javelin Joint Venture will be utilized for Lightweight CLU development efforts. The major sub-assemblies, which are also the primary cost drivers, will be competed. The Javelin Joint Venture has invested Independent Research and Development in the Lightweight CLU. Development, prototype, and testing will occur FY 2015-2021 with production beginning in FY 2021. Army Acquisition Objective (AAO) is 4,809. Current plan is to field to priority Infantry and Stryker Brigade Combat Teams and Special Forces. |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| <b>E. Performance Metrics</b>  |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |
| N/A  |                |                |  |                        |                          |                |   |                |                |                             |                   |                 |                |                  |  |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |                 |         |  |         |            |                 |            |   |            |                  | Date: March 2019 |            |                          |
|--|------------------------|---|-----------------|---------|--|---------|------------|-----------------|------------|---|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |                 |         | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN |         |            |                 |            | Project (Number/Name)<br>499 / Javelin (AAWS-M) |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |   |                 | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO                                  |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                                  | 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/<br>Program Management,<br>Govt     | Allot                  | Multiple : Redstone<br>Arsenal, AL                              | 2.465           | 1.808   | May 2018   | 0.956   | Oct 2018   | 1.070           | Oct 2019   | -   | -          | 1.070            | 0.000            | 6.299      | -                        |
|  |                        |   | <b>Subtotal</b> | 2.465   | 1.808  |         | 0.956      |                 | 1.070      |   | -          | 1.070            | 0.000            | 6.299      | N/A                      |
| Product Development (\$ in Millions)                   |                        |   |                 | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO                                  |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                                  | Prior Years     | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date | Cost  | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Lightweight CLU<br>Development                         | SS/CPFF                | JJV/Raytheon/<br>Lockheed Martin :<br>Orlando, FL/<br>Tucson,AZ | 21.981          | 16.228  | Aug 2018   | 4.294   | Nov 2018   | 14.985          | Nov 2019   | -   | -          | 14.985           | 1.589            | 59.077     | -                        |
| Lightweight CLU<br>Development                         | MIPR                   | Redstone Test<br>Center : Redstone<br>Arsenal, AL               | 0.548           | -       |  | -       |            | -               |            | -   |            | -                | 0.000            | 0.548      | -                        |
| Lightweight CLU<br>Trade Studies and<br>Demonstrations | MIPR                   | AMRDEC : Redstone<br>Arsenal, AL                                | 2.043           | -       |  | -       |            | -               |            | -   |            | -                | 0.000            | 2.043      | -                        |
| FY 2019 SBIR/STTR<br>Transfer                          | TBD                    | TBD : TBD   | -               | -       |  | 0.366   |            | -               |            | -   |            | -                | 0.000            | 0.366      | -                        |
|  |                        |   | <b>Subtotal</b> | 24.572  | 16.228   |         | 4.660      |                 | 14.985     |   | -          | 14.985           | 1.589            | 62.034     | N/A                      |

**Remarks**

JJV - Javelin Joint Venture

SS CPFF - Sole Source Cost Plus Fixed Fee

CLU - Command Launch Unit

AMRDEC - Aviation & Missile Research, Development and Engineering Center

MIPR - Military Interdepartmental Purchase Request

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |         |  |         |            |                 |   |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|---------|--|---------|------------|-----------------|---|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             |         | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN |         |            |                 | Project (Number/Name)<br>499 / Javelin (AAWS-M) |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |   |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |   | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                            | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date                                      | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Lightweight CLU Design Verification Testing            | SS/CPFF                | JJV/Raytheon/<br>Lockheed Martin : Orlando, FL/Tucson, AZ | -           | 1.923   | Jul 2018   | -       | -          | -               | -   | -              | -          | 0.000            | 1.923            | -          |                          |
| Lightweight CLU Design Verification Testing            | MIPR                   | Redstone Test Center : Redstone Arsenal, AL               | -           | 0.293   | Jul 2018   | -       | -          | -               | -   | -              | -          | 0.000            | 0.293            | -          |                          |
| Lightweight CLU Qualification Testing                  | SS/CPFF                | JJV/Raytheon/<br>Lockheed Martin : Orlando, FL/Tucson, AZ | -           | -       | -  | -       | -          | 0.278           | Nov 2019  | -              | -          | 0.278            | 0.828            | 1.106      | -                        |
| Lightweight CLU Qualification Testing                  | MIPR                   | Redstone Test Center : Redstone Arsenal, AL               | -           | -       | -  | -       | -          | 1.564           | Nov 2019  | -              | -          | 1.564            | 4.635            | 6.199      | -                        |
| <b>Subtotal</b>  |                        |   | -           | 2.216   |  | -       |            | 1.842           |   | -              |            | 1.842            | 5.463            | 9.521      | N/A                      |
|  |                        |   | Prior Years | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |   | FY 2020<br>OCO |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |   | 27.037      | 20.252  |  | 5.616   |            | 17.897          |   | -              |            | 17.897           | 7.052            | 77.854     | N/A                      |

Remarks

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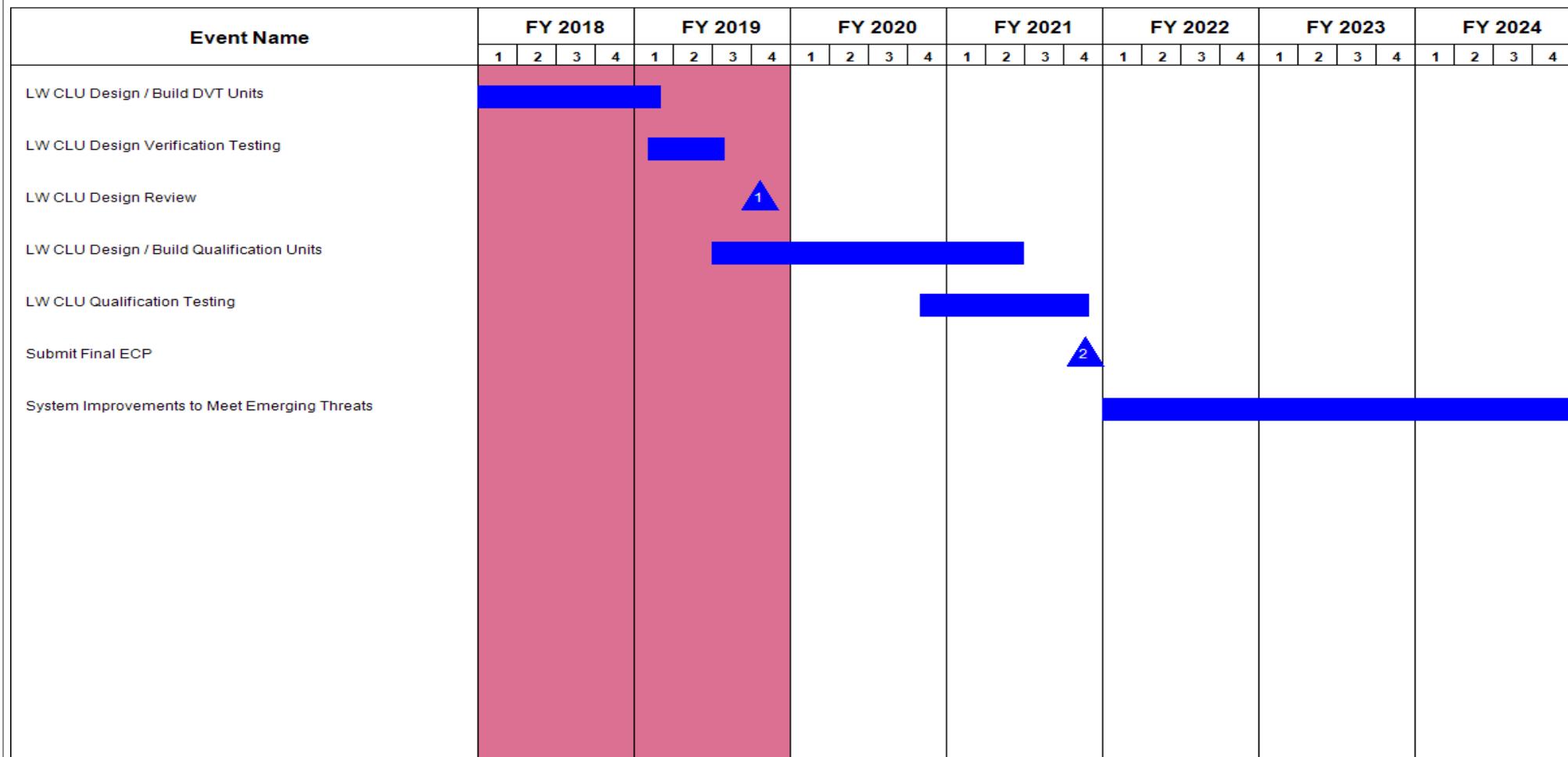
Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**  
2040 / 5

**R-1 Program Element (Number/Name)**  
PE 0604611A / JAVELIN

**Project (Number/Name)**  
499 / Javelin (AAWS-M)



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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |  |   |         | Date: March 2019 |
|--|--|---|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN | Project (Number/Name)<br>499 / Javelin (AAWS-M) |         |                  |
| Schedule Details                                   |  |   |         |                  |
| Events   | Start  | End   | Quarter | Year             |
| LW CLU Design / Build DVT Units                    | 3  | 2016  | 1       | 2019             |
| LW CLU Design Verification Testing                 | 1  | 2019  | 3       | 2019             |
| LW CLU Design Review                               | 4  | 2019  | 4       | 2019             |
| LW CLU Design / Build Qualification Units          | 3  | 2019  | 2       | 2021             |
| LW CLU Qualification Testing                       | 4  | 2020  | 4       | 2021             |
| Submit Final ECP                                   | 4  | 2021  | 4       | 2021             |
| System Improvements to Meet Emerging Threats       | 1  | 2022  | 4       | 2024             |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |   |             |               |         |         |         | Date: March 2019 |                  |            |
|---|-------------|---------|---------|---|-------------|---------------|---------|---------|---------|------------------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         | R-1 Program Element (Number/Name)               |             |               |         |         |         |                  |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         | PE 0604622A / Family of Heavy Tactical Vehicles |             |               |         |         |         |                  |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | 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   | -           | 10.086  | 11.935  | 16.745  | -           | 16.745        | 26.889  | 12.507  | 8.857   | 117.913          | 0.000            | 204.932    |
| 659: Family Of Hvy Tac Veh  | -           | 6.988   | 1.977   | 6.921   | -           | 6.921         | 13.420  | 0.000   | 0.000   | 109.102          | 0.000            | 138.408    |
| E50: TRAILER DEVELOPMENT  | -           | 1.520   | 5.286   | 0.000   | -           | 0.000         | 0.000   | 0.000   | 0.000   | 0.000            | 0.000            | 6.806      |
| EZ8: Leader/Follower  | -           | 0.000   | 0.000   | 5.000   | -           | 5.000         | 10.649  | 9.422   | 5.886   | 5.329            | 0.000            | 36.286     |
| VR5: TWV Protection Kits  | -           | 1.578   | 4.672   | 4.824   | -           | 4.824         | 2.820   | 3.085   | 2.971   | 3.482            | 0.000            | 23.432     |

**Note**

PdM ALUGS Leader/Follower efforts transition from the 0604017A Robotics Development FD9 Robotic Systems line in FY 2018 and FY 2019 to a Program of Record under 0604622A Family of Heavy Tactical Vehicles EZ8 Leader/Follower in FY 2020.

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

This Program Element (PE) aligns system development and demonstration of Heavy Tactical Vehicles (HTV) with Future Force requirements to support combat and combat support missions, to include line haul, local haul, and unit resupply. HTV trucks transport water, ammunition, and general cargo over all terrains and throughout the battle-space. Systems include the Heavy Expanded Mobility Tactical Truck (HEMTT), Palletized Load System (PLS), Heavy Equipment Transporter System (HETS), Line Haul, Heavy Dump Truck (HDT) as well as recovery systems such as the Modular Catastrophic Recovery System (MCRS) that rescue large wheeled vehicle platforms in severe off-road conditions. Funding will also be used for developing the Army's next generation of tactical trucks as part of the Army's Tactical Wheeled Vehicle (TWV) Modernization Strategy. This Program Element also supports the development and demonstration of enablers, active safety technologies, and heavy and medium tactical trailers. Periodic evolutionary upgrade of survivability and crew protection as described in the Long Term Protection Strategy (LTPS) is supported by this PE for both the HTV family of vehicles and the Family of Medium Tactical Vehicles (FMTV). The Tactical Wheeled Vehicle - Leader Follower (TWV-LF) program provides transportation units with the capability to unman Tactical Wheeled Vehicles (TWVs), initially the Palletized Loading System (PLS) vehicles, while operating in a convoy. This is accomplished by integrating technology to the unmanned vehicles which enables them to follow a manned Lead vehicle. This is done in a March Unit of up to (8) TWVs initially PLS vehicles, with (1) manned Lead vehicle and (3) to (7) unmanned Follower vehicles. This capability provides increased Soldier Force Protection and increased convoy logistics throughput by giving Commanders more options on Soldier utilization, removing Soldiers from threat zones and/or utilizing vehicle operators for convoy security, and allowing supply convoys to run more often.

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

FY 2020 Project 659 Base funds in the amount \$6.921 million will support the development, test and evaluation of solutions to upgrade HEMTT and PLS suspensions, cranes, winches and PLS Trailer anti-lock braking system (ABS), system-level test and evaluation of modified HETS M1070A1 tractors and new commercial trailers capable of 85 ton capacity, feasibility testing of 25-Ton Semi-Trailer Low-Bed (STLB) prototype semitrailers, and the development of contracting/acquisition milestone

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Army  | <b>Date:</b> March 2019  |                |                     |                    |                      |
|--|--|----------------|---------------------|--------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / <i>Family of Heavy Tactical Vehicles</i> |                |                     |                    |                      |
| documentation and systems engineering plans for the Enhanced Heavy Equipment Transporter System (EHETS) program. The EHETS is the replacement system for the Heavy Equipment Transporter System (HETS). It is intended to transport, deploy, and evacuate payloads up to the weight of a combat configured M1A2 main battle tank. It will provide increased payload, highway transportability, and force protection over its predecessor.  |  |                |                     |                    |                      |
| FY 2020 Project VR5 Base funds in the amount of \$4.824 million will be used for the test and evaluation of Heavy Dump Truck (HDT) armored cabs and armored trucks, and testing on the improvements to the Family of Medium Tactical Vehicles (FMTV) Armor Kits that are required to support Full Material Release. The Heavy Dump Truck supports construction by loading, transporting and dumping payloads during engineering operations needed to establish or improve infrastructure.  |  |                |                     |                    |                      |
| FY 2020 Project EZ8 Base funds in the amount of \$5.000 million will execute testing for the Tactical Wheeled Leader Follower program for safety and performance evaluations by Army Test & Evaluation Command (ATEC) to support production decision by the Milestone Decision Authority, fund Program Management office lifecycle planning, and engagements with industry to plan and solicit proposals for the production contracts. FY20 funds will enable the Tactical Wheeled Leader Follower program to transition to the Program Office from the Tank Automotive Research and Development Center (TARDEC), to complete Engineering and Manufacturing Development (EMD), prepare for and execute a production decision (Milestone C), and begin contract planning and actions for Low Rate Initial Production (LRIP), Production Qualification Testing (PQT), and Initial Operational Testing (IOT). |  |                |                     |                    |                      |
| In accordance with Section 1815 of the FY 2008 National Defense Authorization Act (P.L. 110-181), this item is necessary for use by the active and reserve components of the Armed Forces for homeland defense missions, domestic emergency responses, and providing military support to civil authorities.  |  |                |                     |                    |                      |
| <b>B. Program Change Summary (\$ in Millions)</b>  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |
| Previous President's Budget  | 10.507   | 11.950         | 11.745              | -                  | 11.745               |
| Current President's Budget   | 10.086   | 11.935         | 16.745              | -                  | 16.745               |
| Total Adjustments  | -0.421   | -0.015         | 5.000               | -                  | 5.000                |
| • Congressional General Reductions   | -0.009   | -0.015         |                     |                    |                      |
| • Congressional Directed Reductions  | -  | -              |                     |                    |                      |
| • Congressional Rescissions  | -  | -              |                     |                    |                      |
| • Congressional Adds   | -  | -              |                     |                    |                      |
| • Congressional Directed Transfers   | -  | -              |                     |                    |                      |
| • Reprogrammings   | -  | -              |                     |                    |                      |
| • SBIR/STTR Transfer   | -0.412   | -              |                     |                    |                      |
| • Adjustments to Budget Years  | -  | -              | 5.000               | -                  | 5.000                |
| <b>Change Summary Explanation</b>  |  |                |                     |                    |                      |
| FY 2020 has an increase of approximately 30% (\$5.000 million) to the total program element between the Current President's Budget (CPB) and Previous President's Budget (PPB). \$5.000 million was added to project EZ8 Leader/Follower program to provide transportation units with the capability to remove Soldier operators from Palletized Loading System (PLS) vehicles while operating in a convoy.  |  |                |                     |                    |                      |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |         |  | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|--|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |               |         |         |         | Project (Number/Name)<br>659 / Family Of Hvy Tac Veh |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024  | Cost To Complete | Total Cost |  |
| 659: Family Of Hvy Tac Veh                              | -           | 6.988   | 1.977   | 6.921        | -  | 6.921         | 13.420  | 0.000   | 0.000   | 109.102  | 0.000            | 138.408    |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -       | -  | -                |            |  |

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

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

The Heavy Equipment Transporter System (HETS) is comprised of a M1070A1 Tractor and M1000 Trailer for transport, recovery and evacuation of heavy, oversized combat equipment such as the M1A1 Abrams main battle tank (MBT) and M88 recovery vehicle or similar loads. The current HETS has two capability gaps: Payload and Road Network Accessibility. The current HETS is not capable of transporting or loading/unloading the heaviest combat platform in the ABCT since it exceeds the HETS rated payload of 70 tons (U.S.). Road Network Accessibility of the current HETS is restricted due to exceeding axle load limits CONUS/OCONUS, which prevents the HETS from obtaining road permits. In the near term, the interim solution is to modify current HETS tractors and procure new HETS trailers. The long term solution is the Enhanced Heavy Equipment Transporter System (EHETS) that will address these capability gaps.

The near term interim solution is in response to a United States Army Europe (USAREUR) Operational Needs Statement (ONS# 17-22207) for Heavy Equipment Transporter Systems with deliveries beginning the first quarter of FY2020. The USAREUR HETS ONS solution will be capable of carrying 78.5 Tons of payload while achieving host country road permits at a reduced weight of 75 tons. The recommended course of action for satisfying the ONS is to utilize a modified version of the M1070A1 tractor combined with a commercial 8-axle trailer. Per the 1 DEC 17 Army Requirements Oversight Council (AROC) decision, this trailer will be capable of carrying 85 tons. The AROC also directed an additional modification to the tractor that will allow it to achieve an ultimate carrying capacity of 85 tons.

The Enhanced Heavy Equipment Transporter System (EHETS) is the replacement system for the Heavy Equipment Transporter System (HETS). It is intended to transport, deploy, and evacuate payloads up to the weight of a combat configured M1A2 MBT. It will provide increased payload, highway transportability, and force protection over its predecessor.

The Heavy Expanded Mobility Tactical Truck (HEMTT) and the Palletized Load System (PLS) are designed for cross-country military missions to transport ammunition, petroleum, oils and lubricants, unit resupply, and other missions throughout the tactical environment to support modern and highly mobile combat units.

The Semi-Trailer Low-Bed (STLB) is a 25-ton payload capacity semi-trailer with a fixed goose neck, step deck, and rear loading ramps. The STLB is interoperable with a variety of trucks residing across the U.S. Army equipment and will be introduced into a theater of operations to transport construction equipment (CE) employed by U.S. Army Engineers to execute horizontal and vertical construction projects in support of sustainment operations, exercises/deployments, disaster relief, and other nation building operations. The STLB will be capable of supporting mobility, counter mobility, survivability, counter improvised and sustainment needs and all applicable North Atlantic Treaty Organization (NATO) interoperability criteria.

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |  |  |              | Date: March 2019 |               |  |
|---|--|--|--------------|------------------|---------------|--|
| Appropriation/Budget Activity<br>2040 / 5   | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles | Project (Number/Name)<br>659 / Family Of Hvy Tac Veh |              |                  |               |  |
| FY 2020 Project 659 Base funds in the amount of \$2.221 million are for the system level test and evaluation of modified HETS M1070A1 tractors and new commercial trailers that will be capable of 85 ton capacity.   |  |  |              |                  |               |  |
| FY 2020 Project 659 Base funds in the amount of \$1.200 million are for the development of contracting/acquisition milestone documentation and systems engineering plans for the Enhanced Heavy Equipment Transporter System (EHETS) program. The EHETS program is expected to enter at Milestone B after completion of the Analysis of Alternatives (AoA).   |  |  |              |                  |               |  |
| FY 2020 Project 659 Base funds in the amount of \$1.500 million are for the development, test and evaluation of Heavy Expanded Mobility Tactical Truck (HEMTT) and Palletized Load System (PLS) truck suspension upgrades that are required due to increased vehicle weight as a result of armor kits and Objective Gunner Protection Kit (OGPK) integration. Truck crane and winch replacements are required due to obsolescence of these systems. PLS trailers will be upgraded with anti-lock braking systems (ABS) to meet current Department of Transportation (DOT) and European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR) requirements.   |  |  |              |                  |               |  |
| FY 2020 Project 659 Base funds in the amount of \$2.000 million are for feasibility testing and evaluation of 25-ton STLB prototype semitrailers.   |  |  |              |                  |               |  |
| In accordance with Section 1815 of the FY 2008 National Defense Authorization Act (P.L. 110-181), this item is necessary for use by the active and reserve components of the Armed Forces for homeland defense missions, domestic emergency responses, and providing military support to civil authorities.   |  |  |              |                  |               |  |
| B. Accomplishments/Planned Programs (\$ in Millions)  | FY 2018  | FY 2019  | FY 2020 Base | FY 2020 OCO      | FY 2020 Total |  |
| <b>Title:</b> EHETS Acquisition Planning and Documentation Development<br><br><b>Description:</b> Acquisition planning and documentation development includes matrix personnel program support for the development of contracting/acquisition milestone documentation and systems engineering plans for the Enhanced Heavy Equipment Transporter System (EHETS) program.<br><br><b>FY 2019 Plans:</b><br>Program Management and Engineering Support to prepare contracting documentation, Systems Engineering Plans (SEP) and Test and Evaluation Master Plans (TEMP).<br><br><b>FY 2020 Base Plans:</b><br>Matrix staffing required for program development and systems engineering support to prepare acquisition program documents, Systems Engineering Plans (SEP), test and evaluation plans and contracting Request for Proposal (RFP) documentation.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> | 1.364  | 0.300  | 1.200        | -                | 1.200         |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |   |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles | <b>Project (Number/Name)</b><br>659 / Family Of Hvy Tac Veh |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| FY2020 increase due to an anticipated affirmative Materiel Development Decision (MDD) in 4QFY2019, resulting in a requirement for additional matrix staffing to generate acquisition program documents, develop systems engineering plans, test and evaluation plans and contracting Request for Proposal (RFP) documentation.  |   |   |                |                     |                         |                      |
| <b>Title:</b> HETS M1070A1 Tractor Modifications & System-level Testing   |   | 5.159   | 1.614          | 2.221               | -                       | 2.221                |
| <b>Description:</b> HETS M1070A1 tractor modifications and system-level testing are required to develop a near term interim solution in response to the USAREUR ONS for a transportation system capable of carrying 78.5 Tons of payload while achieving host country road permits at a reduced weight of 75 tons with an ultimate carrying capacity of 85 tons.  |   |   |                |                     |                         |                      |
| <b>FY 2019 Plans:</b><br>Research and develop a solution to modify the current M1070A1 HETS tractor to ultimately carry an 85 tons payload when paired with the commercial trailer.   |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>HET System-level testing and evaluation of modified M1070A1 tractors and new commercial trailers required for the USAREUR ONS to meet 85 ton capability.  |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase due to requirement for system level testing of modified HETS tractors and new commercial trailers.   |   |   |                |                     |                         |                      |
| <b>Title:</b> HEMTT/PLS Upgrades  |   | -   | -              | 1.500               | -                       | 1.500                |
| <b>Description:</b> Research, development, test and evaluation of HEMTT and PLS truck suspension upgrades that are required due to increased vehicle weight as a result of armor kits and OGPK integration. Truck crane and winch replacements are required due to obsolescence of these systems. PLS trailers will be upgraded with ABS to meet current DOT and ADR requirements.                      |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Award System Technical Support (STS) Task Orders and fund the development, test and evaluation of HEMTT and PLS truck suspension upgrades that are required due to increased vehicle weight as a result of armor kits and OGPK integration. Truck crane and winch replacements are required due to obsolescence of these systems. PLS trailers will be upgraded with ABS. |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>  |   |   |                |                     |                         |                      |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |         |   |             |               |         |              |   |               | Date: March 2019 |            |
|---|---------|---------|---|-------------|---------------|---------|--------------|---|---------------|------------------|------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |         |         | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles |             |               |         |              | <b>Project (Number/Name)</b><br>659 / Family Of Hvy Tac Veh |               |                  |            |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |         |         |   |             | FY 2018       | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total |                  |            |
| Award STS Task Orders and fund the development, test and evaluation of HEMTT and PLS truck suspension upgrades.   |         |         |   |             |               |         |              |   |               |                  |            |
| <b>Title:</b> HDT   |         |         |   |             | 0.465         | -       | -            | -   | -             |                  |            |
| <b>Title:</b> 25T STLB  |         |         |   |             | -             | -       | 2.000        | -   | 2.000         |                  |            |
| <b>FY 2020 Base Plans:</b><br>Feasibility testing required to evaluate prototype semitrailers from two vendors produced under Other Transaction (OT) project agreement award. Test results will be evaluated to determine single vendor for project agreement production award. |         |         |   |             |               |         |              |   |               |                  |            |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 increase due to lack of FY 2020 funding in Project E50 TRAILER DEVELOPMENT. Other Transaction (OT) project agreement prototype awards were made with Project E50 FY 2019 funds.                               |         |         |   |             |               |         |              |   |               |                  |            |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer  |         |         |   |             | -             | 0.063   | -            | -   | -             |                  |            |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer   |         |         |   |             |               |         |              |   |               |                  |            |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR Transfer  |         |         |   |             |               |         |              |   |               |                  |            |
| <b>Accomplishments/Planned Programs Subtotals</b>   |         |         |   |             | 6.988         | 1.977   | 6.921        | -   | 6.921         |                  |            |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |         |   |             |               |         |              |   |               |                  |            |
| Line Item   | FY 2018 | FY 2019 | FY 2020 Base  | FY 2020 OCO | FY 2020 Total | FY 2021 | FY 2022      | FY 2023   | FY 2024       | Cost To Complete | Total Cost |
| • DA0924: Modification Of In Svc Equip  | 146.587 | 256.642 | 58.946  | 28.000      | 86.946        | 49.250  | 46.050       | -   | -             | 0.000            | 585.475    |
| • DA0500: Family Of Heavy Tactical Vehicles (FHTV)  | 110.195 | 160.897 | 9.969   | 26.917      | 36.886        | 80.903  | -            | -   | -             | 0.000            | 388.881    |
| • D16506: PLS ESP   | 59.729  | -       | 6.280   | 16.941      | 23.221        | 15.163  | -            | -   | -             | 0.000            | 98.113     |
| • DV0021: Hvy Expanded Mobile Tactical Truck Ext Serv   | 150.878 | 109.764 | 30.841  | 62.734      | 93.575        | -       | -            | -   | -             | 0.000            | 354.217    |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |                |                |                |   |                |            |                | <b>Date:</b> March 2019                                     |                |                |                |                |                         |                   |
|--|----------------|----------------|----------------|---|----------------|------------|----------------|---|----------------|----------------|----------------|----------------|-------------------------|-------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles |                |            |                | <b>Project (Number/Name)</b><br>659 / Family Of Hvy Tac Veh |                |                |                |                |                         |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |                |   |                |            |                |   |                |                |                |                |                         |                   |
| <u>Line Item</u>   | <u>FY 2018</u> | <u>FY 2019</u> | <u>FY 2020</u> | <u>Base</u>   | <u>FY 2020</u> | <u>OCO</u> | <u>FY 2020</u> | <u>Total</u>  | <u>FY 2021</u> | <u>FY 2022</u> | <u>FY 2023</u> | <u>FY 2024</u> | <u>Cost To Complete</u> | <u>Total Cost</u> |
| <b>Remarks</b><br>DA0924 - Modification Of In Svc Equip is a shared funding line with other product offices.   |                |                |                |   |                |            |                |   |                |                |                |                |                         |                   |
| <b>D. Acquisition Strategy</b><br>The current interim solution for the Heavy Equipment Transporter System (HETS) is in response to a United States Army Europe (USAREUR) Operational Needs Statement (ONS# 17-22207) with deliveries beginning the first quarter of FY 2020. The USAREUR HETS ONS solution shall be capable of carrying 78.5 Tons of payload while achieving host country road permits at a reduced weight of 75 tons. The recommended course of action for satisfying the ONS is to utilize a modified version of the M1070A1 tractor combined with a commercial 8-axle trailer. Per the 1 DEC 17 Army Requirements Oversight Council (AROC), this trailer will be capable of carrying 85 tons. The AROC also directed an additional modification to the tractor that will allow it to achieve an ultimate carrying capacity of 85 tons.<br><br>Based on the outcome of the Analysis of Alternatives (AoA) and Materiel Development Decision (MDD), the Enhanced Heavy Equipment Transporter System (EHETS) is expected to enter at MS B and the acquisition will be a full and open competition. Planned efforts include: Requirements Analysis (FY18), Milestone B, Test plans and RFP documentation preparation (FY19-FY23), RFP release (FY22), and EMD Contract Award (FY23).<br><br>HEMTT/PLS upgrades will be developed through System Technical Support (STS) task orders in FY20, tested and evaluated in FY21, and then applied through block upgrades on the FHTV V contract, which is projected for award in September 2020. Block upgrades to the HEMTT and PLS platforms will be incorporated into the FHTV V production contract in 4QFY2022.<br><br>The 25-Ton Semi-Trailer Low-Bed (STLB) will pursue an Other Transaction (OT) prototype project strategy, with prototype award anticipated in 3QFY2019. Prototype feasibility testing will begin in 2QFY2020. Feasibility testing required to evaluate prototype semitrailers from two vendors produced under the OT project agreement award. Test results will be evaluated to determine single vendor for project agreement production award. MS C is projected for 1QFY2021. Low rate initial production (LRIP) is expected to begin 3QFY2021.<br><br>The Heavy Dump Truck (HDT) entered the acquisition cycle pre-Milestone C, based on a competitive source selection process that resulted in the award of a five year plus two option years firm-fixed price (FFP) indefinite delivery indefinite quantity (IDIQ) contract. The contract award was for one Original Equipment Manufacturer (OEM) to develop an armor solution for a commercially-based dump truck. The commercially-based dump truck will be armor-capable and will be produced concurrently with the development of the armor solution, which will ensure that the armor solution correctly interfaces with the commercially-based dump truck. LRIP began in 3QFY2018. Full rate production (FRP) is expected to begin 4QFY2020. |                |                |                |   |                |            |                |   |                |                |                |                |                         |                   |
| <b>E. Performance Metrics</b><br>N/A   |                |                |                |   |                |            |                |   |                |                |                |                |                         |                   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army   |                        |  |             |         |  |         |            |              |  |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---------|--|---------|------------|--------------|--|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |         |            |              | Project (Number/Name)<br>659 / Family Of Hvy Tac Veh |             |            |                  |                  |            |                          |
| 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 |
| EHETS - Technical Reports and Analysis                   | MIPR                   | TRADOC Analysis Center : Ft. Lee, VA       | 0.300       | 1.364   | Sep 2018   | -       | -          | -            | -  | -           | -          | 0.000            | 1.664            | -          |                          |
| HETS M1070A1 Tractor Modification                        | SS/CPIF                | Oshkosh Defense : Oshkosh, WI              | -           | 2.337   | Aug 2018   | 1.614   | Mar 2019   | -            | -  | -           | -          | 0.000            | 3.951            | -          |                          |
| HEMTT/PLS Upgrades Development (STS)                     | SS/CPIF                | Oshkosh Defense : Oshkosh, WI              | -           | -       | -  | -       | -          | 0.750        | Dec 2019   | -           | -          | 0.750            | 0.000            | 0.750      | -                        |
| HDT - IETM Authoring System Development                  | MIPR                   | AMRDEC - Redstone Arsenal : Huntsville, AL | -           | 0.465   | Sep 2018   | -       | -          | -            | -  | -           | -          | 0.000            | 0.465            | -          |                          |
| FY 2019 SBIR / STTR Transfer                             | TBD                    | PM HTV : Warren, MI                        | -           | -       | -  | 0.063   | -          | -            | -  | -           | -          | 0.000            | 0.063            | -          |                          |
| <b>Subtotal</b>  |                        | 0.300                                      | 4.166       |         | 1.677  |         | 0.750      |              | -  | 0.750       | 0.000      | 6.893            | 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 |
| EHETS Acquisition Planning and Documentation Development | MIPR                   | TACOM LCMC : Warren, MI                    | 0.148       | -       | -  | 0.300   | Mar 2019   | 1.200        | Dec 2019   | -           | -          | 1.200            | 0.000            | 1.648      | -                        |
| <b>Subtotal</b>  |                        | 0.148                                      | -           | -       | 0.300  | -       | 1.200      | -            | -  | 1.200       | 0.000      | 1.648            | 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 |
| USAREUR HETS ONS System Level Testing                    | MIPR                   | Aberdeen Test Center (ATC) : Aberdeen, MD  | 0.500       | 2.822   | Jun 2018   | -       | -          | 2.221        | Nov 2019   | -           | -          | 2.221            | 0.000            | 5.543      | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |  |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|--|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |            |         |            | Project (Number/Name)<br>659 / Family Of Hvy Tac Veh |            |             |            |                  |                  |            |                          |
| 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 |
| HEMTT/PLS Upgrades Test and Evaluation                 | MIPR                   | Aberdeen Test Center (ATC) : Aberdeen, MD | -           | -  |            | -       |            | 0.750  | Sep 2020   | -           |            | 0.750            | 0.000            | 0.750      | -                        |
| 25T STLB Prototype Test and Evaluation                 | MIPR                   | Aberdeen Test Center (ATC) : Aberdeen, MD | -           | -  |            | -       |            | 2.000  | Jan 2020   | -           |            | 2.000            | 0.000            | 2.000      | -                        |
| <b>Subtotal</b>  |                        | 0.500                                     | 2.822       |  | -          |         | 4.971      |  | -          |             | 4.971      | 0.000            | 8.293            | 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 |
| <b>Project Cost Totals</b>                             |                        |   | 0.948       | 6.988  |            | 1.977   |            | 6.921  |            | -           |            | 6.921            | 0.000            | 16.834     | N/A                      |

**Remarks**

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| 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)       |   |         |   |   |                  |         |   |   |   |
| 2040 / 5   |  |         |   | PE 0604622A / Family of Heavy Tactical Vehicles |   |         |   | 659 / Family Of Hvy Tac Veh |   |         |   |   |                  |         |   |   |   |
|  |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Event Name   |  | FY 2018 |   |   |   | FY 2019 |   |                             |   | FY 2020 |   |   |                  | FY 2021 |   |   |   |
|  |  | 1       | 2 | 3   | 4 | 1       | 2 | 3                           | 4 | 1       | 2 | 3 | 4                | 1       | 2 | 3 | 4 |
| <b>Enhanced Heavy Equipment Transporter System (EHETS)</b> |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Perform pre-MDD Studies                                    |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Materiel Development Decision                              |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Analysis of Alternatives                                   |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Program Milestone B Documentation Preparation              |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Contract Documentation and Test Plans Development          |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Request for Proposal Release                               |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Source Selection Evaluation Board                          |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Milestone B  |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| Engineering and Manufacturing Development Contract Award   |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| <b>USAREUR HETS ONS</b>                                    |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| USAREUR HETS ONS Testing                                   |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| <b>HEMTT/PLS Upgrades</b>                                  |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |
| MOD A and MOD B Testing                                    |  |         |   |   |   |         |   |                             |   |         |   |   |                  |         |   |   |   |

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| 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)       |   |   |   |                |                  |   |   |                |   |
| 2040 / 5  |  |  |  | PE 0604622A / Family of Heavy Tactical Vehicles |   |   |   | 659 / Family Of Hvy Tac Veh |   |   |   |                |                  |   |   |                |   |
| <b>Event Name</b>                                 |  |  |  |   |   |   |   |                             |   |   |   |                |                  |   |   |                |   |
|   |  |  |  | <b>FY 2018</b>                                  |   |   |   | <b>FY 2019</b>              |   |   |   | <b>FY 2020</b> |                  |   |   | <b>FY 2021</b> |   |
|   |  |  |  | 1   | 2 | 3 | 4 | 1                           | 2 | 3 | 4 | 1              | 2                | 3 | 4 | 1              | 2 |
| Development Engineering                           |  |  |  |   |   |   |   |                             |   |   |   |                |                  |   |   |                |   |
| Upgrades Testing                                  |  |  |  |   |   |   |   |                             |   |   |   |                |                  |   |   |                |   |
| 25-Ton Semitrailer Lowbed (25T STLB)              |  |  |  |   |   |   |   |                             |   |   |   |                |                  |   |   |                |   |
| 25T STLB Prototype Testing                        |  |  |  |   |   |   |   |                             |   |   |   |                |                  |   |   |                |   |

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|---|---|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |   | <b>Date:</b> March 2019                                     |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles | <b>Project (Number/Name)</b><br>659 / Family Of Hvy Tac Veh |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Enhanced Heavy Equipment Transporter System (EHETS)      | 1              | 2017        | 4              | 2023        |
| Perform pre-MDD Studies                                  | 1              | 2017        | 1              | 2018        |
| Materiel Development Decision                            | 4              | 2019        | 4              | 2019        |
| Analysis of Alternatives                                 | 2              | 2018        | 3              | 2019        |
| Program Milestone B Documentation Preparation            | 2              | 2019        | 2              | 2023        |
| Contract Documentation and Test Plans Development        | 1              | 2019        | 4              | 2021        |
| Request for Proposal Release                             | 2              | 2022        | 2              | 2022        |
| Source Selection Evaluation Board                        | 3              | 2022        | 3              | 2023        |
| Milestone B  | 4              | 2023        | 4              | 2023        |
| Engineering and Manufacturing Development Contract Award | 4              | 2023        | 4              | 2023        |
| USAREUR HETS ONS   | 1              | 2018        | 4              | 2022        |
| USAREUR HETS ONS Testing                                 | 1              | 2019        | 1              | 2022        |
| HEMTT/PLS Upgrades                                       | 1              | 2019        | 4              | 2021        |
| Development Engineering                                  | 1              | 2020        | 4              | 2020        |
| Upgrades Testing   | 4              | 2020        | 4              | 2021        |
| 25-Ton Semitrailer Lowbed (25T STLB)                     | 2              | 2020        | 4              | 2020        |
| 25T STLB Prototype Testing                               | 2              | 2020        | 4              | 2020        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|---------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |               |         |         | Project (Number/Name)<br>E50 / TRAILER 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 |
| E50: TRAILER DEVELOPMENT                                | -           | 1.520   | 5.286   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000  | 0.000   | 0.000            | 6.806      |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -  | -       | -                |            |

**Note**

There is no FY 2020 funding for Project E50 / TRAILER DEVELOPMENT. The project was previously funded in FY 2019. 25-Ton Semitrailer prototype test and evaluation will be funded in FY 2020 from Project 659 / Family of Heavy Tactical Vehicles.

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

The Semi-Trailer Low-Bed (STLB) is a 25-ton payload capacity semi-trailer with a fixed goose neck, step deck, and rear loading ramps. The STLB is interoperable with a variety of trucks residing across the U.S. Army equipment and will be introduced into a theater of operations to transport construction equipment (CE) employed by U.S. Army Engineers to execute horizontal and vertical construction projects in support of U.S. Military or other national goals and objectives. The STLB is employed to transport CE, miscellaneous equipment, disabled equipment, Class IV (construction materials), and logistical provisions. The STLB supports units in the execution of the following tasks: expand the lodgment, construction/upgrade/rehabilitation and maintenance of main supply routes (MSR), alternate supply routes (ASR), logistical facilities, bituminous roads, helipads, airfields, landing strips, motor pools, parking areas, etc. These types of facilities are required for sustainment operations during decisive action operations. The STLB will also be used during routine exercises/deployments, disaster relief, and other nation building operations. The STLB will be capable of supporting mobility, counter mobility, survivability, counter improvised and sustainment needs and all applicable North Atlantic Treaty Organization (NATO) interoperability criteria.

The Heavy Equipment Transporter System (HETS) is comprised of a M1070A1 Tractor and M1000 Trailer for transport, recovery and evacuation of heavy, oversized combat equipment such as the M1A1 Abrams main battle tank (MBT) and M88 recovery vehicle or similar loads. The current HETS has two capability gaps: Payload and Road Network Accessibility. The current HETS is not capable of transporting or loading/unloading the heaviest combat platform in the ABCT since it exceeds the HETS rated payload of 70 tons (U.S.). Road Network Accessibility of the current HETS is restricted due to exceeding axle load limits CONUS/OCONUS, which prevents the HETS from obtaining road permits. In the near term, the interim solution is to modify current HETS tractors and procure new HETS trailers. The long term solution is the Enhanced Heavy Equipment Transporter System (EHETS) that will address these capability gaps.

The near term interim solution is in response to a United States Army Europe (USAREUR) Operational Needs Statement (ONS# 17-22207) for Heavy Equipment Transporter Systems with deliveries beginning the first quarter of FY2020. The USAREUR HETS ONS solution will be capable of carrying 78.5 Tons of payload while achieving host country road permits at a reduced weight of 75 tons. The recommended course of action for satisfying the ONS is to utilize a modified version of the M1070A1 tractor combined with a commercial 8-axle trailer. Per the 1 DEC 17 Army Requirements Oversight Council (AROC) decision, this trailer will be capable of carrying 85 tons. The AROC also directed an additional modification to the tractor that will allow it to achieve an ultimate carrying capacity of 85 tons.

The Enhanced Heavy Equipment Transporter System (EHETS) is a force protected tractor and trailer to operationally move and load/unload the heaviest combat platform in the ABCT. EHETS will be capable of transporting at a higher rated payload and will self-load/unload heavy and outsized equipment such as the Abrams

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   |   | <b>Date:</b> March 2019 |                    |                      |
|--|---|---|-------------------------|--------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles | <b>Project (Number/Name)</b><br>E50 / TRAILER DEVELOPMENT |                         |                    |                      |
| SEPv2 and SEPv3, which currently exceeds the existing Heavy Equipment Transporter System rated capacity of 70-tons (U.S.), while achieving road network accessibility (e.g. road permits) and mobility on primary and secondary roads.   |   |   |                         |                    |                      |
| The Heavy Dump Truck (HDT) supports construction projects by loading, transporting and dumping payloads of sand and gravel aggregates, crushed rock, hot asphalt mixes, earth, clay, rubble, large boulders and other materials up to gross vehicle weight rating to job sites under world-wide climatic conditions. The HDT also serves as a quarry truck for the quick transport of bulk raw earth material to and from the crushing, screening and washing plant and the asphalt mixing plant. The HDT also serves as a transportation asset for organizational equipment. The HDT is Long Term Armor Strategy (LTAS) compliant with MRAP 1.1 underbody protection. The armor solution is developed concurrently with the production of armor capable HDTs. |   |   |                         |                    |                      |
| Funding supports modernization of the current Tactical Wheeled Vehicle fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Victory Architecture, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts  |   |   |                         |                    |                      |
| There is no FY 2020 funding for Project E50 / TRAILER DEVELOPMENT. The above activities were funded with Project E50 funds prior to FY 2020.   |   |   |                         |                    |                      |
| In accordance with Section 1815 of the FY 2008 National Defense Authorization Act (P.L. 110-181), this item is necessary for use by the active and reserve components of the Armed Forces for homeland defense missions, domestic emergency responses, and providing military support to civil authorities.  |   |   |                         |                    |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  | <b>FY 2018</b>  | <b>FY 2019</b>  | <b>FY 2020 Base</b>     | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |
| <b>Title:</b> 25-Ton STLB Prototypes<br><b>Description:</b> Award of 25-Ton STLB prototypes, test services support and data item deliverables for test.<br><br><b>FY 2019 Plans:</b><br>Preparation of solicitation, scope of work, and other acquisition documentation leading to Other Transaction (OT) prototype project agreement awards to two vendors. Prototype builds of ten semitrailers (five trailers per vendor) expected to begin 4QFY2019.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019: Preparation of solicitation, scope of work, and other acquisition documentation leading to prototype awards. There is no FY 2020 funding for Project E50.   | -   | 2.300   | -                       | -                  | -                    |
| <b>Title:</b> Systems Engineering/Program Management (SEPM) Support  | 0.610   | -   | -                       | -                  | -                    |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |  |                 |                |  |         |         | Date: March 2019 |         |                     |             |               |  |  |  |
|---|---------|--|-----------------|----------------|--|---------|---------|------------------|---------|---------------------|-------------|---------------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5   |         | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |                 |                | Project (Number/Name)<br>E50 / TRAILER DEVELOPMENT |         |         |                  |         |                     |             |               |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |         |  |                 |                |  |         |         | FY 2018          | FY 2019 | FY 2020 Base        | FY 2020 OCO | FY 2020 Total |  |  |  |
| <b>Description:</b> SEPM includes PM and System Engineering oversight required to conduct requirements analysis, specification development, program management and contractor oversight. Salaries, Benefits, Travel, Personnel Training and other Government costs are included for retaining a professional acquisition workforce. |         |  |                 |                |  |         |         |                  |         |                     |             |               |  |  |  |
| <b>Title:</b> HDT Prototypes  |         |  |                 |                |  |         |         | -                | 2.792   | -                   | -           | -             |  |  |  |
| <b>Description:</b> Build six (6) armored Heavy Dump Trucks (HDTs) and one (1) armored cab. The armor solution will be developed concurrently with the armor capable truck.   |         |  |                 |                |  |         |         |                  |         |                     |             |               |  |  |  |
| <b>FY 2019 Plans:</b><br>The armor solution is developed concurrently with the production of armor capable HDTs. Upon development of the armor solution, the Government procures a total of six (6) armored HDT prototypes.   |         |  |                 |                |  |         |         |                  |         |                     |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Prototype production will be complete with FY 2019 RDTE funding. Prototype testing will be conducted with FY 2020 funds under Project VR5.  |         |  |                 |                |  |         |         |                  |         |                     |             |               |  |  |  |
| <b>Title:</b> HETS M1070A1 Tractor Modification   |         |  |                 |                |  |         |         | 0.910            | -       | -                   | -           | -             |  |  |  |
| <b>Description:</b> Modify M1070A1 tractors that were required for the USAREUR HETS ONS to meet an 85 tons capability.  |         |  |                 |                |  |         |         |                  |         |                     |             |               |  |  |  |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer  |         |  |                 |                |  |         |         | -                | 0.194   | -                   | -           | -             |  |  |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer   |         |  |                 |                |  |         |         |                  |         |                     |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR Transfer  |         |  |                 |                |  |         |         |                  |         |                     |             |               |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |         |  |                 |                |  |         |         | 1.520            | 5.286   | -                   | -           | -             |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |  |                 |                |  |         |         |                  |         |                     |             |               |  |  |  |
| Line Item   | FY 2018 | FY 2019  | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total                                   | FY 2021 | FY 2022 | FY 2023          | FY 2024 | Cost To<br>Complete | Total Cost  |               |  |  |  |
| • D01650: SEMITRAILER<br>LOW BED 25 TON   | -       | 1.618  | 4.619           | -              | 4.619  | 16.116  | 16.425  | 16.639           | 16.363  | 0.000               | 71.780      |               |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |         |         |                 |   |                  |         |         |         |         |   | <b>Date:</b> March 2019 |  |  |  |  |  |  |  |  |
|---|---------|---------|-----------------|---|------------------|---------|---------|---------|---------|---|-------------------------|--|--|--|--|--|--|--|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |         |         |                 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles |                  |         |         |         |         | <b>Project (Number/Name)</b><br>E50 / TRAILER DEVELOPMENT |                         |  |  |  |  |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |
|   |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |
| Line Item   | FY 2018 | FY 2019 | FY 2020<br>Base | FY 2020<br>OCO  | FY 2020<br>Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete  | Total Cost              |  |  |  |  |  |  |  |  |
| • DV0012: HEAVY EQUIPMENT TRANSPORTER SYS   | 37.398  | 72.169  | 0.000           | -   | 0.000            | -       | -       | -       | -       | 0.000   | 109.567                 |  |  |  |  |  |  |  |  |
| • D16001: TRUCK, DUMP, 20T (CCE)  | 1.083   | 5.061   | 10.838          | -   | 10.838           | 14.339  | 15.060  | -       | -       | 0.000   | 46.381                  |  |  |  |  |  |  |  |  |
| • DA0924: Modification Of In Svc Equip  | 146.587 | 256.642 | 58.946          | 28.000  | 86.946           | 49.250  | 46.050  | -       | -       | 0.000   | 585.475                 |  |  |  |  |  |  |  |  |
| <b>Remarks</b>  |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |
| DA0924 - Modification Of In Svc Equip is a shared funding line with other product offices.  |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |
| <b>D. Acquisition Strategy</b>  |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |
| The 25-Ton Semi-Trailer Low-Bed (STLB) will pursue an Other Transaction (OT) prototype project strategy, with prototype award anticipated in 3QFY2019. Prototype feasibility testing projected to begin 2QFY2020 and will evaluate prototype semitrailers from two vendors produced under the OT project agreement award. Test results will be evaluated to determine single vendor for project agreement production award. MS C projected for 1QFY2021. Low rate initial production (LRIP) expected to begin 3QFY2021.   |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |
| The Heavy Dump Truck (HDT) entered the acquisition cycle pre-Milestone C, based on a competitive source selection process that resulted in the award of a five year plus two option years firm-fixed price (FFP) indefinite delivery indefinite quantity (IDIQ) contract. The contract award was for one Original Equipment Manufacturer (OEM) to develop an armor solution for a commercially-based dump truck. The commercially-based dump truck will be armor-capable and will be produced concurrently with the development of the armor solution, which will ensure that the armor solution correctly interfaces with the commercially-based dump truck. LRIP began in 3QFY2018. Full rate production (FRP) is expected to begin 4QFY2020. |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |
| <b>E. Performance Metrics</b>   |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |
| N/A   |         |         |                 |   |                  |         |         |         |         |   |                         |  |  |  |  |  |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |  |            |         |            |  |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|--|------------|---------|------------|--|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |            |         |            | Project (Number/Name)<br>E50 / TRAILER DEVELOPMENT |              |             |             |                  |                  |                  |                          |                          |
| Product Development (\$ in Millions)                   |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base                                       |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Heavy Dump Truck (HDT) Prototype Design of Armored Cab | C/IDIQ                 | Mack Defense : Allentown, PA   | -           | -  |            | 2.792   | Apr 2019   | -  | -            | -           | -           | -                | 0.000            | 2.792            | -                        |                          |
| HETS M1070A1 Tractor Modification                      | SS/CPIF                | Oshkosh Defense : Oshkosh, WI  | -           | 0.910  | Aug 2018   | -       | -          | -  | -            | -           | -           | -                | 0.000            | 0.910            | -                        |                          |
| 25-Ton STLB Prototypes                                 | C/IDIQ                 | TBD : TBD                      | -           | -  |            | 2.300   | Jul 2019   | -  | -            | -           | -           | -                | 0.000            | 2.300            | -                        |                          |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | PM HTV : Warren, MI            | -           | -  |            | 0.194   |            | -  | -            | -           | -           | -                | 0.000            | 0.194            | -                        |                          |
| <b>Subtotal</b>  |                        |                                | -           | 0.910  |            | 5.286   |            | -  | -            | -           | -           | -                | 0.000            | 6.196            | 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 |                          |
| Systems Engineering/Program Management (SEPM)          | MIPR                   | TACOM : Warren, MI             | -           | 0.610  | Jan 2018   | -       | -          | -  | -            | -           | -           | -                | 0.000            | 0.610            | -                        |                          |
| <b>Subtotal</b>  |                        |                                | -           | 0.610  |            | -       | -          | -  | -            | -           | -           | -                | 0.000            | 0.610            | 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 |
| <b>Project Cost Totals</b>                             |                        |                                |             | -  | 1.520      |         | 5.286      |  | -            | -           | -           | -                | -                | 0.000            | 6.806                    | N/A                      |
| <b>Remarks</b>   |                        |                                |             |  |            |         |            |  |              |             |             |                  |                  |                  |                          |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

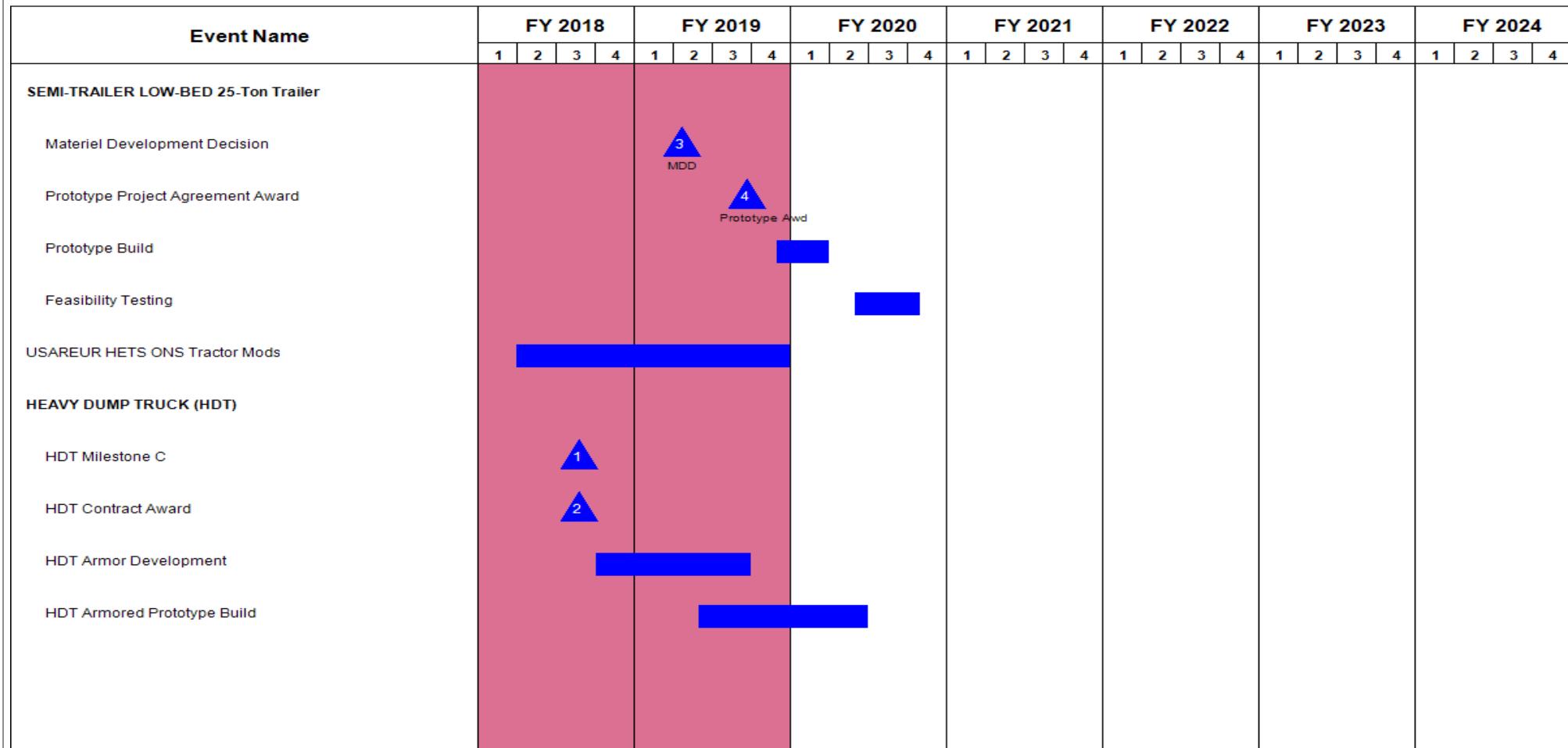
Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604622A / Family of Heavy Tactical  
Vehicles**Project (Number/Name)**

E50 / TRAILER DEVELOPMENT



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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / <i>Family of Heavy Tactical Vehicles</i> | <b>Project (Number/Name)</b><br>E50 / <i>TRAILER DEVELOPMENT</i> |

**Schedule Details**

| <b>Events</b>                       | <b>Start</b>   |             | <b>End</b>     |             |
|-------------------------------------|----------------|-------------|----------------|-------------|
|                                     | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| SEMI-TRAILER LOW-BED 25-Ton Trailer | 1              | 2018        | 4              | 2020        |
| Materiel Development Decision       | 2              | 2019        | 2              | 2019        |
| Prototype Project Agreement Award   | 3              | 2019        | 3              | 2019        |
| Prototype Build                     | 4              | 2019        | 1              | 2020        |
| Feasibility Testing                 | 2              | 2020        | 4              | 2020        |
| USAREUR HETS ONS Tractor Mods       | 1              | 2018        | 4              | 2019        |
| HEAVY DUMP TRUCK (HDT)              | 4              | 2017        | 3              | 2022        |
| HDT Milestone C                     | 3              | 2018        | 3              | 2018        |
| HDT Contract Award                  | 3              | 2018        | 3              | 2018        |
| HDT Armor Development               | 4              | 2018        | 3              | 2019        |
| HDT Armored Prototype Build         | 2              | 2019        | 2              | 2020        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |         |  | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|--|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |               |         |         |         | Project (Number/Name)<br>EZ8 / Leader/Follower |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024  | Cost To Complete | Total Cost |  |
| EZ8: Leader/Follower                                    | -           | 0.000   | 0.000   | 5.000        | -  | 5.000         | 10.649  | 9.422   | 5.886   | 5.329  | 0.000            | 36.286     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -       | -  | -                |            |  |

**Note**  
PdM ALUGS Leader Follower efforts transitioned from the 0604017A Robotics Development FD9 Robotic Systems line in FY 2018 and FY 2019 to a Program of Record under 0604622A Family of Heavy Tactical Vehicles EZ8 Leader/Follower in FY 2020. .

**A. Mission Description and Budget Item Justification**  
Tactical Wheeled Vehicle Leader Follower program provides transportation units with the capability to unman Tactical Wheeled Vehicles (TWVs), beginning with the Palletized Loading System (PLS) vehicles, while operating in a convoy. This is accomplished by integrating technology to the unmanned vehicles which enables them to follow a manned lead vehicle. This is done in a March Unit of up to (8) TWVs initially PLS vehicles, with (1) manned Lead vehicle and (3) to (7) unmanned follower vehicles. This capability provides increased Soldier Force Protection and increased convoy logistics throughput by giving commanders more options on Soldier utilization, removing Soldiers from threat zones and/or utilizing vehicle operators for convoy security, and allowing supply convoys to run more often.

FY20 RDT&E funds will execute testing for the Tactical Wheeled Leader Follower program for safety and performance evaluations by Army Test & Evaluation Command (ATEC) to support production decision by the Milestone Decision Authority, fund Program Management office lifecycle planning, and engagements with industry to plan and solicit proposals for the production contracts. FY20 funds will enable the Tactical Wheeled Leader Follower program to transition to the Program Office from TARDEC, to complete Engineering and Manufacturing Development (EMD), prepare for and execute a production decision (Milestone C), and begin contract planning and actions for Low Rate Initial Production (LRIP), Production Qualification Testing (PQT), and Initial Operational Testing (IOT).

| B. Accomplishments/Planned Programs (\$ in Millions)   | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Tactical Wheeled Vehicle Leader Follower<br><b>Description:</b> Funding line is new in FY20 for Project Manager Force Projection, Product Manager Applique and Large Unmanned Systems, to execute the program of record for the Leader Follower capability of removing Soldier Operators from the PLS. This provides increased Soldier protection and logistics throughput.<br><b>FY 2020 Base Plans:</b><br>FY20 funding will be used for the execution and management of the Leader Follower Transition Agreement (TA) and support LF Capability requirements development. It will also fund the chartering and support of the Test and Evaluation Working Integrated Product Team (T&E WIPT), Risk Management support, Logistics planning and IPT initiation. Technical Manual Validation and Logistics Demo will be funded in FY20. Funding will complete testing of the Expedient Leader Follower system design as it completes the engineering and operational | -       | -       | 5.000        | -           | 5.000         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                |                |                |             |            |              |                |                |                | <b>Date:</b> March 2019   |                         |                     |                    |                      |
|--|----------------|----------------|----------------|-------------|------------|--------------|----------------|----------------|----------------|---|-------------------------|---------------------|--------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |                |                |                |             |            |              |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles |                         |                     |                    |                      |
| <b>Project (Number/Name)</b><br>EZ8 / Leader/Follower  |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                |                |                |             |            |              |                |                |                | <b>FY 2018</b>  | <b>FY 2019</b>          | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |
| demonstration phase under a directed requirement. Pre-Production Qualification Testing which includes RAM testing, Obstacle Detection and Avoidance Testing and Degraded System Testing will occur in FY20. Funding will support formal validation of the demonstrated capability, and manpower support for production planning and Milestone C execution.   |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This funding line is new in FY20 to execute the program of record for the Leader Follower capability of unmanaging Tactical Wheeled Vehicles initially the Palletized Load System (PLS).   |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| <b>Accomplishments/Planned Programs Subtotals</b>  |                |                |                |             |            |              |                |                |                | -   | -                       | 5.000               | -                  | 5.000                |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| <b>Line Item</b>   | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>Base</b> | <b>OCO</b> | <b>Total</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b> | <b>FY 2024</b>  | <b>Cost To Complete</b> | <b>Total Cost</b>   |                    |                      |
| • 0604017A: Robotics Development   | 38.051         | 74.368         | 115.222        | -           | 115.222    | 105.332      | 132.978        | 83.910         | 65.971         | 0.000   | 615.832                 |                     |                    |                      |
| <b>Remarks</b>   |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| Prior to FY20, PM LF efforts were funded under the Robotics Development 6.4 line along with TARDEC who had most of the funding.  |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| <b>D. Acquisition Strategy</b>   |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| The TWV LF Acquisition Strategy leverages prior developed and demonstrated technology, developed under a HQDA G-8 Directed Requirement effort by TARDEC and transitions to the Program Manager Force Projection, PdM ALUGS, for Milestone C, Production Qualification Testing in FY20-21, and Full Rate Production in FY23. PdM ALUGS will award a production contract after the MS C decision to build Low Rate Initial Production (LRIP) assets for testing. This configuration and technology will be what was approved under the prior directed requirement effort and will fulfill the user's requirements as identified in the Capabilities Development Document (CDD). The funding allows for the Army to mature the technology demonstrated under the directed requirement, fully validate the production solution and ensure safe and suitable operation, develop the appropriate logistics products, operations manuals, and supportability strategy, and field an enduring unmanned, robotic, autonomous PLS convoy capability to Soldiers. |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| <b>E. Performance Metrics</b>  |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |
| N/A  |                |                |                |             |            |              |                |                |                |   |                         |                     |                    |                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                      |             |  |            |         |            |  |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------------|-------------|--|------------|---------|------------|--|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                      |             | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |            |         |            | Project (Number/Name)<br>EZ8 / Leader/Follower |              |             |             |                  |                  |                  |                          |                          |
| 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 |                          |
| LF Program Management                                  | Allot                  | PM FP : Warren, MI; Harrison Twp, MI | -           | -  |            | -       |            | 0.950  | Oct 2019     | -           |             | 0.950            | 0.000            | 0.950            | -                        |                          |
| <b>Subtotal</b>  |                        |                                      |             | -  | -          | -       |            | 0.950  |              | -           |             | 0.950            | 0.000            | 0.950            | 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 |                          |
| LF Tech Support  | MIPR                   | TARDEC, TACOM : Warren, MI           | -           | -  |            | -       |            | 1.410  | Oct 2019     | -           |             | 1.410            | 0.000            | 1.410            | -                        |                          |
| <b>Subtotal</b>  |                        |                                      |             | -  | -          | -       |            | 1.410  |              | -           |             | 1.410            | 0.000            | 1.410            | 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 |                          |
| LF Test Support ATEC                                   | MIPR                   | ATEC : Aberdeen, MD                  | -           | -  |            | -       |            | 2.640  | Oct 2019     | -           |             | 2.640            | 0.000            | 2.640            | -                        |                          |
| <b>Subtotal</b>  |                        |                                      |             | -  | -          | -       |            | 2.640  |              | -           |             | 2.640            | 0.000            | 2.640            | 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 |
| <b>Project Cost Totals</b>                             |                        |                                      |             | -  | -          |         | 0.000      |  | 5.000        |             | -           |                  | 5.000            | 0.000            | 5.000                    | N/A                      |
| <b>Remarks</b>   |                        |                                      |             |  |            |         |            |  |              |             |             |                  |                  |                  |                          |                          |

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| 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) |  |  |  |  |                  |  |  |  |  |
| 2040 / 5  |  |  |  | PE 0604622A / Family of Heavy Tactical Vehicles |  |  |  | EZ8 / Leader/Follower |  |  |  |  |                  |  |  |  |  |
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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |   | <b>Date:</b> March 2019                               |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles | <b>Project (Number/Name)</b><br>EZ8 / Leader/Follower |

**Schedule Details**

| <b>Events</b>                               | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| LEADER FOLLOWER (LF) ALUGS                  | 1              | 2020        | 4              | 2027        |
| LF Pre-Production Qualification testing     | 4              | 2019        | 4              | 2020        |
| LF PoR Technology Readiness Review          | 1              | 2020        | 1              | 2020        |
| LF Life Cycle Sustainment Plan (LCSP) final | 2              | 2020        | 2              | 2020        |
| LF Tech Manual Validation                   | 3              | 2020        | 4              | 2020        |
| LF Logistics Demonstration                  | 4              | 2020        | 4              | 2020        |
| LF Milestone C                              | 4              | 2020        | 4              | 2020        |
| LF Low Rate Initial Production (LRIP)       | 1              | 2021        | 1              | 2023        |
| LF Production Qualification Testing         | 1              | 2021        | 3              | 2021        |
| LF First Unit Equipped                      | 3              | 2022        | 3              | 2022        |
| LF Initial Operational Capability           | 3              | 2022        | 3              | 2022        |
| LF Full Rate Production                     | 1              | 2023        | 4              | 2027        |
| LF Full Materiel Release                    | 4              | 2023        | 4              | 2023        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |                           |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------------------------|---------|------------------|------------|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)               |               |         |         | Project (Number/Name)     |         |                  |            |
| 2040 / 5  |             |         |         |              | PE 0604622A / Family of Heavy Tactical Vehicles |               |         |         | VR5 / TWV Protection Kits |         |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                                     | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                   | FY 2024 | Cost To Complete | Total Cost |
| VR5: TWV Protection Kits                                | -           | 1.578   | 4.672   | 4.824        | -   | 4.824         | 2.820   | 3.085   | 2.971                     | 3.482   | 0.000            | 23.432     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -                         | -       | -                |            |

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

This program element supports periodic, evolutionary upgrade of survivability and crew protection for Heavy Tactical Vehicles (HTV) and Medium Tactical Vehicles (MTV) as described in the Tactical Wheeled Vehicle (TWV) Strategy and individual variants' Capability Production Documents (CPDs). The upgrades will leverage the Army Technology Objective's (ATO) survivability and Army Research Laboratory's (ARL) research and development activities to develop and evaluate armor kits which increase the protection level of all HTVs to the Mine-Resistant Ambush Protected (MRAP) protection level as well as anticipating changing threat environments, protection gaps, or improving the operating performance, efficiency, and reliability through armor weight reduction. This Program Element (PE) also supports increasing crew protection by leveraging advancements in autonomous ground vehicle technology via development and evaluation of autonomous applique kits that can be applied to the current and future HTV fleet. Funding supports modernization of the current Tactical Wheeled Vehicle fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Victory Architecture, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

The Heavy Dump Truck (HDT) supports construction projects by loading, transporting and dumping payloads of sand and gravel aggregates, crushed rock, hot asphalt mixes, earth, clay, rubble, large boulders and other materials up to gross vehicle weight rating to job sites under world-wide climatic conditions. The HDT also serves as a quarry truck for the quick transport of bulk raw earth material to and from the crushing, screening and washing plant and the asphalt mixing plant. The HDT also serves as a transportation asset for organizational equipment. The HDT is Long Term Armor Strategy (LTAS) compliant with MRAP 1.1 underbody protection. The armor solution is developed concurrently with the production of armor capable HDTs.

The Heavy Equipment Transporter System (HETS) is comprised of a M1070A1 Tractor and M1000 Trailer for transport, recovery and evacuation of heavy, oversized combat equipment such as the M1A1 Abrams main battle tank (MBT) and M88 recovery vehicle or similar loads. The current HETS has two capability gaps: Payload and Road Network Accessibility. The current HETS is not capable of transporting or loading/unloading the heaviest combat platform in the ABCT since it exceeds the HETS rated payload of 70 tons (U.S.). Road Network Accessibility of the current HETS is restricted due to exceeding axle load limits CONUS/OCONUS, which prevents the HETS from obtaining road permits. In the near term, the interim solution is to modify current HETS tractors and procure new HETS trailers. The long term solution is the Enhanced Heavy Equipment Transporter System (EHETS) that will address these capability gaps. The EHETS will provide increased payload, highway transportability, and force protection over its predecessor.

The near term interim solution is in response to a United States Army Europe (USAREUR) Operational Needs Statement (ONS# 17-22207) for Heavy Equipment Transporter Systems with deliveries beginning the first quarter of FY2020. The USAREUR HETS ONS solution will be capable of carrying 78.5 Tons of payload while achieving host country road permits at a reduced weight of 75 tons. The recommended course of action for satisfying the ONS is to utilize a modified version of the

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |   |   | <b>Date:</b> March 2019 |                    |                      |
|---|---|---|-------------------------|--------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles | <b>Project (Number/Name)</b><br>VR5 / TWV Protection Kits |                         |                    |                      |
| M1070A1 tractor combined with a commercial 8-axle trailer. Per the 1 DEC 17 Army Requirements Oversight Council (AROC) decision, this trailer will be capable of carrying 85 tons. The AROC also directed an additional modification to the tractor that will allow it to achieve an ultimate carrying capacity of 85 tons.   |   |   |                         |                    |                      |
| The Family of Medium Tactical Vehicles (FMTV) Armor Kit design was greatly enhanced and requires testing to support Full Material Release. The FMTV requirements document issued for a Medium Tactical Vehicle (MTV) truck delineates model configuration upgrades needed to support required transport capabilities, armor capabilities, and load dimensions. This Acquisition Strategy reduces operation and support costs, displaces vehicles which cannot be armored, and results in a more reliable fleet.   |   |   |                         |                    |                      |
| FY 2020 Project VR5 Base funds in the amount of \$4.324 million will be used to test six (6) armored Heavy Dump Trucks. Armored truck testing costs include system testing, evaluation and report production for the HDT program. The Government will conduct Production Verification Testing (PVT), which includes First Production Vehicle Inspection (FPVI), Reliability, Availability, and Maintainability (RAM) testing, Operational Testing (OT), and Live Fire Testing (LFT), as well as OEM test services support, familiarization training and refurbishment of test assets. |   |   |                         |                    |                      |
| FY 2020 Project VR5 Base funds in the amount of \$0.500 million will be used for testing of the improvements to the Family of Medium Tactical Vehicles (FMTV) Armor Kit that are required to support Full Material Release.   |   |   |                         |                    |                      |
| In accordance with Section 1815 of the FY 2008 National Defense Authorization Act (P.L. 110-181), this item is necessary for use by the active and reserve components of the Armed Forces for homeland defense missions, domestic emergency responses, and providing military support to civil authorities.   |   |   |                         |                    |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   | <b>FY 2018</b>  | <b>FY 2019</b>  | <b>FY 2020 Base</b>     | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |
| <b>Title:</b> HEMTTA4/PLSA1 Suspension and Weapon Station Upgrade CROWS<br><br><b>Description:</b> Design new HEMTTA4 and PLSA1 axle and suspension components and integrate protected weapon station.  | 0.168   | -   | -                       | -                  | -                    |
| <b>Title:</b> HEMTTA4/PLSA1 Weapon Station Upgrade / Testing<br><br><b>Description:</b> Integrate and test HEMTTA4 / PLSA1 weapon station ring mount kit.   | 0.112   | -   | -                       | -                  | -                    |
| <b>Title:</b> HDT Prototypes<br><br><b>Description:</b> Build six (6) armored Heavy Dump Trucks (HDTs) and one (1) armored cab. The armor solution will be developed concurrently with the armor capable truck.   | 0.169   | 3.701   | -                       | -                  | -                    |
| <b>FY 2019 Plans:</b>   |   |   |                         |                    |                      |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |   |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / Family of Heavy Tactical Vehicles | <b>Project (Number/Name)</b><br>VR5 / TWV Protection Kits |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| The armor solution will be developed concurrently with the production of armor capable HDTs. Upon development of the armor solution, the Government will procure six (6) armored HDTs.  |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Prototype production will be complete with FY 2019 RDTE funding. Prototype testing will be conducted with FY 2020 funds.  |   |   |                |                     |                         |                      |
| <b>Title:</b> HDT Testing<br><br><b>Description:</b> Reliability, Availability, and Maintainability (RAM) testing and system performance testing / evaluation of the armored HDTs.  |   | -   | -              | 4.324               | -                       | 4.324                |
| <b>FY 2020 Base Plans:</b><br>Armored HDT testing costs include system testing, evaluation and report production for the HDT program. The Government will conduct Production Verification Testing (PVT), First Production Vehicle Inspection (FPVI), Reliability, Availability, and Maintainability (RAM) testing and Live Fire Testing (LFT), as well as OEM test services support, familiarization training and refurbishment of test assets. |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Majority of HDT test costs are funded with FY 2020 funds.   |   |   |                |                     |                         |                      |
| <b>Title:</b> FMTV Armor Kit Testing<br><br><b>Description:</b> Development and testing of improvements to the FMTV Armor Kit that simplifies the design and reduces installation cost and complexity.  |   | -   | 0.800          | 0.500               | -                       | 0.500                |
| <b>FY 2019 Plans:</b><br>FY19 funding will be used for Live Fire Testing of the FMTV Underbody Armor Kit improvements to support Full Material Release.   |   |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>FY 2020 funding will be used for testing of the FMTV Underbody Armor Kit improvements to support Full Material Release.   |   |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease due to less extensive testing requirements in FY 2020.   |   |   |                |                     |                         |                      |
| <b>Title:</b> HUSK  |   | 1.129   | -              | -                   | -                       | -                    |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |         |  |             |               |         |  |         |         | Date: March 2019 |            |  |  |  |
|---|---------|---------|--|-------------|---------------|---------|--|---------|---------|------------------|------------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5   |         |         | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |             |               |         | Project (Number/Name)<br>VR5 / TWV Protection Kits |         |         |                  |            |  |  |  |
| B. Accomplishments/Planned Programs (\$ in Millions)  |         |         |  |             |               |         |  |         |         | FY 2018          |            |  |  |  |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer  |         |         |  |             |               |         |  |         |         | -                |            |  |  |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer   |         |         |  |             |               |         |  |         |         | 0.171            |            |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR Transfer  |         |         |  |             |               |         |  |         |         | -                |            |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |         |         |  |             |               |         |  |         |         | 1.578            |            |  |  |  |
| 4.672   |         |         |  |             |               |         |  |         |         | 4.824            |            |  |  |  |
| -   |         |         |  |             |               |         |  |         |         | 4.824            |            |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |         |  |             |               |         |  |         |         |                  |            |  |  |  |
| Line Item   | FY 2018 | FY 2019 | FY 2020 Base   | FY 2020 OCO | FY 2020 Total | FY 2021 | FY 2022  | FY 2023 | FY 2024 | Cost To Complete | Total Cost |  |  |  |
| • D04017: HEAVY TACTICAL VEHICLE PROTECTION KITS  | 16.778  | 49.800  | 25.743   | 25.351      | 51.094        | 51.668  | 55.736   | 70.783  | 71.195  | 0.000            | 367.054    |  |  |  |
| • D04016: MEDIUM TACTICAL VEHICLE PROTECTION KITS   | 17.916  | 38.328  | 19.370   | 24.649      | 44.019        | 44.562  | 49.767   | 37.933  | 33.622  | 0.000            | 266.147    |  |  |  |
| • D16001: TRUCK, DUMP, 20T (CCE)  | 1.083   | 5.061   | 10.838   | -           | 10.838        | 14.339  | 15.060   | -       | -       | 0.000            | 46.381     |  |  |  |
| • DA0500: Family Of Heavy Tactical Vehicles (FHTV)  | 110.195 | 160.897 | 9.969  | 26.917      | 36.886        | 80.903  | -  | -       | -       | 0.000            | 388.881    |  |  |  |
| <b>Remarks</b>  |         |         |  |             |               |         |  |         |         |                  |            |  |  |  |
| <b>D. Acquisition Strategy</b>  |         |         |  |             |               |         |  |         |         |                  |            |  |  |  |
| The Heavy Dump Truck (HDT) entered the acquisition cycle pre-Milestone C, based on a competitive source selection process that resulted in the award of a five year plus two option years firm-fixed price (FFP) indefinite delivery indefinite quantity (IDIQ) contract. The contract award was for one Original Equipment Manufacturer (OEM) to develop an armor solution for a commercially-based dump truck. The commercially-based dump truck will be armor-capable and will be produced concurrently with the development of the armor solution, which will ensure that the armor solution correctly interfaces with the commercially-based dump truck. LRIP began in 3QFY2018. Full rate production (FRP) is expected to begin 4QFY2020. |         |         |  |             |               |         |  |         |         |                  |            |  |  |  |
| The current interim solution for the Heavy Equipment Transporter System (HETS) is in response to a United States Army Europe (USAREUR) Operational Needs Statement (ONS# 17-22207) with deliveries beginning the first quarter of FY 2020. The USAREUR HETS ONS solution shall be capable of carrying 78.5 Tons of payload while achieving host country road permits at a reduced weight of 75 tons. The recommended course of action for satisfying the ONS is to utilize a modified   |         |         |  |             |               |         |  |         |         |                  |            |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |  | <b>Date:</b> March 2019  |
|--|--|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604622A / <i>Family of Heavy Tactical Vehicles</i> | <b>Project (Number/Name)</b><br>VR5 / <i>TWV Protection Kits</i> |
| version of the M1070A1 tractor combined with a commercial 8-axle trailer. Per the 1 DEC 17 Army Requirements Oversight Council (AROC), this trailer will be capable of carrying 85 tons.   |  |  |
| Conduct FMTV Underbody Armor Kit Testing. This effort will utilize Government test facilities.   |  |  |
| HEMTTA4/PLSA1 Suspension and Weapon Station Upgrades includes the design, development, prototypes and testing of new axles, suspension components, and protected weapon station components. The new components will be tested and approved to be released as a stand-alone kit or revision to the current underbody armor kit (aka C-Kit). Technical Data Package (TDP) Conversion from Prototype-level to Production-level will convert and release a Production-level TDP. When complete, the kit can be procured competitively. |  |  |
| <b>E. Performance Metrics</b><br>N/A   |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |  |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|--|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |            |         |            | Project (Number/Name)<br>VR5 / TWV Protection Kits |            |             |            |                  |                  |            |                          |
| 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 |
| Heavy Dump Truck (HDT) Prototype Design of Armored Cab | C/IDIQ                 | Mack Defense : Allentown, PA              | -           | 0.169  | Apr 2018   | 3.701   | Apr 2019   | -  | -          | -           | -          | -                | 0.000            | 3.870      | -                        |
| Weapon Station OGPK/CROWS - STS Task Order             | SS/CPIF                | Oshkosh Defense : Oshkosh, WI             | 0.326       | 0.168  | Sep 2018   | -       | -          | -  | -          | -           | -          | -                | 0.000            | 0.494      | -                        |
| HUSK TDP Development                                   | MIPR                   | TARDEC CSI : Warren, MI                   | -           | 1.129  | Sep 2018   | -       | -          | -  | -          | -           | -          | -                | 0.000            | 1.129      | -                        |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | PM HTV : Warren, MI                       | -           | -  |            | 0.171   |            | -  | -          | -           | -          | -                | 0.000            | 0.171      | -                        |
| <b>Subtotal</b>  |                        | <b>Subtotal</b>                           | 0.326       | 1.466  |            | 3.872   |            | -  | -          | -           | -          | -                | 0.000            | 5.664      | 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 |
| HDT - Production Verification Testing                  | MIPR                   | Aberdeen Test Center (ATC) : Aberdeen, MD | -           | -  |            | -       |            | 1.900  | Jan 2020   | -           | -          | 1.900            | 0.000            | 1.900      | -                        |
| HDT - Live Fire Testing                                | MIPR                   | Aberdeen Test Center (ATC) : Aberdeen, MD | -           | -  |            | -       |            | 1.400  | Mar 2020   | -           | -          | 1.400            | 0.000            | 1.400      | -                        |
| HDT - Familiarization Training                         | C/IDIQ                 | Mack Defense : Allentown, PA              | -           | -  |            | -       |            | 0.050  | Dec 2019   | -           | -          | 0.050            | 0.000            | 0.050      | -                        |
| HDT - Test Services Representative                     | C/IDIQ                 | Mack Defense : Allentown, PA              | -           | -  |            | -       |            | 0.500  | Dec 2019   | -           | -          | 0.500            | 0.000            | 0.500      | -                        |
| HDT - Test System Support Package                      | C/IDIQ                 | Mack Defense : Allentown, PA              | -           | -  |            | -       |            | 0.350  | Dec 2019   | -           | -          | 0.350            | 0.000            | 0.350      | -                        |
| HDT - Refurb of Test Assets                            | C/IDIQ                 | Mack Defense : Allentown, PA              | -           | -  |            | -       |            | 0.124  | Sep 2020   | -           | -          | 0.124            | 0.000            | 0.124      | -                        |
| FMTVA1P2 Underbody Armor Kit Testing                   | MIPR                   | Aberdeen Test Center (ATC) :              | -           | -  |            | 0.800   | Apr 2019   | 0.500  | Apr 2020   | -           | -          | 0.500            | 0.000            | 1.300      | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |  |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|--|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical Vehicles |            |         |            | Project (Number/Name)<br>VR5 / TWV Protection Kits |            |             |            |                  |                  |            |                          |
| 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 |
|  |                        | Aberdeen Proving Grounds, MD              |             |  |            |         |            |  |            |             |            |                  |                  |            |                          |
| HEMTTA4 / PLSA1 Weapons Station Ring Mount Kit         | MIPR                   | Aberdeen Test Center (ATC) : Aberdeen, MD | -           | 0.112  | Mar 2018   | -       | -          | -  | -          | -           | -          | 0.000            | 0.112            | -          |                          |
| <b>Subtotal</b>  |                        |   | -           | 0.112  |            | 0.800   |            | 4.824  |            | -           |            | 4.824            | 0.000            | 5.736      | 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 |
| <b>Project Cost Totals</b>                             |                        |   | 0.326       | 1.578  |            | 4.672   |            | 4.824  |            | -           |            | 4.824            | 0.000            | 11.400     | N/A                      |

Remarks

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| 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)     |   |         |   |         |                  |         |   |         |   |
| 2040 / 5  |  |  |  | PE 0604622A / Family of Heavy Tactical Vehicles |   |         |   | VR5 / TWV Protection Kits |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| Event Name  |  |  |  | FY 2018   |   | FY 2019 |   | FY 2020                   |   | FY 2021 |   | FY 2022 |                  | FY 2023 |   | FY 2024 |   |
|   |  |  |  | 1   | 2 | 3       | 4 | 1                         | 2 | 3       | 4 | 1       | 2                | 3       | 4 | 1       | 2 |
| HEAVY DUMP TRUCK (HDT)  |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Milestone C   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Contract Award  |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Armor Development   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Armored LRIP  |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Armored Cab Live Fire Exploitation Test                         |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Armored PVT   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Armored Live Fire Testing                                       |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Armored Operational Test  |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Type Classification/Materiel Release                            |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HDT Initial Operating Capability                                    |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| HEMTTA4/PLSA1 Suspension and Weapon Station OGPK/CROWS Task Order 1 |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
| FMTV Armor Kit Testing  |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   |         |   |                           |   |         |   |         |                  |         |   |         |   |
|   |  |  |  |   |   | </      |   |                           |   |         |   |         |                  |         |   |         |   |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army                  |   |  |         | Date: March 2019 |
|---|---|--|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5                           | R-1 Program Element (Number/Name)<br>PE 0604622A / Family of Heavy Tactical<br>Vehicles | Project (Number/Name)<br>VR5 / TWV Protection Kits |         |                  |
| Schedule Details  |   |  |         |                  |
| Events  | Start   | End  | Quarter | Year             |
| HEAVY DUMP TRUCK (HDT)  | 1   | 2017   | 4       | 2024             |
| HDT Milestone C   | 3   | 2018   | 3       | 2018             |
| HDT Contract Award  | 3   | 2018   | 3       | 2018             |
| HDT Armor Development   | 4   | 2018   | 3       | 2019             |
| HDT Armored LRIP  | 2   | 2019   | 2       | 2020             |
| HDT Armored Cab Live Fire Exploitation Test                         | 1   | 2020   | 1       | 2020             |
| HDT Armored PVT   | 3   | 2020   | 2       | 2021             |
| HDT Armored Live Fire Testing                                       | 4   | 2020   | 4       | 2021             |
| HDT Armored Operational Test  | 3   | 2021   | 3       | 2021             |
| HDT Type Classification/Materiel Release                            | 1   | 2022   | 1       | 2022             |
| HDT Initial Operating Capability                                    | 2   | 2022   | 2       | 2022             |
| HEMTTA4/PLSA1 Suspension and Weapon Station OGPK/CROWS Task Order 1 | 2   | 2019   | 3       | 2019             |
| FMTV Armor Kit Testing  | 3   | 2019   | 4       | 2022             |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |                                   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|-----------------------------------|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name) |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604633A / Air Traffic Control |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                       | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 3.433   | 12.332  | 6.989        | -                                 | 6.989         | 7.523   | 6.832   | 2.565   | 2.129   | 0.000            | 41.803     |
| 586: Air Traffic Control  | -           | 3.433   | 12.332  | 6.989        | -                                 | 6.989         | 7.523   | 6.832   | 2.565   | 2.129   | 0.000            | 41.803     |

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

This program element funds continuous efforts in the development of modernized tactical Air Traffic Control (ATC) systems that are mission enablers and enable safety of aircraft operations. ATC systems are required to achieve or maintain compliance with civil, military, domestic and international ATC mandates and combat identification requirements.

Tactical Airspace Integration System (TAIS) is the Army's program of record for Airspace Control (AC) and enroute Air Traffic Services (ATS). Continued compatibility and interoperability with the Army Mission Command Information System (MCIS) requires development, testing and integration of new web-based services for AC into common MCIS hardware, while meeting the evolving Common Operating Environment (COE) standards. Includes development and testing of improvements in fusing Blue Force Tracker radar, Identify Friend or Foe, and additional sensor feeds. TAIS develops software and hardware for ATS and AC missions to operate effectively in a dynamic net-centric interconnected environment to further enhance airspace integration and dynamic management capabilities for aviation gateway to mission command.

Air Traffic Navigation Integration and Coordination System (ATNAVICS) is an Airport Surveillance Radar and Precision Approach Radar system that provides ATS at Army terminal airfields and landing sites at Division, Corps, and Echelons Above Corps to include services for Joint and Allied aircraft. ATNAVICS will integrate the Transportable Radar Identification and Recognition capabilities to control aircraft both Outside of the Continental United States and Continental United States. ATNAVICS will network its radar picture and interrogator data to aviation and joint network nodes through TAIS. As the Department of Defense transitions military aircraft to positional self-reporting technologies, flight information will be captured by the upgraded Interrogation Friend-or-Foe (IFF) system. The upgraded IFF allows ATC reception of aircraft self-reporting data to include the Automatic Dependent Surveillance Broadcast and integrates local radar feeds and self-reporting aircraft positional data into a correlated situational awareness air picture.

Tactical Terminal Control System (TTCS) is a mobile ATC communications system that provides initial ATS at remote landing sites and drop zones. It enables secure ground-to-air and ground-to-ground communications between Army aircraft, other services, Allied aircraft, and ground stations. TTCS provides aircraft separation and ground control capabilities, a meteorological measuring system for basic weather information, Blue Force Tracker which provides near real time situational awareness and precision location capability.

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>  |  |                |                     |                    | <b>Date:</b> March 2019 |
|--|--|----------------|---------------------|--------------------|-------------------------|
| <b>Appropriation/Budget Activity</b>   | <b>R-1 Program Element (Number/Name)</b> |                |                     |                    |                         |
| 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i> | PE 0604633A / <i>Air Traffic Control</i> |                |                     |                    |                         |
| <b>B. Program Change Summary (\$ in Millions)</b>  | <b>FY 2018</b>                           | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |
| Previous President's Budget  | 3.536                                    | 12.347         | 6.992               | -                  | 6.992                   |
| Current President's Budget   | 3.433                                    | 12.332         | 6.989               | -                  | 6.989                   |
| Total Adjustments  | -0.103                                   | -0.015         | -0.003              | -                  | -0.003                  |
| • Congressional General Reductions   | -0.002                                   | -0.015         |                     |                    |                         |
| • Congressional Directed Reductions  | -  | -              |                     |                    |                         |
| • Congressional Rescissions  | -  | -              |                     |                    |                         |
| • Congressional Adds   | -  | -              |                     |                    |                         |
| • Congressional Directed Transfers   | -  | -              |                     |                    |                         |
| • Reprogrammings   | -  | -              |                     |                    |                         |
| • SBIR/STTR Transfer   | -0.101                                   | -              |                     |                    |                         |
| • Adjustments to Budget Years  | -  | -              | -0.003              | -                  | -0.003                  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  | Date: March 2019 |                  |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|------------------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604633A / Air Traffic Control |               |         |         | Project (Number/Name)<br>586 / Air Traffic Control |                  |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024          | Cost To Complete | Total Cost |
| 586: Air Traffic Control                                | -           | 3.433   | 12.332  | 6.989        | -  | 6.989         | 7.523   | 6.832   | 2.565  | 2.129            | 0.000            | 41.803     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -  | -                | -                |            |

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

This Project funds continuous efforts in the development of modernized tactical Air Traffic Control (ATC) systems that are mission enablers and enable safety of aircraft operations. ATC systems are required to achieve or maintain compliance with civil, military, domestic and international ATC mandates and combat identification requirements.

Tactical Airspace Integration System (TAIS) is the Army's program of record for Airspace Control (AC) and enroute Air Traffic Services (ATS). Continued compatibility and interoperability with the Army Mission Command Information System (MCIS) requires development, testing and integration of new web-based services for AC into common MCIS hardware, while meeting the evolving Common Operating Environment (COE) standards. Includes development and testing of improvements in fusing Blue Force Tracker radar, Identify Friend or Foe, and additional sensor feeds. TAIS develops software and hardware for ATS and AC missions to operate effectively in a dynamic net-centric interconnected environment to further enhance airspace integration and dynamic management capabilities for aviation gateway to mission command.

Air Traffic Navigation Integration and Coordination System (ATNAVICS) is an Airport Surveillance Radar and Precision Approach Radar system that provides ATS at Army terminal airfields and landing sites at Division, Corps, and Echelons Above Corps to include services for Joint and Allied aircraft. ATNAVICS will integrate the Transportable Radar Identification and Recognition capabilities to control aircraft both Outside of the Continental United States and Continental United States. ATNAVICS will network its radar picture and interrogator data to aviation and joint network nodes through TAIS. As the Department of Defense transitions military aircraft to positional self-reporting technologies, flight information will be captured by the upgraded Interrogation Friend-or-Foe (IFF) system. The upgraded IFF allows ATC reception of aircraft self-reporting data to include the Automatic Dependent Surveillance Broadcast and integrates local radar feeds and self-reporting aircraft positional data into a correlated situational awareness air picture.

Tactical Terminal Control System (TTCS) is a mobile ATC communications system that provides initial ATS at remote landing sites and drop zones. It enables secure ground-to-air and ground-to-ground communications between Army aircraft, other services, Allied aircraft, and ground stations. TTCS provides aircraft separation and ground control capabilities, a meteorological measuring system for basic weather information, Blue Force Tracker which provides near real time situational awareness and precision location capability.

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

|   | FY 2018 | FY 2019 | FY 2020 |
|---|---------|---------|---------|
| <b>Title:</b> Tactical Airspace Integration System (TAIS) | 1.178   | 7.221   | 4.149   |

**Description:** TAIS Airspace Information Center (AIC), Common Operating Environment (COE) and Airspace Integration Improvements Initiative enhancements will be addressed through Expanded Airtrack Sensor Interface optimization and the expansion of electronic flight strips. The radio frequency Link 16 Battlefield Awareness System solution will be certified by Joint

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|---|---|---|-------------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |   |   | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604633A / Air Traffic Control | <b>Project (Number/Name)</b><br>586 / Air Traffic Control |                         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   |   |                         |
| Interoperability Test Certification. Cyber Security and communications range testing will complete qualifications. TAIS continues to develop software and required hardware for airspace management web services to operate effectively in a dynamic net centric interconnected COE environment.  |   |   | <b>FY 2018</b>          |
| <p><b>FY 2019 Plans:</b><br/>           Continue COE and Airspace Integration Improvements, Joint Interoperability Testing and Network Integration Event test and certification in support of the interoperability within the Army's Mission Command Information System (MCIS). Incorporate emerging Federal Aviation Administration (FAA) requirements. Develop software solutions to provide FAA Notice to Airman, Pilot Reports and Temporary Flight Restrictions. Develop system and user defined quality of service and performance tools to monitor and adjust critical performance and loading of software. Continue System Modification 2 testing which includes reliability and maintainability, communications range testing, transportability, and mobility tests.</p> <p><b>FY 2020 Plans:</b><br/>           Will continue COE and Airspace Integration Improvements and certification in support of the interoperability within the Army's Mission Command Information Systems (MCIS). Incorporate emerging FAA requirements. Develop software solutions to provide FAA Notice to Airman, Pilot Reports and adjust critical performance and loading software.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           Funding decrease in FY 2020 is due to decrease in TAIS systems test and evaluation requirements.</p> |   |   | <b>FY 2019</b>          |
| <p><b>Title:</b> Air Traffic Navigation Integration and Coordination System (ATNAVICS) Modernization</p> <p><b>Description:</b> ATNAVICS is a highly mobile tactical area surveillance and precision approach air traffic control radar system. It provides the Joint Force Commander or Combatant Commander, with a mobile, self-contained and reliable Airport Surveillance Radar, Precision Approach Radar and a Secondary Surveillance Radar capability. System modernization includes radar interrogation enhancements.</p> <p><b>FY 2019 Plans:</b><br/>           Complete NRE to ensure ATNAVICS compliance with Risk Management Framework (RMF) to comply with Cyber Security requirements. Complete system Army Test Evaluation Command (ATEC) testing required for Full Material Release. Continue modernization for TPX-59 and Range Extension.</p> <p><b>FY 2020 Plans:</b><br/>           Continue TPX-59 integration, RMF compliance, and product support analysis efforts for ATNAVICS.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           Decrease in FY 2020 is due to decrease in systems test and evaluation requirements.</p>  |   |   | <b>FY 2020</b>          |
| <b>Title:</b> Tactical Terminal Control System (TTCS)   |   |   | 0.938                   |
|   |   |   | 3.760                   |
|   |   |   | 2.611                   |
|   |   |   | 0.847                   |
|   |   |   | 0.899                   |
|   |   |   | 0.229                   |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |                |  |                         |                        |  |                |                | Date: March 2019 |                |                             |                   |
|---|----------------|--|-------------------------|------------------------|--|----------------|----------------|------------------|----------------|-----------------------------|-------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                | R-1 Program Element (Number/Name)<br>PE 0604633A / Air Traffic Control |                         |                        | Project (Number/Name)<br>586 / Air Traffic Control |                |                |                  |                |                             |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |  |                         |                        |  |                |                | FY 2018          | FY 2019        | FY 2020                     |                   |
| <b>Description:</b> The TTCS is a mobile ATC communications system that provides initial ATS at remote landing sites and drop zones. It enables secure ground-to-air and ground-to-ground communications between Army aircraft, other services, Allied aircraft and ground stations. TTCS also provides aircraft separation and ground control capabilities, a meteorological measuring system for basic weather information, and Blue Force Tracker which provides near real time situational awareness and precision location capability. |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>FY 2019 Plans:</b><br>Continue testing of the Tactical Terminal Control System (TTCS) 198C Upgrade to include Cooperative Vulnerability and Penetration Assessment Testing, and Vehicle Durability Simulator Testing.  |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>FY 2020 Plans:</b><br>Will continue testing of the TTCS 198C Upgrade to include High Altitude Electromagnetic Pulse testing. This is a destructive test event and will be performed at completion of the testing in FY 2020.   |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease is due to and completion of testing in FY2020.   |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>Title:</b> Program Management (PM) Support   |                |  |                         |                        |  |                |                | 0.470            | -              | -                           |                   |
| <b>Description:</b> PM support of PM ATC  |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>Title:</b> FY 2019 SBIR/STTR Transfer  |                |  |                         |                        |  |                |                | -                | 0.452          | -                           |                   |
| <b>Description:</b> FY 2019 SBIR/STTR Transfer  |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR/STTR transfer.  |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR/STTR Transfer  |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |  |                         |                        |  |                |                | 3.433            | 12.332         | 6.989                       |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |  |                         |                        |  |                |                |                  |                |                             |                   |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b>   | <b>FY 2020<br/>Base</b> | <b>FY 2020<br/>OCO</b> | <b>FY 2020<br/>Total</b>                           | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>   | <b>FY 2024</b> | <b>Cost To<br/>Complete</b> | <b>Total Cost</b> |
| • AA0050: Air Traffic Control   | 78.790         | 63.872   | 32.738                  | -                      | 32.738   | 37.332         | 34.044         | 34.219           | 33.988         | 0.000                       | 314.983           |
| <b>Remarks</b>  |                |  |                         |                        |  |                |                |                  |                |                             |                   |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |  | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604633A / <i>Air Traffic Control</i> | <b>Project (Number/Name)</b><br>586 / <i>Air Traffic Control</i> |
| <b>D. Acquisition Strategy</b><br>This project is comprised of multiple systems supporting ATC development and test efforts. While the detailed acquisition strategy varies by program, the general strategy for each program is to complete development and testing efforts through contract modifications, engineering service tasks, and new/follow-on contracts. ATC systems are required to achieve or maintain compliance with civil, military, domestic and international air traffic control and upcoming Next Gen requirements and mandates as well as current aircraft self-reporting transponders. |  |  |
| <b>E. Performance Metrics</b><br>N/A  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                       |             |         |  |         |            |                 |  |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---------------------------------------|-------------|---------|--|---------|------------|-----------------|--|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                       |             |         | R-1 Program Element (Number/Name)<br>PE 0604633A / Air Traffic Control |         |            |                 | Project (Number/Name)<br>586 / Air Traffic Control |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                       |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location        | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| PM Support   | Various                | PM ATC : Redstone Arsenal, AL         | 1.757       | 0.470   | Oct 2017   | -       | -          | -               | -  | -              | -          | 0.000            | 2.227            | -          |                          |
| FY2019 SBIR/STTR                                       | TBD                    | HQDA : Washington D.C.                | -           | -       |  | 0.452   | Oct 2018   | -               | -  | -              | -          | 0.000            | 0.452            | -          |                          |
| <b>Subtotal</b>  |                        | 1.757                                 | 0.470       |         | 0.452  |         | -          | -               | -  | -              | -          | 0.000            | 2.679            | N/A        |                          |
| Product Development (\$ in Millions)                   |                        |                                       |             | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location        | Prior Years | Cost    | Award Date   | Cost    | Award Date | Cost            | Award Date   | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| TAIS (Web Based Services Dev)                          | SS/T&M                 | General Dynamics C4S : Huntsville, AL | 29.637      | 1.178   | May 2018   | 7.221   | Jun 2019   | 4.149           | May 2020   | -              |            | 4.149            | Continuing       | Continuing | Continuing               |
| ATNAVICS Modernization, TPX-59                         | Various                | Various : Various                     | 20.006      | 0.938   | Feb 2018   | 3.760   | Jan 2019   | 2.611           | Jan 2020   | -              |            | 2.611            | Continuing       | Continuing | Continuing               |
| Tactical Terminal Control System (TTCS)                | Various                | Various : Various                     | 2.781       | 0.847   | Mar 2018   | 0.899   | Mar 2019   | 0.229           | Oct 2019   | -              |            | 0.229            | 0.000            | 4.756      | -                        |
| <b>Subtotal</b>  |                        | 52.424                                | 2.963       |         | 11.880   |         | 6.989      |                 | -  |                |            | 6.989            | Continuing       | Continuing | N/A                      |
|  |                        |                                       | Prior Years | FY 2018 |  | FY 2019 |            | FY 2020<br>Base |  | FY 2020<br>OCO |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                       | 54.181      | 3.433   |  | 12.332  |            | 6.989           |  | -              |            | 6.989            | Continuing       | Continuing | N/A                      |

Remarks

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army      |              |   |   |   |         |   |  |   |         |   |   |   |         | Date: March 2019                                   |   |   |         |   |   |   |         |   |   |   |
|--|--------------|---|---|---|---------|---|--|---|---------|---|---|---|---------|--|---|---|---------|---|---|---|---------|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5              |              |   |   |   |         |   | R-1 Program Element (Number/Name)<br>PE 0604633A / Air Traffic Control |   |         |   |   |   |         | Project (Number/Name)<br>586 / Air Traffic Control |   |   |         |   |   |   |         |   |   |   |
| Event Name   | FY 2018      |   |   |   | FY 2019 |   |  |   | FY 2020 |   |   |   | FY 2021 |  |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |
|  | 1            | 2 | 3 | 4 | 1       | 2 | 3  | 4 | 1       | 2 | 3 | 4 | 1       | 2  | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |
| TAIS (Web Based Services Dev)                          |              |   |   |   |         |   |  |   |         |   |   |   |         |  |   |   |         |   |   |   |         |   |   |   |
| ATNAVICS Modernization TPX-59                          | TAIS         |   |   |   |         |   |  |   |         |   |   |   |         |  |   |   |         |   |   |   |         |   |   |   |
| Tactical Terminal Control System (TTCS) - 198C Upgrade | TPX-59       |   |   |   |         |   |  |   |         |   |   |   |         |  |   |   |         |   |   |   |         |   |   |   |
|  | 198C Upgrade |   |   |   |         |   |  |   |         |   |   |   |         |  |   |   |         |   |   |   |         |   |   |   |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army     |  |  |         | Date: March 2019 |
|--|--|--|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5              | R-1 Program Element (Number/Name)<br>PE 0604633A / Air Traffic Control | Project (Number/Name)<br>586 / Air Traffic Control |         |                  |
| Schedule Details                                       |  |  |         |                  |
| Events   | Start  | End  | Quarter | Year             |
| TAIS (Web Based Services Dev)                          | 1  | 2015   | 4       | 2024             |
| ATNAVICS Modernization TPX-59                          | 3  | 2017   | 4       | 2021             |
| Tactical Terminal Control System (TTCS) - 198C Upgrade | 2  | 2018   | 4       | 2020             |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)             |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604642A / Light Tactical Wheeled Vehicles |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                                   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 3.619   | 1.276   | 10.465       | -   | 10.465        | 1.977   | 1.976   | 0.000   | 0.000   | 0.000            | 19.313     |
| E40: LTV Prototype  | -           | 3.619   | 1.276   | 10.465       | -   | 10.465        | 1.977   | 1.976   | 0.000   | 0.000   | 0.000            | 19.313     |

**Note**

This project includes GMV (AGMV1.1, Infantry Squad Vehicle (ISV), & SOCOM GMV1.1), and Up-Armored High Mobility Multi-purpose Wheeled Vehicle (UAH HMMWV) Recapitalization Program.

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

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

The Army Ground Mobility Vehicle (GMV) provides Infantry Battalions with motorized expeditionary mobility platforms to provide needed operational mobility for the infantry squad with their associated equipment to move quickly around the battlefield. This capability is required across the range of military operations facing IBCT units conducting crises response, initial entry, and selected decisive action missions. GMV deploys worldwide by sea, air, and land modes to support strategic deployment and operational maneuver in accordance with Army and Joint doctrine. This capability provides flexibility for entry operations (permissive and non-permissive) to counter threat anti-access strategies by using multiple austere entry points to bring in combined arms configured units.

The Up-Armored HMMWV (UAH) provides a light tactical wheeled vehicle for command and control, troop transport, light cargo transport, shelter carrier, towed weapons prime mover, and weapons platform throughout areas of the battlefield. The UAH Recapitalization program is focused on addressing readiness, obsolescence and safety improvements, rebalancing payload, protection automotive performance and air transportability based on available trade-offs and in accordance with user requirements. The HMMWV currently cannot meet its validated operational requirements due to add-on armor weight, and requires modernization to restore those lost capabilities, improve reliability and reduce related Operations and Support costs.

FY20 GMV budget activities include GMV test assets, performance and quality testing, contractor test support, and prototypes.

FY20 HMMWV UAH Recapitalization Program budget activities include prototyping (to address powertrain structure, cooling pack and transmission), program support, contractor test support, and travel.

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b> |   |                |                     |                    | <b>Date:</b> March 2019 |
|---|---|----------------|---------------------|--------------------|-------------------------|
| <b>Appropriation/Budget Activity</b>                                  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604642A / Light Tactical Wheeled Vehicles |                |                     |                    |                         |
| <b>B. Program Change Summary (\$ in Millions)</b>                     | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |
| Previous President's Budget   | 7.000   | 8.212          | 2.965               | -                  | 2.965                   |
| Current President's Budget  | 3.619   | 1.276          | 10.465              | -                  | 10.465                  |
| Total Adjustments   | -3.381  | -6.936         | 7.500               | -                  | 7.500                   |
| • Congressional General Reductions                                    | -0.006  | -0.002         |                     |                    |                         |
| • Congressional Directed Reductions                                   | -   | -6.934         |                     |                    |                         |
| • Congressional Rescissions   | -   | -              |                     |                    |                         |
| • Congressional Adds  | -   | -              |                     |                    |                         |
| • Congressional Directed Transfers                                    | -   | -              |                     |                    |                         |
| • Reprogrammings  | -3.101  | -              |                     |                    |                         |
| • SBIR/STTR Transfer  | -0.274  | -              |                     |                    |                         |
| • Adjustments to Budget Years   | -   | -              | 7.500               | -                  | 7.500                   |

**Change Summary Explanation**

FY 2019 decrease of \$6.934M is for excess GMV test funding (\$2.705M) and JLTV-RV test funding ahead of need (\$4.229M).

FY 2020 increase of \$7.5M is for Up-Armored High Mobility Multi-purpose Wheeled Vehicle (HMMWV UAH) Recapitalization.

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|---------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604642A / Light Tactical Wheeled Vehicles |               |         |         | Project (Number/Name)<br>E40 / LTV 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 |
| E40: LTV Prototype                                      | -           | 3.619   | 1.276   | 10.465       | -  | 10.465        | 1.977   | 1.976   | 0.000  | 0.000   | 0.000            | 19.313     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -  | -       | -                |            |

**Note**  
This project includes GMV (AGMV1.1, Infantry Squad Vehicle (ISV), & SOCOM GMV1.1), and Up-Armored High Mobility Multi-purpose Wheeled Vehicle (UAH HMMWV) Recapitalization Program. High Mobility Multi-purpose Wheeled Vehicle (UAH HMMWV) Recapitalization is a new start effort in FY20.

**A. Mission Description and Budget Item Justification**  
Funding supports modernization of the current Tactical Wheeled Vehicle fleets by investigating technology insertions including, but not limited to: condition based maintenance, vetronics, Victory Architecture, autonomous operations and other emerging technologies. Funding also supports developing initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and operational movement operating concepts.

The Army Ground Mobility Vehicle (GMV) provides enhanced tactical mobility for an Infantry Brigade Combat Team (IBCT) 9-Soldier infantry squad with their associated equipment to move quickly around the battlefield. This capability is required across the range of military operations facing IBCT units conducting crises response, initial entry, and selected decisive action missions. GMV deploys worldwide by sea, air, and land modes to support strategic deployment and operational maneuver in accordance with Army and Joint doctrine. This capability provides flexibility for entry operations (permissive and non-permissive) to counter threat anti-access strategies by using multiple austere entry points to bring in combined arms configured units.

The Up-Armored HMMWV (UAH) provides a light tactical wheeled vehicle for command and control, troop transport, light cargo transport, shelter carrier, towed weapons prime mover, and weapons platform throughout areas of the battlefield. The UAH Recapitalization program is focused on addressing readiness, obsolescence and safety improvements, rebalancing payload, protection automotive performance and air transportability based on available trade-offs and in accordance with user requirements. The HMMWV currently cannot meet its validated operational requirements due to add-on armor weight, and requires modernization to restore those lost capabilities, improve reliability and reduce related Operations and Support costs.

FY20 GMV budget activities include GMV test assets, performance and quality testing, contractor test support, and prototypes.

FY20 HMMWV UAH Recapitalization Program budget activities include prototyping (to address powertrain structure, cooling pack and transmission), program support, contractor test support, and travel.

| B. Accomplishments/Planned Programs (\$ in Millions)  | FY 2018 | FY 2019 | FY 2020 |
|---|---------|---------|---------|
| <b>Title:</b> GMV Contract Test Support   | -       | -       | 0.263   |
| <b>Description:</b> Funding is provided for the contract award for Ground Mobility Vehicle (GMV) contractor test support. |         |         |         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |  |  | Date: March 2019 |         |
|--|--|--|------------------|---------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604642A / Light Tactical Wheeled Vehicles | Project (Number/Name)<br>E40 / LTV Prototype |                  |         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | FY 2018                                      | FY 2019          | FY 2020 |
| <b>FY 2020 Plans:</b><br>GMV contractor test support.  |  |  |                  |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase in funding for contractor test support due to the initiation of the Army competitive production contract award.                                       |  |  |                  |         |
| <b>Title:</b> GMV Test and Evaluation<br><br><b>Description:</b> Funding is provided for Ground Mobility Vehicle (GMV) testing events.   |  | 0.135  | 1.013            | 2.164   |
| <b>FY 2019 Plans:</b><br>GMV performance and quality testing.  |  |  |                  |         |
| <b>FY 2020 Plans:</b><br>GMV performance and quality testing. (Production Qualification Testing (PQT), Low Velocity Air Drop ( LVAD), and operational testing)   |  |  |                  |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase in funding due to the start of test events for the Army competitive production contract award.  |  |  |                  |         |
| <b>Title:</b> GMV Prototypes<br><br><b>Description:</b> Funding is provided for the support of Ground Mobility Vehicle (GMV) Prototypes.   |  | 3.370  | -                | -       |
| <b>Title:</b> GMV Test Assets<br><br><b>Description:</b> GMV Test Assets for Performance, Rollover, and Low Velocity Air Drop (LVAD) testing.  |  | 0.114  | -                | 0.538   |
| <b>FY 2020 Plans:</b><br>LVAD test assets for ISV.   |  |  |                  |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Initiation of production representative test assets are required for LVAD testing.   |  |  |                  |         |
| <b>Title:</b> HMMWV UAH Recapitalization Design<br><br><b>Description:</b> Award contracts to address readiness, obsolescence and safety issues to include improved powertrain structure, cooling pack and transmission. |  | -  | -                | 3.150   |
| <b>FY 2020 Plans:</b>  |  |  |                  |         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |                       | Date: March 2019 |
|--|---|-----------------------|------------------|
| Appropriation/Budget Activity  | R-1 Program Element (Number/Name)             | Project (Number/Name) |                  |
| 2040 / 5   | PE 0604642A / Light Tactical Wheeled Vehicles | E40 / LTV Prototype   |                  |
| B. Accomplishments/Planned Programs (\$ in Millions)   |   | FY 2018               | FY 2019          |
| Address readiness, obsolescence and safety issues.   |   |                       |                  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>New start effort in FY20.                            |   |                       |                  |
| <b>Title:</b> HMMWV UAH Recapitalization Program Support   |   | -                     | -                |
| <b>Description:</b> Funding is provided for Matrix support of the HMMWV UAH Recapitalization program           |   |                       | 1.502            |
| <b>FY 2020 Plans:</b><br>Issue funding for Matrix Support.   |   |                       |                  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>New start effort in FY20.                            |   |                       |                  |
| <b>Title:</b> HMMWV UAH Recapitalization Travel  |   | -                     | -                |
| <b>Description:</b> Funding is provided for HMMWV UAH Recapitalization program travel.                         |   |                       | 0.300            |
| <b>FY 2020 Plans:</b><br>Fund program support travel.  |   |                       |                  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>New start effort in FY20.                            |   |                       |                  |
| <b>Title:</b> HMMWV UAH Recapitalization Test Support Package  |   | -                     | -                |
| <b>Description:</b> Funding is provided for contractor test support package to include FSR support and spares. |   |                       | 0.566            |
| <b>FY 2020 Plans:</b><br>Issue funding for contractor support package including miscellaneous spares.          |   |                       |                  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>New start effort in FY20.                            |   |                       |                  |
| <b>Title:</b> HMMWV UAH Testing  |   | -                     | -                |
| <b>Description:</b> Funding is provided for destructive, crash and reliability testing.                        |   |                       | 1.982            |
| <b>FY 2020 Plans:</b>  |   |                       |                  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                |                |                |                |                |                |                |                |                | <b>Date:</b> March 2019  |                   |
|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|--|-------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                |                |                |                |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604642A / <i>Light Tactical Wheeled Vehicles</i> |                   |
| <b>Project (Number/Name)</b><br>E40 / <i>LTV Prototype</i>  |                |                |                |                |                |                |                |                |                |  |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |                |                |                |                |                |                |                |  |                   |
| Issue funding for destructive, crash and reliability testing.   |                |                |                |                |                |                |                |                |                |  |                   |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>New start effort in FY20.   |                |                |                |                |                |                |                |                |                |  |                   |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer  |                |                |                |                |                |                |                |                |                |  |                   |
| <b>Description:</b> FY 2019 SBIR / STTR Transfer  |                |                |                |                |                |                |                |                |                |  |                   |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer   |                |                |                |                |                |                |                |                |                |  |                   |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR Transfer  |                |                |                |                |                |                |                |                |                |  |                   |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                |                |                |                |                |                |                | 3.619      1.276      10.465   |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                |                |                |                |                |                |                |  |                   |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b> | <b>FY 2024</b> | <b>Cost To Complete</b>  | <b>Total Cost</b> |
| • D15505: <i>Ground Mobility Vehicles (Light) GMV (L)</i>   | 40.935         | 42.695         | 37.038         | -              | 37.038         | 19.078         | 17.914         | 18.000         | 17.000         | Continuing   | Continuing        |
| • DV0230: <i>HMMWV Recapitalization Program</i>   | -              | -              | 5.734          | -              | 5.734          | -              | -              | -              | -              | 0.000  | 5.734             |
| <b>Remarks</b>  |                |                |                |                |                |                |                |                |                |  |                   |
| <b>D. Acquisition Strategy</b>  |                |                |                |                |                |                |                |                |                |  |                   |
| Ground Mobility Vehicle (GMV) Phase I: Per AROC on 10 August 2018 the Army's new direction is to procure 127 vehicles for USASOC, and 168 for Army GMV 1.1 for 3 Airborne IBCTs.  |                |                |                |                |                |                |                |                |                |  |                   |
| GMV Phase II: Pursue development of the GMV ISV to fulfill the requirements for IBCTs using a non-developmental item. A firm fixed priced contract will be awarded through full and open competition. Production contract award is anticipated to be in FY20. |                |                |                |                |                |                |                |                |                |  |                   |
| HMMWV UAH Recapitalization: Pursue a design, prototyping, logistics products, and testing to determine a solution to address readiness, obsolescence and safety improvements.   |                |                |                |                |                |                |                |                |                |  |                   |
| <b>E. Performance Metrics</b>   |                |                |                |                |                |                |                |                |                |  |                   |
| N/A   |                |                |                |                |                |                |                |                |                |  |                   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                                  |                        |                                     |             |  |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|---|------------------------|-------------------------------------|-------------|--|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                        |                                     |             | R-1 Program Element (Number/Name)<br>PE 0604642A / Light Tactical Wheeled Vehicles |            |         |            | Project (Number/Name)<br>E40 / LTV Prototype |            |             |            |                  |                  |            |                          |
| 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 |
| GMV Contractor Test Support   | TBD                    | TBD : TBD                           | 0.153       | -  |            | -       |            | 0.263  | Mar 2020   | -           |            | 0.263            | 0.000            | 0.416      | -                        |
| GMV Test Assets   | TBD                    | TBD : TBD                           | -           | 0.114  | Jan 2019   | -       |            | 0.538  | Mar 2020   | -           |            | 0.538            | 0.000            | 0.652      | -                        |
| GMV Prototypes  | TBD                    | TBD : TBD                           | -           | 3.370  | Jun 2019   | -       |            | -  |            | -           |            | -                | 0.000            | 3.370      | -                        |
| HMMWV UAH Recapitalization Design (powertrain structure, cooling pack and transmission) | C/TBD                  | To Be Determined : To Be Determined | -           | -  |            | -       |            | 3.150  | Feb 2020   | -           |            | 3.150            | 0.000            | 3.150      | -                        |
| FY 2019 SBIR / STTR Transfer  | TBD                    | TBD : TBD                           | -           | -  |            | 0.263   |            | -  |            | -           |            | -                | 0.000            | 0.263      | -                        |
| <b>Subtotal</b>   |                        | 0.153                               | 3.484       |  | 0.263      |         | 3.951      |  |            |             | 3.951      | 0.000            | 7.851            | 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 |
| HMMWV UAH Recapitalization PM Support   | MIPR                   | PD LTV : TACOM Warren, MI           | -           | -  |            | -       |            | 1.502  | Oct 2019   | -           |            | 1.502            | 0.000            | 1.502      | -                        |
| HMMWV UAH Recapitalization Travel   | MIPR                   | PD LTV : TACOM Warren, MI           | -           | -  |            | -       |            | 0.300  | Oct 2019   | -           |            | 0.300            | 0.000            | 0.300      | -                        |
| <b>Subtotal</b>   |                        | -                                   | -           |  | -          |         | 1.802      |  |            |             | 1.802      | 0.000            | 1.802            | 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 |
| GMV performance and qualification testing   | MIPR                   | Various : Various                   | 0.323       | 0.135  | Mar 2019   | 1.013   | Jun 2019   | 2.164  | Aug 2020   | -           |            | 2.164            | 0.000            | 3.635      | -                        |
| HMMWV UAH Recapitalization Contractor   | C/TBD                  | TBD : TBD                           | -           | -  |            | -       |            | 0.566  | Feb 2020   | -           |            | 0.566            | 0.000            | 0.566      | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |  |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|--|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604642A / Light Tactical Wheeled Vehicles |            |         |            | Project (Number/Name)<br>E40 / LTV Prototype |            |             |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base                                 |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Test Support Package (FSR support and spares)          |                        |                                |             |  |            |         |            |  |            |             |            |                  |                  |            |                          |
| HMMWV UAH Testing (destructive, crash and reliability) | MIPR                   | TBD : TBD                      | -           | -  |            | -       |            | 1.982  | Feb 2020   | -           |            | 1.982            | 0.000            | 1.982      | -                        |
| <b>Subtotal</b>  |                        |                                | 0.323       | 0.135  |            | 1.013   |            | 4.712  |            | -           |            | 4.712            | 0.000            | 6.183      | 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 |
| <b>Project Cost Totals</b>                             |                        |                                | 0.476       | 3.619  |            | 1.276   |            | 10.465                                       |            | -           |            | 10.465           | 0.000            | 15.836     | N/A                      |

Remarks

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604642A / *Light Tactical Wheeled Vehicles***Project (Number/Name)**E40 / *LTV Prototype*

| <b>Event Name</b>                             | <b>FY 2018</b> |   |   |   | <b>FY 2019</b> |   |   |   | <b>FY 2020</b> |   |   |   | <b>FY 2021</b> |   |   |   | <b>FY 2022</b> |   |   |   | <b>FY 2023</b> |   |   |   | <b>FY 2024</b> |   |   |   |  |  |
|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|----------------|---|---|---|--|--|
|   | 1              | 2 | 3 | 4 | 1              | 2 | 3 | 4 | 1              | 2 | 3 | 4 | 1              | 2 | 3 | 4 | 1              | 2 | 3 | 4 | 1              | 2 | 3 | 4 | 1              | 2 | 3 | 4 |  |  |
| HMMWV UAH Recapitalization ECP Contract Award |                |   |   |   |                |   |   |   |                |   |   |   |                |   |   |   |                |   |   |   |                |   |   |   |                |   |   |   |  |  |



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|   |  |  |
|---|--|--|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |  | <b>Date:</b> March 2019                                    |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604642A / <i>Light Tactical Wheeled Vehicles</i> | <b>Project (Number/Name)</b><br>E40 / <i>LTV Prototype</i> |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| AGMV1.1 MS C   | 3              | 2018        | 3              | 2018        |
| AGMV1.1 Hardware Contract                              | 3              | 2018        | 3              | 2018        |
| AGMV1.1 UMR Approval                                   | 4              | 2018        | 4              | 2018        |
| AGMV1.1 Log Development                                | 1              | 2019        | 1              | 2020        |
| GMV ISV OTA Prototype Contract Award                   | 3              | 2019        | 3              | 2019        |
| GMV ISV OTA Run-off Testing                            | 4              | 2019        | 2              | 2020        |
| GMV ISV MS C   | 2              | 2020        | 2              | 2020        |
| GMV ISV Production Contract                            | 2              | 2020        | 2              | 2020        |
| GMV ISV Production Qualification Testing (PQT)         | 4              | 2020        | 2              | 2021        |
| GMV ISV Operational Testing                            | 4              | 2021        | 1              | 2022        |
| GMV ISV First Unit Equipped (FUE)                      | 2              | 2022        | 2              | 2022        |
| HMMWV UAH Recapitalization Contract Award              | 2              | 2020        | 2              | 2020        |
| HMMWV UAH Recapitalization Design, Test and Evaluation | 2              | 2020        | 3              | 2021        |
| HMMWV UAH Recapitalization ECP Contract Award          | 1              | 2022        | 1              | 2022        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)                           |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604645A / Armored Systems Modernization (ASM) - Eng Dev |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 34.794  | 373.337 | 310.152      | -   | 310.152       | 135.619 | 83.360  | 37.238  | 56.932  | 0.000            | 1,031.432  |
| EV8: Mobile Protected Firepower   | -           | 34.794  | 373.337 | 310.152      | -   | 310.152       | 135.619 | 83.360  | 37.238  | 56.932  | 0.000            | 1,031.432  |

**Note**  
This program supports the Cross Functional Team (CFT).

**A. Mission Description and Budget Item Justification**  
Infantry Brigade Combat Teams (IBCTs) lack the mobile protected firepower capability necessary to defeat enemy prepared positions, destroy enemy armored vehicles, close with the enemy through fire and maneuver, and ensure freedom of maneuver and action in close contact with the enemy. Mobile Protected Firepower (MPF) will provide the protected, long range, precision direct-fire capability to ensure freedom of movement and action during offensive operations or defeat attacking enemy during defensive operations.

| B. Program Change Summary (\$ in Millions) | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| Previous President's Budget                | 36.242  | 393.613 | 270.183      | -           | 270.183       |
| Current President's Budget                 | 34.794  | 373.337 | 310.152      | -           | 310.152       |
| Total Adjustments                          | -1.448  | -20.276 | 39.969       | -           | 39.969        |
| • Congressional General Reductions         | -0.029  | -0.463  |              |             |               |
| • Congressional Directed Reductions        | -       | -19.813 |              |             |               |
| • Congressional Rescissions                | -       | -       |              |             |               |
| • Congressional Adds                       | -       | -       |              |             |               |
| • Congressional Directed Transfers         | -       | -       |              |             |               |
| • Reprogrammings                           | -       | -       |              |             |               |
| • SBIR/STTR Transfer                       | -1.419  | -       |              |             |               |
| • Adjustments to Budget Years              | -       | -       | 39.969       | -           | 39.969        |

**Change Summary Explanation**  
The FY 2020 change resulted from the finalization of performance specifications included within the MPF Request For Proposal (RFP) and refinement of the MPF test plan. These programmatic refinements necessitated a \$39.969 million increase to FY 2020 funding, however the refinements also reduced FY2021 projected funding by \$54.031 million, resulting in an overall cost reduction of \$14.092 million across FY 2020 and FY 2021.

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |         |   | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------|---|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604645A / Armored Systems<br>Modernization (ASM) - Eng Dev |               |         |         |         | Project (Number/Name)<br>EV8 / Mobile Protected Firepower |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024   | Cost To Complete | Total Cost |  |
| EV8: Mobile Protected Firepower                         | -           | 34.794  | 373.337 | 310.152      | -   | 310.152       | 135.619 | 83.360  | 37.238  | 56.932  | 0.000            | 1,031.432  |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -       | -   | -                |            |  |

**Note**  
This program supports the Cross Functional Team (CFT).

**A. Mission Description and Budget Item Justification**  
Infantry Brigade Combat Teams (IBCTs) lack the mobile protected firepower capability necessary to defeat enemy prepared positions, destroy enemy armored vehicles, close with the enemy through fire and maneuver, and ensure freedom of maneuver and action in close contact with the enemy. Mobile Protected Firepower (MPF) will provide the protected, long range, precision direct-fire capability to ensure freedom of movement and action during offensive operations or defeat attacking enemy during defensive operations.

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

|  | FY 2018 | FY 2019 | FY 2020 |
|--|---------|---------|---------|
| <b>Title:</b> Product Development  | 9.720   | 342.844 | 256.623 |
| <b>Description:</b> MPF Middle Tier Acquisition (MTA) Rapid Prototyping efforts, to include integration engineering, prototype builds, technical support to government test, and logistics products development.   |         |         |         |
| <b>FY 2019 Plans:</b><br>The Army awarded two MTA Rapid Prototyping contracts in December 2018. FY 2019 activities include start of work meeting execution, product design engineering, Design Maturity Review (DMR) completion, component-level qualification testing and performance analyses, and contractor and government-furnished material procurement for prototype and Ballistic Hull & Turret (BH&T) builds. Additionally, FY 2019 efforts include planning and material procurement to support FY 2020 developmental test and execution of logistics engineering and analysis necessary to initiate Technical Manual (TM) and Training Support Package (TSP) development. |         |         |         |
| <b>FY 2020 Plans:</b><br>Continuation of MTA Rapid Prototyping efforts, to include build completion of 24 prototypes and 4 BH&Ts. FY 2020 efforts also include TM and TSP development, system protection, survivability, and subsystem performance analyses, engineering and logistics support necessary to conduct BH&T test and Soldier Vehicle Assessment (SVA) readiness reviews, and root cause analysis, corrective action implementation, and test asset maintenance to support execution BH&T testing, Pre-Production Testing (PPT), and SVA.  |         |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>   |         |         |         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |   | Date: March 2019 |         |         |
|--|---|---|------------------|---------|---------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604645A / Armored Systems<br>Modernization (ASM) - Eng Dev | Project (Number/Name)<br>EV8 / Mobile Protected Firepower |                  |         |         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   |   | FY 2018          | FY 2019 | FY 2020 |
| Decrease from FY 2019 to FY 2020 is due to declining levels material purchases necessary for MPF prototype builds. The FY 2019 budget provides for the purchase of material necessary to build MPF prototype systems while the FY 2020 budget provides assembly labor to complete MPF prototype builds.  |   |   |                  |         |         |
| <b>Title:</b> Government Test and Evaluation<br><br><b>Description:</b> Government test and evaluation support for MPF Rapid Prototyping efforts. Includes salaries, travel, and material necessary to conduct test planning, system instrumentation, test execution, and test report development.<br><br><b>FY 2019 Plans:</b><br>Continued government test activities, to include completion of Armor Coupon testing, and planning for FY20 BH&T test and PPT.<br><br><b>FY 2020 Plans:</b><br>Government test activities necessary to complete BH&T testing and initiate PPT, to include Test Readiness Review (TRR) execution, integration and installation of instrumentation, test execution, data collection and storage, Test Incident Report (TIR) processing, and Failure Analysis and Corrective Action (FACAR) resolution.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase from FY 2019 to FY 2020 is due to initiation of MPF system-level developmental testing (BH&T, PPT) in FY 2020.  |   |   | 7.116            | 1.502   | 29.843  |
| <b>Title:</b> Soldier Vehicle Assessment<br><br><b>Description:</b> The SVA will place eight prototype vehicles (four per contractor) into the hands of soldiers to develop MPF Tactics, Techniques, and Procedures (TTPs), assess Doctrine, Organization, Training materiel Leadership and educational Personal Facilities and Policy (DOTmLPF-P) domains, collect data to support preparations for the FY 2021 Limited User Test (LUT), and inform future MPF product improvements.<br><br><b>FY 2019 Plans:</b><br>Continue preparatory activities for SVA, to include supporting detailed data collection plan development and assisting facility and infrastructure requirement assessments.<br><br><b>FY 2020 Plans:</b><br>Preparation and initiation of the SVA. Preparatory activities include finalization of the detailed data collection plan, early TTP development, and conduct of contractor-led soldier training. Execution of the SVA will consist of unit level training, to include crew gunnery qualification and force-on-force training missions, and assessments of TTPs and DOTmLPF-P domains.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> |   |   | -                | 0.176   | 2.842   |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |   | Date: March 2019 |         |
|--|---|---|------------------|---------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604645A / Armored Systems<br>Modernization (ASM) - Eng Dev | Project (Number/Name)<br>EV8 / Mobile Protected Firepower |                  |         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   | FY 2018   | FY 2019          | FY 2020 |
| Increase from FY 2019 to FY 2020 is due to the initiation of SVA in FY 2020.   |   |   |                  |         |
| <b>Title:</b> Training Aids and Devices Development  |   | -   | -                | 6.468   |
| <b>Description:</b> Development of training aids and devices to facilitate MPF crew and maintainer training.   |   |   |                  |         |
| <b>FY 2020 Plans:</b><br>Development MPF operator and maintainer training aids and devices, to include Hands on Trainers (HOT), Diagnostic/Troubleshooting Trainers (DTT), Part Task Trainers (PTT), Advanced Gunnery Training System (AGTS), and Combat Vehicle Tactical Engagement Simulation System (CVTESS).   |   |   |                  |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase from FY 2019 to FY 2020 is due to the initiation of training device development activities in FY 2020.  |   |   |                  |         |
| <b>Title:</b> Government Engineering and Project Management  |   | 8.569   | 13.408           | 13.562  |
| <b>Description:</b> Government program management and system engineering support, to include salaries, travel, training, supplies, facilities, equipment, and support contractors necessary to manage the MPF MTA Rapid Prototyping effort.  |   |   |                  |         |
| <b>FY 2019 Plans:</b><br>Continued government program management, to include engineering, logistics, product assurance and test, financial management, acquisition, and operations support for the MPF MTA Rapid Prototyping activities. Includes salaries, training, travel, supplies, facilities, and equipment to manage MPF integration design, prototype build, and test and evaluation efforts. MPF awarded two contracts for MTA Rapid Prototyping activities in December 2018.   |   |   |                  |         |
| <b>FY 2020 Plans:</b><br>Continuation of government program management, to include engineering, logistics, product assurance and test, financial management, acquisition, and operations support for the MPF MTA Rapid Prototyping activities. Includes salaries, training, travel, supplies, facilities, and equipment to manage MPF integration design, prototype build, test and evaluation, logistics products development, Soldier touch-point feedback collection and analysis, and system vulnerability assessment efforts. |   |   |                  |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase from FY 2019 to FY 2020 is due to the ramp up in support necessary to manage system-level testing and logistics products development efforts for two competing prototype systems.   |   |   |                  |         |
| <b>Title:</b> Government Support to Product Development  |   | 9.389   | 1.087            | 0.814   |
| <b>Description:</b> Government support to MPF MTA Rapid Prototyping efforts, to include Source Selection activities and Large Caliber Weapon System development.   |   |   |                  |         |

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|--|----------------|----------------|---|----------------|----------------|--|----------------|----------------|----------------|-------------------------|-------------------|--|--|--|--|--|--|
| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                |                |   |                |                |  |                |                |                |                         | Date: March 2019  |  |  |  |  |  |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604645A / Armored Systems Modernization (ASM) - Eng Dev |                |                | <b>Project (Number/Name)</b><br>EV8 / Mobile Protected Firepower |                |                |                |                         |                   |  |  |  |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                |                |   |                |                |  |                |                | <b>FY 2018</b> | <b>FY 2019</b>          | <b>FY 2020</b>    |  |  |  |  |  |  |
| <b>FY 2019 Plans:</b><br>Continued Large Caliber Weapon System development, to include initiation of Safety Confirmation testing necessary to obtain weapon system safety release for the SVA and support grant of MPF system materiel release prior to vehicle fielding to Army IBCTs.  |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |
| <b>FY 2020 Plans:</b><br>Continuation of Large Caliber Weapon System development, to include completion of Safety Confirmation testing necessary to obtain weapon system safety release for the SVA and obtain MPF system materiel release necessary for system fielding to Army IBCTs.  |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease from FY 2019 to FY 2020 is due to reduction of engineering support necessary to complete Large Caliber Weapon System Safety Confirmation testing.   |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer<br><br><b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer  |                |                |   |                |                |  |                |                | -              | 14.320                  | -                 |  |  |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR Transfer   |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |                |                |   |                |                |  |                |                | 34.794         | 373.337                 | 310.152           |  |  |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |
| <b>Line Item</b>   | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b>  | <b>FY 2020</b> | <b>FY 2020</b> | <b>FY 2021</b>   | <b>FY 2022</b> | <b>FY 2023</b> | <b>FY 2024</b> | <b>Cost To Complete</b> | <b>Total Cost</b> |  |  |  |  |  |  |
| • G80820: Mobile Protected Firepower   | -              | -              | 0.000   | -              | 0.000          | -  | 346.007        | 367.438        | 499.323        | Continuing              | Continuing        |  |  |  |  |  |  |
| <b>Remarks</b>   |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |
| SSN G80820 resources production of MPF. FY 2022 - FY 2023 resourcing supports MPF Low Rate Initial Production (LRIP) while FY 2024 resourcing supports MPF Full Rate Production (FRP).   |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |
| <b>D. Acquisition Strategy</b>   |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |
| The MPF RFP was issued on 21 November 2017 as a full and open, best value competitive action. On 25 September 2018, the Army Acquisition Executive (AAE) approved the execution of MPF Rapid Prototyping activities under Section 804 of the 2016 National Defense Authorization Act (NDAA), (Public Law 114-92), Middle Tier Acquisition (Rapid Prototyping). The competitive selection process for MPF Rapid Prototyping contracts included the evaluation of written proposals and optional bid |                |                |   |                |                |  |                |                |                |                         |                   |  |  |  |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   | <b>Date:</b> March 2019  |
|--|---|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604645A / Armored Systems<br><i>Modernization (ASM) - Eng Dev</i> | <b>Project (Number/Name)</b><br>EV8 / Mobile Protected Firepower |
| samples to provide additional substantiating data for Source Selection Evaluation. On 17 December 2018, two MPF Rapid Prototyping contracts were awarded, one to BAE Land Systems and the other to General Dynamics Land Systems (GDLS). Upon AAE Milestone C approval in 3QFY 2022, a Source Selection Evaluation will be finalized to down-select to a single contractor for a Fixed Price Incentive (FPI) LRIP effort. An MPF FRP decision is targeted for 3QFY 2025. |   |  |
| <b>E. Performance Metrics</b><br>N/A   |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army  |                        |   |             |   |            |         |            |   |            |                |            | Date: March 2019 |                  |            |                          |
|---|------------------------|---|-------------|---|------------|---------|------------|---|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604645A / Armored Systems<br>Modernization (ASM) - Eng Dev |            |         |            | Project (Number/Name)<br>EV8 / Mobile Protected Firepower |            |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)  |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location  | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Government Engineering and Project Management   | MIPR                   | Various : Warren, MI; Picatinny, NJ   | -           | 8.569   | Dec 2017   | 13.408  | Dec 2018   | 13.562  | Dec 2019   | -              |            | 13.562           | 35.563           | 71.102     | -                        |
| <b>Subtotal</b>   |                        |   |             | 8.569   |            | 13.408  |            | 13.562  |            | -              |            | 13.562           | 35.563           | 71.102     | N/A                      |
| Product Development (\$ in Millions)  |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location  | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Middle Tier Acquisition (MTA) Rapid Prototyping Contracts   | C/FFP                  | BAE Land Systems; General Dynamics Land Systems (GDLS) : Sterling Heights, MI; Sterling Heights, MI | -           | 8.342   | Dec 2018   | 342.465 | Dec 2018   | 256.623   | Dec 2019   | -              |            | 256.623          | 192.302          | 799.732    | 799.732                  |
| Government Furnished Material (GFM) Procurement   | Various                | Various : Various   | -           | 1.378   | Oct 2017   | 0.380   | Feb 2019   | -   |            | -              |            | -                | 0.000            | 1.758      | -                        |
| FY 2019 SBIR / STTR Transfer  | TBD                    | TBD : TBD   | -           | -   |            | 14.320  | Nov 2018   | -   |            | -              |            | -                | 0.000            | 14.320     | -                        |
| <b>Subtotal</b>   |                        |   |             | 9.720   |            | 357.165 |            | 256.623   |            | -              |            | 256.623          | 192.302          | 815.810    | N/A                      |
| <b>Remarks</b>  |                        |   |             |   |            |         |            |   |            |                |            |                  |                  |            |                          |
| MTA Rapid Prototyping contract costs are inclusive of both competitors during the Mobile Protected Firepower (MPF) MTA Rapid Prototyping Phase (1QFY2019 - 3QFY2022) and a single vendor after down-select for Low Rate Initial Production (LRIP) at Milestone C (3QFY2022). Contract product development efforts during the LRIP phase include retrofit of prototypes to LRIP configuration, technical support to Government Production Qualification Test (PQT) and Initial Operational Test and Evaluation (IOT&E), and completion of system log products. |                        |   |             |   |            |         |            |   |            |                |            |                  |                  |            |                          |
| Support (\$ in Millions)  |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location  | 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 to Product Development -   | PO                     | Armament Research, Development and  | -           | 5.169   | Jan 2018   | 1.086   | Jan 2019   | 0.814   | Jan 2020   | -              |            | 0.814            | 0.000            | 7.069      | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                               |                        |  |             |             |   |         |            |                 |   |                |                | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--|-------------|-------------|---|---------|------------|-----------------|---|----------------|----------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5  |                        |  |             |             | R-1 Program Element (Number/Name)<br>PE 0604645A / Armored Systems<br>Modernization (ASM) - Eng Dev |         |            |                 | Project (Number/Name)<br>EV8 / Mobile Protected Firepower |                |                |                  |                  |                  |                          |                          |
| Support (\$ in Millions)   |                        |  |             | FY 2018     |   | FY 2019 |            | FY 2020<br>Base |   | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location   | Prior Years | Cost        | Award Date  | Cost    | Award Date | Cost            | Award Date  | Cost           | Award Date     | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Large Caliber Weapon System Development  |                        | Engineering Center (ARDEC); Watervliet Arsenal (WVA); Rock Island Arsenal (RIA) : Picatinny, NJ; Watervliet, NY; Rock Island, IL |             |             |   |         |            |                 |   |                |                |                  |                  |                  |                          |                          |
| Government Support to Product Development - Source Selection Evaluation Board (SSEB) | Various                | Various : Various  | -           | 4.220       | Oct 2017  | -       | -          | -               | -   | -              | -              | 0.000            | 4.220            | -                |                          |                          |
| Training Aids and Devices Development  | Various                | Program Executive Office Simulation, Training and Instrumentation (PEO STRI) : Orlando, FL                                       | -           | -           | -   | -       | -          | 6.468           | Feb 2020  | -              | -              | 6.468            | 9.207            | 15.675           | -                        |                          |
| <b>Subtotal</b>  |                        | -  | 9.389       |             | 1.086   |         | 7.282      |                 | -   |                | 7.282          | 9.207            | 26.964           | N/A              |                          |                          |
| Test and Evaluation (\$ in Millions)   |                        |  |             | FY 2018     |   | FY 2019 |            | FY 2020<br>Base |   | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location   | Prior Years | Cost        | Award Date  | Cost    | Award Date | Cost            | Award Date  | Cost           | Award Date     | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Government Test and Evaluation   | PO                     | Aberdeen Test Center (ATC); Yuma Test Center (YTC) : Aberdeen, MD; Yuma, AZ  | -           | 7.116       | Feb 2018  | 1.678   | Mar 2019   | 32.685          | Dec 2019  | -              | -              | 32.685           | 76.077           | 117.556          | -                        |                          |
| <b>Subtotal</b>  |                        | -  | 7.116       |             | 1.678   |         | 32.685     |                 | -   |                | 32.685         | 76.077           | 117.556          | N/A              |                          |                          |
|  |                        |  |             | Prior Years | FY 2018   |         | FY 2019    |                 | FY 2020<br>Base   |                | FY 2020<br>OCO |                  | FY 2020<br>Total | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>   |                        |  |             | -           | 34.794  |         | 373.337    |                 | 310.152   |                | -              |                  | 310.152          | 313.149          | 1,031.432                | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army  |                |         |   |                 |                |   | Date: March 2019    |               |                                |
|---|----------------|---------|---|-----------------|----------------|---|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                |         | R-1 Program Element (Number/Name)<br>PE 0604645A / Armored Systems<br>Modernization (ASM) - Eng Dev |                 |                | Project (Number/Name)<br>EV8 / Mobile Protected Firepower |                     |               |                                |
|   | Prior<br>Years | FY 2018 | FY 2019   | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total  | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
| <b>Remarks</b><br>FY 2018 funding supported successful Request For Proposal (RFP) release, subsequent execution of a Source Selection Evaluation Board (SSEB), vendor bid sample testing, evaluation and update of large caliber gun manufacturing processes and documentation, and large caliber gun Technical Data Package (TDP) development.<br>FY 2019 funding supports award of two rapid prototyping contracts that will design and build 24 total Mobile Protected Firepower (MPF) prototypes (12 per vendor), execution of armor coupon test, and planning for FY 2020 Ballistic Hull and Turret (BH&T) test, Pre-Production Test (PPT), and Soldier Vehicle Assessment (SVA).<br>FY 2020 funding will support final assembly and delivery of MPF prototypes and BH&T assets, execution of BH&T testing, initiation of PPT and SVA, and development of MPF Technical Manuals (TM), Training Support Packages (TSP), and training devices. |                |         |   |                 |                |   |                     |               |                                |
|   |                |         |   |                 |                |   |                     |               |                                |

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| 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)            |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2040 / 5   |  |             |   | PE 0604645A / Armored Systems Modernization (ASM) - Eng Dev            |   |                                   |  | EV8 / Mobile Protected Firepower |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Event Name   |  | FY 2018     |   | FY 2019  |   | FY 2020                           |  | FY 2021                          |   | FY 2022                          |           | FY 2023                              |                           | FY 2024  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  |  | 1           | 2   | 3  | 4   | 1                                 | 2  | 3                                | 4   | 1                                | 2         | 3                                    | 4                         | 1  | 2 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Request for Proposal (RFP) Release                                     |  | RFP Release | Risk Reduction of Large Caliber Weapon System | Middle Tier Acquisition (MTA) Source Selection Evaluation Board (SSEB) | Section 804 MTA Rapid Prototyping Designation | Rapid Prototyping Contract Awards | Mobile Protected Firepower (MPF) Rapid Prototyping Phase | Design Maturity Review (DMR)     | Ballistic Hull & Turret (BH&T) Deliveries (4 BH&Ts) | BH&T Test Readiness Review (TRR) | BH&T Test | Prototype Deliveries (24 Prototypes) | Pre-Production Test (PPT) | Soldier Vehicle Assessment (SVA) Readiness Review (RR) |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Risk Reduction of Large Caliber Weapon System                          |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Middle Tier Acquisition (MTA) Source Selection Evaluation Board (SSEB) |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Section 804 MTA Rapid Prototyping Designation                          |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Rapid Prototyping Contract Awards                                      |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Mobile Protected Firepower (MPF) Rapid Prototyping Phase               |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Design Maturity Review (DMR)   |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Ballistic Hull & Turret (BH&T) Deliveries (4 BH&Ts)                    |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| BH&T Test Readiness Review (TRR)                                       |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| BH&T Test  |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Prototype Deliveries (24 Prototypes)                                   |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Pre-Production Test (PPT)  |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Soldier Vehicle Assessment (SVA) Readiness Review (RR)                 |  |             |   |  |   |                                   |  |                                  |   |                                  |           |                                      |                           |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

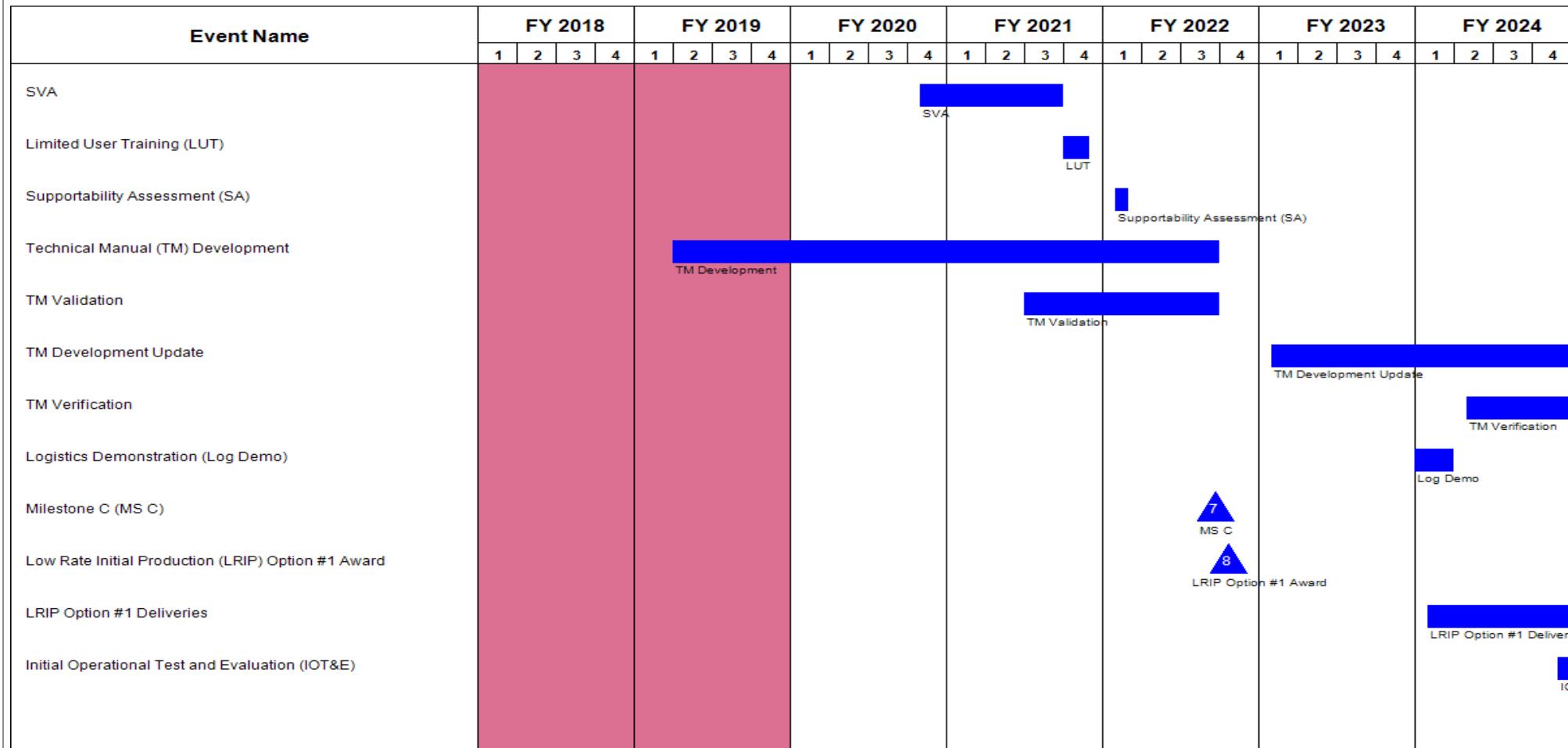
Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604645A / Armored Systems  
Modernization (ASM) - Eng Dev**Project (Number/Name)**

EV8 / Mobile Protected Firepower



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|   |  |  |
|---|--|--|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |  | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604645A / Armored Systems<br>Modernization (ASM) - Eng Dev | <b>Project (Number/Name)</b><br>EV8 / Mobile Protected Firepower |

**Schedule Details**

| Events   | Start   |      | End     |      |
|--|---------|------|---------|------|
|  | Quarter | Year | Quarter | Year |
| Request for Proposal (RFP) Release                                     | 1       | 2018 | 1       | 2018 |
| Risk Reduction of Large Caliber Weapon System                          | 3       | 2017 | 4       | 2020 |
| Middle Tier Acquisition (MTA) Source Selection Evaluation Board (SSEB) | 2       | 2018 | 1       | 2019 |
| Section 804 MTA Rapid Prototyping Designation                          | 4       | 2018 | 4       | 2018 |
| Rapid Prototyping Contract Awards                                      | 1       | 2019 | 1       | 2019 |
| Mobile Protected Firepower (MPF) Rapid Prototyping Phase               | 1       | 2019 | 3       | 2022 |
| Design Maturity Review (DMR)   | 3       | 2019 | 3       | 2019 |
| Ballistic Hull & Turret (BH&T) Deliveries (4 BH&Ts)                    | 3       | 2020 | 3       | 2020 |
| BH&T Test Readiness Review (TRR)                                       | 2       | 2020 | 2       | 2020 |
| BH&T Test  | 3       | 2020 | 4       | 2020 |
| Prototype Deliveries (24 Prototypes)                                   | 2       | 2020 | 4       | 2020 |
| Pre-Production Test (PPT)  | 3       | 2020 | 1       | 2022 |
| Soldier Vehicle Assessment (SVA) Readiness Review (RR)                 | 3       | 2020 | 3       | 2020 |
| SVA  | 4       | 2020 | 3       | 2021 |
| Limited User Training (LUT)  | 4       | 2021 | 4       | 2021 |
| Supportability Assessment (SA)   | 1       | 2022 | 1       | 2022 |
| Technical Manual (TM) Development                                      | 2       | 2019 | 3       | 2022 |
| TM Validation  | 3       | 2021 | 3       | 2022 |
| TM Development Update  | 1       | 2023 | 1       | 2025 |
| TM Verification  | 2       | 2024 | 1       | 2025 |
| Logistics Demonstration (Log Demo)                                     | 1       | 2024 | 1       | 2024 |
| Milestone C (MS C)   | 3       | 2022 | 3       | 2022 |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |   |   |         | Date: March 2019 |
|--|---|---|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604645A / Armored Systems<br>Modernization (ASM) - Eng Dev | Project (Number/Name)<br>EV8 / Mobile Protected Firepower |         |                  |
| Events   | Start   |   | End     |                  |
|  | Quarter   | Year  | Quarter | Year             |
|  | 4   | 2022  | 4       | 2022             |
|  | 1   | 2024  | 1       | 2025             |
| Initial Operational Test and Evaluation (IOT&E)    | 4   | 2024  | 1       | 2025             |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)            |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604710A / Night Vision Systems - Eng Dev |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                                  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 184.389 | 144.442 | 181.732      | -  | 181.732       | 59.469  | 44.109  | 35.456  | 39.935  | Continuing       | Continuing |
| BQ6: Visual Augmentation System Eng Dev   | -           | 0.000   | 0.000   | 89.000       | -  | 89.000        | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 89.000     |
| L67: Soldier Night Vision Devices   | -           | 108.518 | 58.987  | 40.060       | -  | 40.060        | 28.667  | 19.240  | 20.646  | 25.310  | Continuing       | Continuing |
| L70: Night Vision Dev Ed  | -           | 53.681  | 59.670  | 39.026       | -  | 39.026        | 19.982  | 13.809  | 4.892   | 3.536   | Continuing       | Continuing |
| L76: Dismounted Fire Support Laser Targeting Systems  | -           | 14.366  | 15.322  | 5.836        | -  | 5.836         | 5.249   | 5.452   | 4.878   | 5.480   | Continuing       | Continuing |
| L79: Joint Effects Targeting Systems (JETS)   | -           | 7.824   | 10.463  | 7.810        | -  | 7.810         | 5.571   | 5.608   | 5.040   | 5.609   | Continuing       | Continuing |

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

This program element provides night vision/reconnaissance, surveillance and target acquisition technologies required for United States defense forces to engage enemy forces twenty-four hours a day under conditions of degraded visibility due to darkness, adverse weather, battlefield obscurants, foliage and man-made structures. These developments and improvements to high performance night vision electro-optics, radar, laser, and thermal systems and integration of related multi-sensor suites will enable near to long range target acquisition, identification and engagement to include significant fratricide reduction, which will improve battlefield command and control in "around-the-clock" combat operations.

Project BQ6 focuses on developing, improving and miniaturizing high performance vision system's electro-optics. It also provides for systems integration of related multi-sensor suites to enable near to long-range target acquisition and engagement as well as improved battlefield command and control in around-the-clock combat operations. It focuses on adapting demonstrated technologies that bring improvements to the dismounted Soldier's day/night situational awareness and individual targeting capability. 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 EQ9 focuses on a kit of electronic devices that acquires, collects, and transmits data to provide near real time feedback in order to validate, follow, locate, or track a target (i.e., tagging, tracking, and locating (TTL)). Using electronic audio and/or video recorders, information obtained will validate movement and identify targets. In addition, threat monitoring can be integrated into existing operational tools, help to paint a clearer picture of the battlefield, pinpoint possible target locations, and identify and exploit enemy movements and patterns. Close Access Target Reconnaissance (CATR) has been fielded since 2005 as a Quick Reaction Capability (QRC) program.

Project L67 develops, improves and miniaturizes high performance night vision electro-optics, thermal and laser systems. It also provides for systems integration of related multi-sensor suites to enable near to long-range target acquisition and engagement as well as improved battlefield command and control in around-the-

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army   | Date: March 2019  |
|--|---|
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / <i>Night Vision Systems - Eng Dev</i> |
| clock combat operations. It focuses on adapting demonstrated technologies that bring improvements to the dismounted Soldiers' equipment. This project develops or enhances equipment that provides the individual Soldier's day/night situational awareness and individual targeting capability. This project includes cost associated with efforts for integration and interface of products on Soldiers head, body and weapons. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy.   |   |
| Project L70 focuses on night vision, reconnaissance, surveillance and target acquisition (RSTA) sensor and suites of sensors to provide well-defined surveillance and targeting capabilities for a variety of Current, Modular, and Future Force platforms. This project includes: 3rd Generation Forward Looking Infra-Red (3GEN FLIR) B-Kit development activities, the 3GEN Long Range Advanced Scout Surveillance System (LRAS3) Modification Work Order (MWO) to integrate 3GEN FLIR B-Kit, and the Assistant Secretary of the Army for Acquisition, Logistics, and Technology ASA(ALT) Common Operating Environment (COE) effort to meet sensor interoperability requirements and improve the soldier-machine interface of the Program of Record (POR).  |   |
| Project L75 focuses on development of Profiler Block enhanced capabilities for meteorological (MET) measurement sensors and data. Improvements have reduced the footprint (less soldiers/vehicles) and complexity of the system, improved performance (accuracy), improved survivability, connectivity, no balloon sensor, multiple initialization data, and terrain visualization. The improved MET message data will increase lethality by enabling artillery a greater probability of first round hit with indirect fire systems. Profiler Block III provides a networked laptop configuration while further reducing the system's logistics footprint with the elimination of the High Mobility Multi-purpose Wheeled Vehicle (HMMWV) mounted shelter and trailer located in the Tactical Operations Center (TOC). The Profiler Virtual Module (PVM), a product improvement to the Block III, concept includes the following updates: update of weather model; update of software architecture removing legacy Block I code and creating a modular framework; development in conjunction with the Advanced Field Artillery Tactical Data System (AFATDS) program including AFATDS, to provide increased interoperability and usability; and to enable operation of the Profiler system in a virtual machine for use in the Common Operating Environment (COE) versions 2,3,4, and 5. This concept is a flexible approach that supports use of existing Block III hardware, increased accuracy during technical refresh of hardware with higher performance computers, and virtualization on the Command Post Computing Environment (CP CE) server. |   |
| Project L76 matures and integrates technologies and capabilities which benefit the Lightweight Laser Designator Rangefinder (LLDR) and the Joint Effects Targeting System (JETS). These precision targeting and next generation systems are used by dismounted Soldiers to locate, identify, and target enemy assets. This project focuses on reducing size, weight, power and cost, improving imaging performance, and increasing targeting accuracy. Targeting accuracy improvements will focus on developing and integrating affordable, non-magnetic, high accuracy, full-time (24/7), and all weather Precision Azimuth and Vertical Angle Measurement (PAVAM) devices, with reduced size, weight, and power characteristics into the LLDR system. Long term goals include improving current celestial navigation systems to increase operational availability, developing precision targeting capabilities that will operate in a Global Positioning System (GPS) contested environment to improve situational awareness, and to integrate Military Global Positioning System (GPS) User Equipment (M-Code) (next-generation GPS) receivers into LLDR and JETS, when available. 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 L79 is an Army program with joint information (Air Force and Marine Corps). The Joint Effects Targeting System (JETS) addresses the one-man, hand-held precision targeting gap identified by the Fires Center of Excellence (FCoE). JETS is a light-weight, handheld system that will provide the single dismounted observer with a common, enhanced day and night thermal capability to rapidly acquire, accurately locate, positively identify, and precisely designate targets. JETS Target Location  |   |

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Army  | <b>Date:</b> March 2019   |                |                     |                    |                      |
|--|---|----------------|---------------------|--------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / <i>Night Vision Systems - Eng Dev</i> |                |                     |                    |                      |
| and Designation System (TLDS) will be able to interface with existing and future Forward Entry Systems (FESs) and operate in environments where global positioning system (GPS) capabilities are degraded or denied including the integration of military GPS user equipment (M-Code) GPS receivers, when they become available. This project will address continued development and integration of improved precision targeting components to reduce size, weight, power, and cost of systems for dismounted precision Fires mission. 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>B. Program Change Summary (\$ in Millions)</b>  |   |                |                     |                    |                      |
|  | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |
| Previous President's Budget  | 108.504   | 139.614        | 82.845              | -                  | 82.845               |
| Current President's Budget   | 184.389   | 144.442        | 181.732             | -                  | 181.732              |
| Total Adjustments  | 75.885  | 4.828          | 98.887              | -                  | 98.887               |
| • Congressional General Reductions   | -0.087  | -0.172         |                     |                    |                      |
| • Congressional Directed Reductions  | -   | -1.000         |                     |                    |                      |
| • Congressional Rescissions  | -   | -              |                     |                    |                      |
| • Congressional Adds   | 17.500  | 6.000          |                     |                    |                      |
| • Congressional Directed Transfers   | -   | -              |                     |                    |                      |
| • Reprogrammings   | 62.694  | -              |                     |                    |                      |
| • SBIR/STTR Transfer   | -4.222  | -              |                     |                    |                      |
| • Adjustments to Budget Years  | -   | -              | 98.887              | -                  | 98.887               |
| <b>Change Summary Explanation</b>  |   |                |                     |                    |                      |
| 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 sensors and lasers in support of the Army's modernization priorities.  |   |                |                     |                    |                      |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |             |         |              |              |  |               |         |         |  |                  | Date: March 2019 |            |              |             |               |
|---|-------------|---------|--------------|--------------|--|---------------|---------|---------|--|------------------|------------------|------------|--------------|-------------|---------------|
| Appropriation/Budget Activity   |             |         |              |              | R-1 Program Element (Number/Name)            |               |         |         | Project (Number/Name)                    |                  |                  |            |              |             |               |
| 2040 / 5  |             |         |              |              | PE 0604710A / Night Vision Systems - Eng Dev |               |         |         | BQ6 / Visual Augmentation System Eng Dev |                  |                  |            |              |             |               |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019      | FY 2020 Base | FY 2020 OCO                                  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                                  | FY 2024          | Cost To Complete | Total Cost |              |             |               |
| BQ6: Visual Augmentation System Eng Dev   | -           | 0.000   | 0.000        | 89.000       | -  | 89.000        | 0.000   | 0.000   | 0.000                                    | 0.000            | 0.000            | 89.000     |              |             |               |
| Quantity of RDT&E Articles  | -           | -       | -            | -            | -  | -             | -       | -       | -  | -                | -                |            |              |             |               |
| <b>A. Mission Description and Budget Item Justification</b>   |             |         |              |              |  |               |         |         |  |                  |                  |            |              |             |               |
| This project focuses on developing, improving and miniaturizing high performance vision system's electro-optics. It also provides for systems integration of related multi-sensor suites to enable near to long-range target acquisition and engagement as well as improved battlefield command and control in around-the-clock combat operations. It focuses on adapting demonstrated technologies that bring improvements to the dismounted Soldier's day/night situational awareness and individual targeting capability. This is a priority of the Secretary's Close Combat Lethality Task Force. Funding for this project aligns with the Army's priorities in support of the National Defense Strategy. |             |         |              |              |  |               |         |         |  |                  |                  |            |              |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |             |         |              |              |  |               |         |         |  |                  | FY 2018          | FY 2019    | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| <b>Title:</b> Heads Up Display (HUD)  |             |         |              |              |  |               |         |         |  |                  | -                | -          | 89.000       | -           | 89.000        |
| <b>Description:</b> Integrated Visual Augmentation System (IVAS) HUD 3.0 provides a first generation single platform for Soldier/Marines to fight, rehearse, and train in day and night that provides increased lethality, mobility, and situational awareness necessary to achieve overmatch against our current and future adversaries.   |             |         |              |              |  |               |         |         |  |                  |                  |            |              |             |               |
| <b>FY 2020 Base Plans:</b><br>Complete HUD development efforts by demonstrating and testing capability set 3 (further improved capability) and capability set 4 (final form factor and performance) systems.  |             |         |              |              |  |               |         |         |  |                  |                  |            |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 is the first year for the IVAS in this project.   |             |         |              |              |  |               |         |         |  |                  |                  |            |              |             |               |
| <b>Accomplishments/Planned Programs Subtotals</b>   |             |         |              |              |  |               |         |         |  |                  | -                | -          | 89.000       | -           | 89.000        |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |             |         |              |              |  |               |         |         |  |                  |                  |            |              |             |               |
| Line Item   | FY 2018     | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total                                | FY 2021       | FY 2022 | FY 2023 | FY 2024                                  | Cost To Complete | Total Cost       |            |              |             |               |
| • BQ5: Visual Augmentation System Advanced Development  | -           | -       | 242.000      | -            | 242.000                                      | -             | -       | -       | -  | 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                                    | 0.000            | 546.921          |            |              |             |               |

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|   |                |                |                |   |                |                |                |   |                |                         |                         |
|---|----------------|----------------|----------------|---|----------------|----------------|----------------|---|----------------|-------------------------|-------------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |                |                |                |   |                |                |                |   |                |                         | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / <i>Night Vision Systems - Eng Dev</i> |                |                |                | <b>Project (Number/Name)</b><br>BQ6 / <i>Visual Augmentation System Eng Dev</i> |                |                         |                         |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                |   |                |                |                |   |                |                         |                         |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b>  | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>  | <b>FY 2024</b> | <b>Cost To Complete</b> | <b>Total Cost</b>       |
| • K36402: <i>IVAS/Heads Up Display</i>  | -              | -              | 76.225         | -   | 76.225         | 907.000        | 1,046.775      | 320.000   | -              | Continuing              | Continuing              |
| • K36400: <i>Helmet Mounted Enhanced Vision Devices</i>   | 144.644        | 112.251        | 129.485        | -   | 129.485        | 207.845        | 245.266        | 6.442   | 382.007        | Continuing              | Continuing              |
| <b>Remarks</b>  |                |                |                |   |                |                |                |   |                |                         |                         |
| <b>D. Acquisition Strategy</b><br>This project utilizes competitively awarded contracts using best value source selection procedures. |                |                |                |   |                |                |                |   |                |                         |                         |
| <b>E. Performance Metrics</b><br>N/A  |                |                |                |   |                |                |                |   |                |                         |                         |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                      |             |   |            |         |            |   |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------------|-------------|---|------------|---------|------------|---|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                      |             | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |            |         |            | Project (Number/Name)<br>BQ6 / Visual Augmentation System Eng Dev |              |             |             |                  |                  |                  |                          |                          |
| Management Services (\$ in Millions)                   |                        |                                      |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Program Management                                     | MIPR                   | Various : Various                    | -           | -   |            | -       |            | 20.510  | Nov 2019     | -           |             | 20.510           | Continuing       | Continuing       | -                        |                          |
| <b>Subtotal</b>  |                        |                                      |             | -   | -          | -       |            | 20.510  |              | -           |             | 20.510           | Continuing       | Continuing       | N/A                      |                          |
| Product Development (\$ in Millions)                   |                        |                                      |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Heads Up Display (HUD)                                 | Various                | Various : Various                    | -           | -   |            | -       |            | 18.970  | Oct 2019     | -           |             | 18.970           | Continuing       | Continuing       | -                        |                          |
| <b>Subtotal</b>  |                        |                                      |             | -   | -          | -       |            | 18.970  |              | -           |             | 18.970           | Continuing       | Continuing       | N/A                      |                          |
| Support (\$ in Millions)                               |                        |                                      |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Matrix Support   | MIPR                   | NVESD : Fort Belvoir, Virginia 22060 | -           | -   |            | -       |            | 4.845   | Nov 2019     | -           |             | 4.845            | Continuing       | Continuing       | -                        |                          |
| <b>Subtotal</b>  |                        |                                      |             | -   | -          | -       |            | 4.845   |              | -           |             | 4.845            | Continuing       | Continuing       | N/A                      |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                      |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| IVAS HUD 3.0 Testing                                   | MIPR                   | Various : Various                    | -           | -   |            | -       |            | 44.675  | Jan 2020     | -           |             | 44.675           | Continuing       | Continuing       | -                        |                          |
| <b>Subtotal</b>  |                        |                                      |             | -   | -          | -       |            | 44.675  |              | -           |             | 44.675           | Continuing       | Continuing       | N/A                      |                          |
|  |                        |                                      |             | Prior Years   | FY 2018    |         | FY 2019    |   | FY 2020 Base |             | FY 2020 OCO |                  | FY 2020 Total    | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                      |             | -   | -          | 0.000   |            | 89.000  |              | -           |             | 89.000           | Continuing       | Continuing       | N/A                      |                          |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army  |             |         |  |         |  |             | Date: March 2019 |                  |            |                          |  |  |
|---|-------------|---------|--|---------|--|-------------|------------------|------------------|------------|--------------------------|--|--|
| Appropriation/Budget Activity   |             |         | R-1 Program Element (Number/Name)            |         | Project (Number/Name)                    |             |                  |                  |            |                          |  |  |
| 2040 / 5  |             |         | PE 0604710A / Night Vision Systems - Eng Dev |         | BQ6 / Visual Augmentation System Eng Dev |             |                  |                  |            |                          |  |  |
|   | Prior Years | FY 2018 |  | FY 2019 | FY 2020 Base                             | FY 2020 OCO | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |  |  |
| <b>Remarks</b><br>In FY 2020, BQ6 Management Services, Support Cost and Test and Evaluation Cost Category Items will include funding towards PE 0603774A Night Vision Systems - Advanced Development project BQ5 Visual Augmentation System - Advanced Development. |             |         |  |         |  |             |                  |                  |            |                          |  |  |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

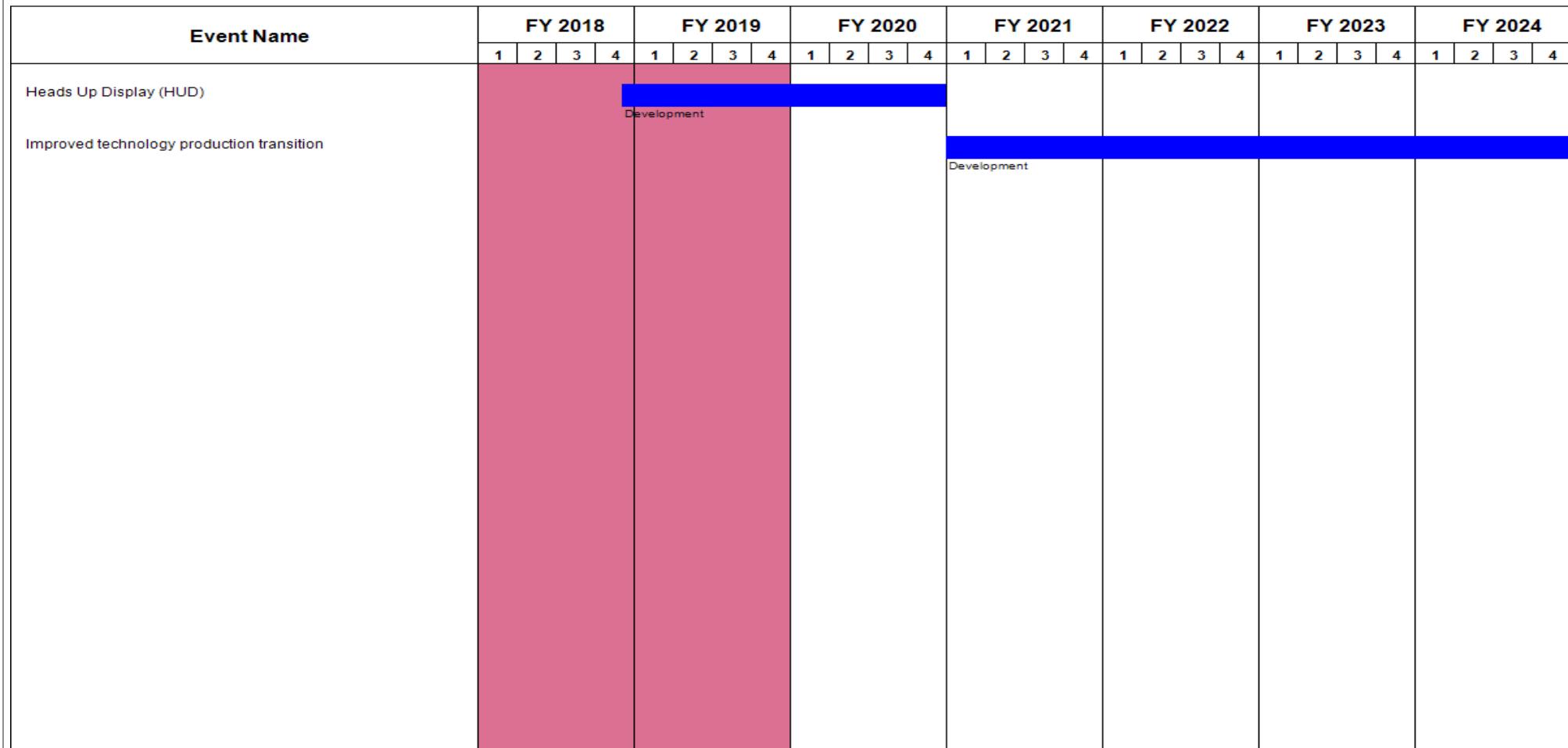
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604710A / Night Vision Systems - Eng Dev

**Project (Number/Name)**

BQ6 / Visual Augmentation System Eng Dev



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|   |   |
|---|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / <i>Night Vision Systems - Eng Dev</i> |

**Schedule Details**

| <b>Events</b>                             | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Heads Up Display (HUD)                    | 4              | 2018        | 4              | 2020        |
| Improved technology production transition | 1              | 2021        | 4              | 2024        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |             |         |         |              |  |               |         |         |                                    |         | Date: March 2019 |            |              |             |               |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|------------------------------------|---------|------------------|------------|--------------|-------------|---------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)            |               |         |         | Project (Number/Name)              |         |                  |            |              |             |               |
| 2040 / 5  |             |         |         |              | PE 0604710A / Night Vision Systems - Eng Dev |               |         |         | L67 / Soldier Night Vision Devices |         |                  |            |              |             |               |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                                  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                            | FY 2024 | Cost To Complete | Total Cost |              |             |               |
| L67: Soldier Night Vision Devices   | -           | 108.518 | 58.987  | 40.060       | -  | 40.060        | 28.667  | 19.240  | 20.646                             | 25.310  | Continuing       | Continuing |              |             |               |
| Quantity of RDT&E Articles  | -           | -       | -       | -            | -  | -             | -       | -       | -                                  | -       |                  |            |              |             |               |
| <b>A. Mission Description and Budget Item Justification</b>   |             |         |         |              |  |               |         |         |                                    |         |                  |            |              |             |               |
| This project develops, improves and miniaturizes high performance night vision electro-optics, thermal and laser systems. It also provides for systems integration of related multi-sensor suites to enable near to long-range target acquisition and engagement as well as improved battlefield command and control in around-the-clock combat operations. It focuses on adapting demonstrated technologies that bring improvements to the dismounted Soldiers' equipment. This project develops or enhances equipment that provides the individual Soldier's day/night situational awareness and individual targeting capability. This project includes cost associated with efforts for integration and interface of products on Soldiers head, body and weapons.  |             |         |         |              |  |               |         |         |                                    |         |                  |            |              |             |               |
| Funding in this project aligns with the Army's priorities in support of the National Defense Strategy.  |             |         |         |              |  |               |         |         |                                    |         |                  |            |              |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |             |         |         |              |  |               |         |         |                                    |         | FY 2018          | FY 2019    | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| <b>Title:</b> Family of Weapon Sights (FWS)   |             |         |         |              |  |               |         |         |                                    |         | 41.295           | 23.972     | 21.708       | -           | 21.708        |
| <b>Description:</b> FWS is a family of weapon sights that enable combat forces to acquire and engage targets with small arms and to conduct surveillance and fire control under day/night obscurants, no-light, and adverse weather conditions. The family utilizes advancements in thermal and low light level sensors to produce Individual (I), Crew-Served (CS), and Sniper (S) weapon sights operable in-line with a day optic or in stand-alone mode. This project integrates smaller pixel focal plane arrays in multiple large format sizes to improve sensitivity, clarity, and range, while simultaneously reducing the size, weight and power consumption of all variants. The FWS-I variant is a weapon mounted long-wave infrared sensor that enables Soldiers to fire quickly and accurately from any carry position and with significantly reduced exposure to enemy fire by providing a wireless zeroed weapon aimpoint in the Soldier's Enhanced Night Vision Goggles or day display on the helmet. Leveraging the success of the Individual variant development, the FWS-CS variant operates as the primary sight. The FWS-CS system includes a wireless Helmet Mount Display (HMD) and provides the Soldier with input from a laser range finder device, resulting in a more accurate aimpoint that adjusts automatically for range, ammunition characteristics, and vertical angle. The FWS-S variant mounts in-line with the Sniper's direct view optic providing a thermal imagery capability to the host weapon at the weapon's maximum effective range, plus 20% overmatch. FWS-S provides Snipers a large format display with increased pixel density that enables accurate long range |             |         |         |              |  |               |         |         |                                    |         |                  |            |              |             |               |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |                                   |                       |              | Date: March 2019 |               |
|---|-----------------------------------|-----------------------|--------------|------------------|---------------|
| Appropriation/Budget Activity   | R-1 Program Element (Number/Name) | Project (Number/Name) |              |                  |               |
| B. Accomplishments/Planned Programs (\$ in Millions)  | FY 2018                           | FY 2019               | FY 2020 Base | FY 2020 OCO      | FY 2020 Total |
| engagements while maintaining day sight, extending the lethality and provide exceptional observation. This project also supports thermal testing capabilities and Thermal Weapon Sight parts obsolescence.  |                                   |                       |              |                  |               |
| <b>FY 2019 Plans:</b><br>Complete FWS-CS Engineering and Manufacturing Development (EMD) testing in preparation for Low Rate Initial Production (LRIP). Improve the manufacturing process of uncooled FPA and micro-Organic Light-Emitting Diode (OLED) displays that are key components of FWS. Both FWS-S and FWS-CS will achieve MS C decision approval to enter LRIP Phase of the program.  |                                   |                       |              |                  |               |
| <b>FY 2020 Base Plans:</b><br>Conduct FWS-CS follow on testing through LRIP. FWS-S will continue EMD.   |                                   |                       |              |                  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Funding decrease due to economic adjustments.   |                                   |                       |              |                  |               |
| <b>Title:</b> Small Tactical Optical Rifle Mounted (STORM) II<br><br><b>Description:</b> The STORM Micro-Laser Range Finder (MLRF) is a weapon-mounted multi-function laser system. It provides an eye safe laser range finder, digital compass, Infrared (IR) and visible aiming lights, and an IR illuminator for far target location with continuous range, accuracy, weight and power performance enhanced capabilities. Funding supports qualifying smaller, lighter, and a less expensive STORM variant (STORM II) for Soldiers. Funding also supports integrating ballistics calculator and in-line display capabilities into the STORM. | 5.524                             | 3.391                 | 0.380        | -                | 0.380         |
| <b>FY 2019 Plans:</b><br>This effort continues to fund and qualify the STORM II test systems in support of future procurements. This effort also funds the certification of technology, Intra Soldier Wireless (ISW), that supports wireless transmission of STORM data to other systems.   |                                   |                       |              |                  |               |
| <b>FY 2020 Base Plans:</b><br>Continue to qualify the STORM II test systems and fund the integration of technology to support wireless transmission of STORM data to other systems.   |                                   |                       |              |                  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Funding decreased in FY 2020 due to the STORM II test systems were already procured and most of the qualification testing will be funded with FY 2019 funds. FY 2019 funds were used to certify ISW.  |                                   |                       |              |                  |               |
| <b>Title:</b> Family of Vision and Mobility Capabilities (FVMC)   | -                                 | -                     | 5.496        | -                | 5.496         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |   |         |              | Date: March 2019 |               |
|--|---|---|---------|--------------|------------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev | Project (Number/Name)<br>L67 / Soldier Night Vision Devices |         |              |                  |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   | FY 2018   | FY 2019 | FY 2020 Base | FY 2020 OCO      | FY 2020 Total |
| <b>Description:</b> The FVMC (Day Display) provides the next generation vision capabilities for day and night that will reduce the Soldier's burden and allow hands free operation. The FVMC will provide automatic adjustment of imagery and matched sensor fields of view. The FVMC will provide day/night Rapid Target Acquisition (RTA) capability by interfacing with FWS-I, day/night data display for the Soldier Network Warrior End User Device/ Computer (EUD), and ability to send/receive data to the EUD to support advanced EUD applications to process the sensor video, integrate it with external data sources, and produce advanced processed imagery with overlay data display. The Heads Up Display (HUD) is an output of the FVMC investment as a result of emerging commercial technology. The HUD will deliver overmatch warfighting capability plus enable Close Combat Squad Immersive Visual Training capability with Synthetic Training Environment core capabilities. The HUD will also provide a single integrated digital, low profile, conformal day/night device that allows Soldiers and Squads to Train, Rehearse and Fight in any operational environment. Prototyping will provide multiple knowledge point events to gauge vendor progress and capability to the force. |   |   |         |              |                  |               |
| <b>FY 2020 Base Plans:</b><br>Continue development of system prototypes for FVMC; Finalize Interface Control Document (ICD) to support interoperability between FVMC systems. Initiates development of the HUD   |   |   |         |              |                  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FVMC funding increase due to maturing research and development of systems for FVMC Finalized ICD interoperability in preparation for subsequent Low-Rate Initial Production.   |   |   |         |              |                  |               |
| <b>Title:</b> Enhanced Night Vision Goggle - Binocular (ENVG-B)  |   | 1.000   | 26.255  | 10.000       | -                | 10.000        |
| <b>Description:</b> The ENVG-B system is a modular helmet-mounted, passive electro-optical night vision and long wave infrared (LWIR) imaging device in a binocular configuration. The system integrates dual Image Intensification (I2) sensors with the LWIR imagery into a single viewing display. The LWIR sensor provides the Soldier with the capability to rapidly detect and recognize human-sized targets in adverse weather, obscurants and in varying light conditions. The dual I2 sensors provide the Soldier with depth perception for ease of low-light level maneuvers and the ability to detect rifle-mounted aiming lights to engage targets. The ENVG-B can also be operated in a monocular configuration by moving one of the two individually rotating monoculars. The ENVG-B has a near infrared (NIR) emitting light source that provides illumination for close-up viewing. The ENVG-B mounts on current Soldier equipment, including the Advanced Combat Helmet (ACH), the Enhanced Combat Helmet (ECH) and Integrated Head Protection System (IHPS). The ENVG-B has a multi-point wireless interface to the FWS-I weapon mounted LWIR sensor and to Nett Warrior in order to support augmented reality   |   |   |         |              |                  |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |  |  |                |                     | <b>Date:</b> March 2019 |                      |
|---|--|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / Night Vision Systems - Eng Dev | <b>Project (Number/Name)</b><br>L67 / Soldier Night Vision Devices |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| requirements. The ENVG-B wirelessly operates with the FWS-I to provide Rapid Target Acquisition (RTA) capability. RTA is the capability to view the boresighted/zeroed weapon sight reticle in the ENVG-B display, enabling the Soldier to accurately engage targets without having to bring the weapon to eye level and without the use of active lasers, all while remaining in defilade.   |  |  |                |                     |                         |                      |
| <p><b>FY 2019 Plans:</b><br/>           FY 2019 will begin with the ENVG-B Engineering and Manufacturing Development (EMD) contract award. Two vendors will begin designing, building and deliver prototype systems for Government and Contract Testing. EMD Government testing will include an Engineering Characterization Test (ECT), a Reliability Growth Test - 1 (RGT-1), a Production Quality Test - Government (PQT-G) and a Limited User Test (LUT). ENVG-B EMD testing is in preparation for Low Rate Initial Production (LRIP).</p> <p><b>FY 2020 Base Plans:</b><br/>           Continue testing and qualification for ENVG-B.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           ENVG-B funding decreases in FY 2020 as qualification events begin systems will ramp down.</p>   |  |  |                |                     |                         |                      |
| <p><b>Title:</b> Family of Target Acquisition Laser (FTAL)</p> <p><b>Description:</b> FTAL develops, improves and miniaturizes high-performance systems to support target acquisition and engagement during day/night operations. FTAL will develop a family of modular products incorporating laser technology that include laser range finders, laser aiming lights, and laser imaging products to be used by mounted and dismounted forces with capabilities including range finding, marking, illumination, target hand-off, detecting optics, countering threat sensors, and navigation enhancements. FTAL will integrate and interface with products on the Soldier's head, body and weapons to enhance situational awareness and lethality.</p> <p><b>FY 2019 Plans:</b><br/>           Continue the development and integration of FTAL products.</p> <p><b>FY 2020 Base Plans:</b><br/>           Continue development and integration of FTAL products.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           There will be a ramp up in development and integration of FTAL products.</p> |  | 0.581  | 1.075          | 2.476               | -                       | 2.476                |
| <p><b>Title:</b> Heads Up Display HUD)</p>  |  | 59.800   | -              | -                   | -                       | -                    |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |         |   |              |             |   |         |         |         |         | Date: March 2019 |            |              |             |               |  |  |  |
|--|---------|---|--------------|-------------|---|---------|---------|---------|---------|------------------|------------|--------------|-------------|---------------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5  |         | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |              |             | Project (Number/Name)<br>L67 / Soldier Night Vision Devices |         |         |         |         |                  |            |              |             |               |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |         |   |              |             |   |         |         |         |         | FY 2018          | FY 2019    | FY 2020 Base | FY 2020 OCO | FY 2020 Total |  |  |  |
| <b>Description:</b> Integrated Visual Augmentation System (IVAS) HUD 3.0 provides a first generation single platform for Soldier/Marines to train, rehearse, fight in day and night that provides increased lethality, mobility, and situational awareness necessary to achieve overmatch against our current and futures adversaries. |         |   |              |             |   |         |         |         |         |                  |            |              |             |               |  |  |  |
| <b>Title:</b> Laser Target Locator Module (LTLM)   |         |   |              |             |   |         |         |         |         | 0.318            | 2.100      | -            | -           | -             |  |  |  |
| <b>Description:</b> LTLM provides the dismounted observer or Scout a fully digital, handheld system to accurately determine target location and the ability of call for fire during all weather and lightening conditions.   |         |   |              |             |   |         |         |         |         |                  |            |              |             |               |  |  |  |
| <b>FY 2019 Plans:</b><br>Continue improvement in speed, accuracy, and safety of the use over previous systems of this type (e.g. Laser Target Locator System).   |         |   |              |             |   |         |         |         |         |                  |            |              |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Effort not funded in FY 2020.  |         |   |              |             |   |         |         |         |         |                  |            |              |             |               |  |  |  |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer   |         |   |              |             |   |         |         |         |         | -                | 2.194      | -            | -           | -             |  |  |  |
| <b>Description:</b> FY 2019 SBIR / STTR adjustment.  |         |   |              |             |   |         |         |         |         |                  |            |              |             |               |  |  |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR adjustment.   |         |   |              |             |   |         |         |         |         |                  |            |              |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR adjustment.  |         |   |              |             |   |         |         |         |         |                  |            |              |             |               |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |         |   |              |             |   |         |         |         |         | 108.518          | 58.987     | 40.060       | -           | 40.060        |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |         |   |              |             |   |         |         |         |         |                  |            |              |             |               |  |  |  |
| Line Item  | FY 2018 | FY 2019   | FY 2020 Base | FY 2020 OCO | FY 2020 Total   | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |              |             |               |  |  |  |
| • VT7: Soldier Maneuver Sensors - Adv Dev  | 501.816 | 7.341   | 7.528        | -           | 7.528   | 7.573   | 7.683   | 7.602   | 7.378   | Continuing       | Continuing |              |             |               |  |  |  |
| • K36400: Helmet Mounted Enhanced Vision Devices   | 144.644 | 112.251   | 129.485      | -           | 129.485   | 207.845 | 245.266 | 6.442   | 382.007 | Continuing       | Continuing |              |             |               |  |  |  |
| • K22002: FWS-INDIVIDUAL   | 59.105  | 94.932  | 81.541       | -           | 81.541  | 70.211  | 61.922  | 71.600  | 77.797  | Continuing       | Continuing |              |             |               |  |  |  |

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|---|----------------|----------------|----------------|--|----------------|----------------|----------------|----------------|----------------|--|-------------------|
| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |                |                |                |  |                |                |                |                |                |  | Date: March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / Night Vision Systems - Eng Dev |                |                |                |                |                | <b>Project (Number/Name)</b><br>L67 / Soldier Night Vision Devices |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                |  |                |                |                |                |                |  |                   |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b>   | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b> | <b>FY 2024</b> | <b>Cost To Complete</b>  | <b>Total Cost</b> |
| • K35110: <i>Small Tactical Optical Rifle Mounted MLRF</i>  | 16.157         | 21.238         | 22.623         | -  | 22.623         | 10.607         | 21.377         | 26.087         | 31.845         | Continuing   | Continuing        |
| • B53800: <i>Laser Target Locator Systems</i>   | 37.975         | 32.704         | 24.354         | -  | 24.354         | 13.913         | 20.839         | 23.773         | 24.182         | Continuing   | Continuing        |
| • K22003: <i>FWS-CREW SERVED</i>  | -              | 31.106         | 39.342         | -  | 39.342         | 85.949         | 85.002         | 85.647         | 77.306         | Continuing   | Continuing        |
| • K22004: <i>FWS-SNIPER</i>   | -              | -              | 0.000          | -  | 0.000          | 2.571          | 11.348         | 18.862         | 19.787         | Continuing   | Continuing        |
| • BQ5: <i>Visual Augmentation System Advanced Development</i>   | -              | -              | 242.000        | -  | 242.000        | -              | -              | -              | -              | 0.000  | 242.000           |
| • BQ6: <i>Visual Augmentation System Eng Dev</i>  | -              | -              | 89.000         | -  | 89.000         | -              | -              | -              | -              | 0.000  | 89.000            |
| • K36401: <i>Night Vision AN/PVS-14 Mods</i>  | -              | 8.496          | 6.540          | 3.676  | 10.216         | 0.416          | 7.379          | 32.735         | 23.867         | Continuing   | Continuing        |
| • K36402: <i>IVAS/Heads Up Display</i>  | -              | -              | 76.225         | -  | 76.225         | 907.000        | 1,046.775      | 320.000        | -              | Continuing   | Continuing        |
| <b>Remarks</b>  |                |                |                |  |                |                |                |                |                |  |                   |
| <b>D. Acquisition Strategy</b>  |                |                |                |  |                |                |                |                |                |  |                   |
| The various developmental programs in this project continue to exercise competitively awarded contracts using best value source selection procedures. |                |                |                |  |                |                |                |                |                |  |                   |
| <b>E. Performance Metrics</b>   |                |                |                |  |                |                |                |                |                |  |                   |
| N/A   |                |                |                |  |                |                |                |                |                |  |                   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army       |                        |  |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                    |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |            |         |            | Project (Number/Name)<br>L67 / Soldier Night Vision Devices |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                         |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                       | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| PROGRAM MGMT   | MIPR                   | Various : Various                                    | 8.097       | 11.000  | Nov 2017   | 1.957   | Nov 2018   | 2.027   | Nov 2019   | -           |            | 2.027            | Continuing       | Continuing | -                        |
|  |                        | <b>Subtotal</b>                                      | 8.097       | 11.000  |            | 1.957   |            | 2.027   |            | -           |            | 2.027            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                         |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                       | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Family of Weapon Sights-Crew Served (FWS-CS)                 | C/CPFF                 | DRS RSTA, Inc<br>BAE Systems : Dallas, TX/Nashua, NH | 11.262      | 33.523  | Nov 2017   | 11.394  | Feb 2019   | -   |            | -           |            | -                | Continuing       | Continuing | -                        |
| Family of Weapon Sights-Sniper (FWS-S)                       | Allot                  | N2 Imaging Systems : Irvine, CA                      | 4.122       | 0.503   | Mar 2018   | 7.947   | Jun 2019   | 8.251   | Jun 2020   | -           |            | 8.251            | Continuing       | Continuing | -                        |
| Family of Vision and Mobility Capabilities (FVMC)            | MIPR                   | NVESD : Ft Belvoir, VA                               | -           | 2.413   | Mar 2018   | -       |            | 13.910  | Feb 2020   | -           |            | 13.910           | Continuing       | Continuing | -                        |
| STORM II Test Systems (L3)                                   | C/FFP                  | Optics 1 : Bedford, NH                               | -           | 2.093   | May 2018   | -       |            | -   |            | -           |            | -                | Continuing       | Continuing | -                        |
| STORM II Test Systems (Optics 1)                             | C/FFP                  | L3 : Londonderry, NH                                 | -           | 3.431   | May 2018   | -       |            | -   |            | -           |            | -                | Continuing       | Continuing | -                        |
| STORM - Intra Soldier Wireless (ISW)                         | TBD                    | TBD : NVESD  | -           | -   |            | 2.100   | Jan 2019   | -   |            | -           |            | -                | Continuing       | Continuing | -                        |
| Enhanced Night Vision Google - Binocular (ENVG-B) (Vendor A) | C/CPFF                 | TBD : TBD  | -           | -   |            | 11.139  | Mar 2019   | 5.000   | Mar 2020   | -           |            | 5.000            | Continuing       | Continuing | -                        |
| Enhanced Night Vision Google - Binocular (ENVG-B) (Vendor B) | C/CPFF                 | TBD : TBD  | -           | -   |            | 11.138  | Mar 2019   | 5.000   | Mar 2020   | -           |            | 5.000            | Continuing       | Continuing | -                        |
| Laser Target Location Module (Optics 1)                      | C/CPFF                 | Army Contracting Center : Aberdeen Proving Ground    | -           | -   |            | 2.100   | Feb 2019   | 0.686   | Feb 2020   | -           |            | 0.686            | Continuing       | Continuing | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army   |                        |  |             |   |            |         |            |   |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--|-------------|---|------------|---------|------------|---|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5  |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |            |         |            | Project (Number/Name)<br>L67 / Soldier Night Vision Devices |              |             |             |                  |                  |                  |                          |                          |
| 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 |                          |
| Family of Target Acquisition Laser (FTAL)  | MIPR                   | NVESD : Ft. Belvoir, VA                    | -           | 0.581   | May 2018   | 0.775   | Nov 2018   | 2.893   | Dec 2019     | -           |             | 2.893            | Continuing       | Continuing       | -                        |                          |
| Heads Up Display (HUD)   | TBD                    | Various : Various                          | -           | 26.270  | Sep 2018   | -       | -          | -   | -            | -           | -           | -                | Continuing       | Continuing       | -                        |                          |
| FY 2019 SBIR / STTR Transfer   | TBD                    | TBD : TBD                                  | -           | -   |            | 2.194   |            | -   | -            | -           | -           | -                | Continuing       | Continuing       | -                        |                          |
| <b>Subtotal</b>  |                        | 15.384                                     | 68.814      |   | 48.787     |         | 35.740     |   | -            |             |             | 35.740           | Continuing       | Continuing       | N/A                      |                          |
| Support (\$ in Millions)   |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location             | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Matrix Support   | MIPR                   | NVESD : Ft Belvoir, VA                     | 6.790       | 20.115  | Nov 2017   | 1.476   | Nov 2018   | 1.160   | Nov 2019     | -           |             | 1.160            | Continuing       | Continuing       | -                        |                          |
| <b>Subtotal</b>  |                        | 6.790                                      | 20.115      |   | 1.476      |         | 1.160      |   | -            |             |             | 1.160            | Continuing       | Continuing       | N/A                      |                          |
| Test and Evaluation (\$ in Millions)   |                        |  |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location             | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Government Test Support Activity   | MIPR                   | Army Test and Evaluation Command : Various | 50.193      | 8.589   | Apr 2018   | 6.767   | Apr 2019   | 1.133   | Nov 2019     | -           |             | 1.133            | Continuing       | Continuing       | -                        |                          |
| <b>Subtotal</b>  |                        | 50.193                                     | 8.589       |   | 6.767      |         | 1.133      |   | -            |             |             | 1.133            | Continuing       | Continuing       | N/A                      |                          |
|  |                        |  |             | Prior Years   | FY 2018    |         | FY 2019    |   | FY 2020 Base |             | FY 2020 OCO |                  | FY 2020 Total    | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>   |                        |  |             | 80.464  | 108.518    |         | 58.987     |   | 40.060       |             | -           |                  | 40.060           | Continuing       | Continuing               | N/A                      |
| <b>Remarks</b>   |                        |  |             |   |            |         |            |   |              |             |             |                  |                  |                  |                          |                          |
| In FY 2018, there's a \$59,800 million Above Threshold Reprogramming for the Heads Up Display (HUD) project. |                        |  |             |   |            |         |            |   |              |             |             |                  |                  |                  |                          |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

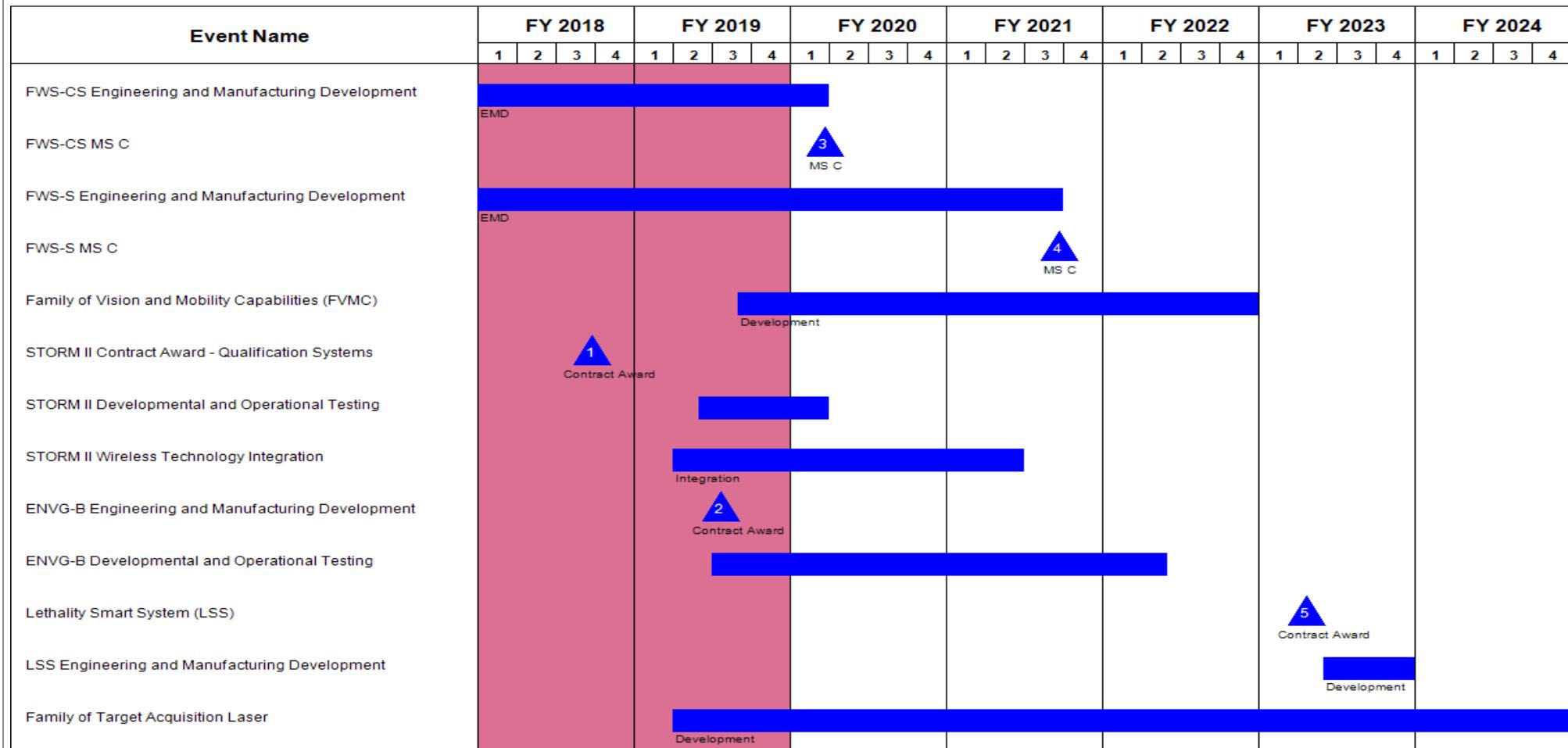
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604710A / Night Vision Systems - Eng Dev

**Project (Number/Name)**

L67 / Soldier Night Vision Devices



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## **Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army**

Date: March 2019

## **Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**  
PE 0604710A / *Night Vision Systems - Eng Dev*

## **Project (Number/Name)**

L67 / Soldier Night Vision Devices

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|   |  |  |                         |
|---|--|--|-------------------------|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  |  | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / Night Vision Systems - Eng Dev | <b>Project (Number/Name)</b><br>L67 / Soldier Night Vision Devices |                         |

**Schedule Details**

| <b>Events</b>                                     | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| FWS-CS Engineering and Manufacturing Development  | 3              | 2016        | 1              | 2020        |
| FWS-CS MS C                                       | 1              | 2020        | 1              | 2020        |
| FWS-S Engineering and Manufacturing Development   | 3              | 2016        | 3              | 2021        |
| FWS-S MS C  | 3              | 2021        | 3              | 2021        |
| Family of Vision and Mobility Capabilities (FVMC) | 3              | 2019        | 4              | 2022        |
| STORM II Contract Award - Qualification Systems   | 3              | 2018        | 3              | 2018        |
| STORM II Developmental and Operational Testing    | 2              | 2019        | 1              | 2020        |
| STORM II Wireless Technology Integration          | 2              | 2019        | 2              | 2021        |
| ENVG-B Engineering and Manufacturing Development  | 3              | 2019        | 3              | 2019        |
| ENVG-B Developmental and Operational Testing      | 3              | 2019        | 2              | 2022        |
| Lethality Smart System (LSS)                      | 2              | 2023        | 2              | 2023        |
| LSS Engineering and Manufacturing Development     | 2              | 2023        | 4              | 2023        |
| Family of Target Acquisition Laser                | 2              | 2019        | 4              | 2024        |
| Heads Up Display (HUD)                            | 4              | 2018        | 4              | 2020        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |               |         |         | Project (Number/Name)<br>L70 / Night Vision Dev Ed |         |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To Complete | Total Cost |
| L70: Night Vision Dev Ed                                | -           | 53.681  | 59.670  | 39.026       | -   | 39.026        | 19.982  | 13.809  | 4.892  | 3.536   | Continuing       | Continuing |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -       |                  |            |

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

This project performs Engineering and Manufacturing Development (EMD) on high performance night vision, Reconnaissance, Surveillance, and Target Acquisition (RSTA) systems and other related systems that allow forces to locate and track enemy units in day, night, and all battlefield conditions, and through natural and man-made structures and obscurants. It also develops and integrates suites of these sensors to provide well-defined surveillance and targeting capabilities, as well as architectures for these sensors to communicate automatically. These efforts focus on meeting the requisite night vision and RSTA capabilities required for evolving Current Force, Modular Force, and Future Force systems.

The project supports the 3rd Generation Forward Looking Infrared (3GEN FLIR) B-Kit EMD program, which incorporates the next generation of forward looking infrared technologies. The 3GEN FLIR EMD program will develop a common 3GEN FLIR B-Kit for integration into US Army FLIR sensor systems in accordance with the approved Improved Forward Looking Infrared (I-FLIR) Capability Development Document (CDD). The common 3GEN FLIR B-Kit prescribed by the I-FLIR CDD will allow the Army to achieve economies of scale and avoid duplicative engineering and development costs. As a result, 3GEN FLIR capabilities can be delivered at a lower cost to the Abrams and Next Generation Combat Vehicle / Optionally Manned Fighting Vehicle (NGCV/OMFV) platforms, while potentially leveraging 3GEN FLIR components for airborne applications. The 3GEN FLIR B-Kit provides Mid Wave Infrared and Long Wave Infrared digital video and the electronic interfaces required to integrate the 3GEN FLIR technology with the host platform sensor. When integrated in current sensor packages, 3GEN FLIR technology enhances the war-fighters' survivability and lethality through increased identification range performance, while enabling the detection of difficult or obscured targets and faster threat detection through automated processes. The 3GEN FLIR B-Kit EMD program is also a key element in maintaining the Army's FLIR industrial base.

The project supports the LRAS3 Modification Work Order (MWO) to integrate the 3GEN FLIR B-Kit. The LRAS3 MWO effort includes integration of 3GEN FLIR B-Kit technology, an Inertial Measurement Unit (IMU), and an M-code Global Positioning System (GPS) receiver. Collectively, these capabilities will improve the Far Target Location (FTL) accuracy of the LRAS3 and enhance the scout's survivability and lethality through increased detection, recognition and identification range performance.

This project also executes the Army Sensor Computing Environment (CE) effort which is part of the Assistant Secretary of the Army for Acquisition, Logistics and Technology (ASA-ALT) Common Operating Environment (COE) program. The Sensor CE effort focuses on increasing sensor interoperability across the enterprise and improving the Soldier-machine interface. This is done by defining, demonstrating and standardizing Sensor interfaces across the Army networks. Standardized interfaces delivered from this effort will be incorporated into current and future sensor systems and programs.

FY 2020 Base funding in the amount of \$39.026 million supports the 3 GEN FLIR B-Kit EMD program activities. Additionally, FY 2020 Base Funding supports the 3GEN LRAS3 program and the continued activities associated with meeting sensor interoperability requirements and improving the Soldier machine interface in support of the Army's vision of the Common Operating Environment (COE).

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |  |   |                |                     | <b>Date:</b> March 2019 |                      |
|---|--|---|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / Night Vision Systems - Eng Dev | <b>Project (Number/Name)</b><br>L70 / Night Vision Dev Ed |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |  | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| <b>Title:</b> 3GEN FLIR B-Kit EMD   |  | 52.789  | 59.034         | 38.826              | -                       | 38.826               |
| <b>Description:</b> 3GEN FLIR EMD requirements and contract awards.   |  |   |                |                     |                         |                      |
| <b>FY 2019 Plans:</b><br>FY 2019 Base Funding supports 3GEN FLIR Prototype Fabrication, B-Kit CDR, TRR, and Design Verification Testing (DVT).  |  |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>FY 2020 Base funding supports 3GEN FLIR B-Kit integration, Hardware/Software Test Readiness Review, Software Functional Qualification Testing, Sight Qualification Testing, Design Verification Testing (DVT), Improved Optical Improvement Dewar Cooler Bench Physical Configuration Audit, Software Verification Review, and development of the Digital Readout Integrated Circuit (DROIC) and Strained Layer Superlattice (SLS). |  |   |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease is due to the transition from hardware fabrication to qualification test activities.   |  |   |                |                     |                         |                      |
| <b>Title:</b> Common Operating Environment (COE)  |  | 0.100   | 0.100          | 0.100               | -                       | 0.100                |
| <b>Description:</b> This effort supports the Common Operating Environment vision by improving the sensor interoperability requirement and the Soldier-machine interface. Resultant improvements to be made on a program by program basis.   |  |   |                |                     |                         |                      |
| <b>FY 2019 Plans:</b><br>FY 2019 Base Funding supports continued development of the COE program to include meeting the sensor interoperability requirement and improving the soldier-machine interface. Specific FY 2019 activities include continued demonstrations and experimentation for transition into Army programs.   |  |   |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>FY 2020 Base funding supports continued development of the COE program to include meeting the sensor interoperability requirement and improving the soldier machine interface. Specific FY 2020 activities include continued demonstrations and experimentation for transition into Army programs.  |  |   |                |                     |                         |                      |
| <b>Title:</b> 3GEN LRAS3 ECP to integrate 3GEN FLIR B-Kit   |  | 0.792   | 0.536          | 0.100               | -                       | 0.100                |
| <b>Description:</b> This effort supports the sensor enhancement activities required to integrate 3GEN FLIR B-Kit technology into the LRAS3.   |  |   |                |                     |                         |                      |

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|--|----------------|----------------|----------------|--|----------------|----------------|----------------|---|----------------|-------------------------|-------------------|
| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                |                |                |  |                |                |                |   |                |                         | Date: March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / Night Vision Systems - Eng Dev |                |                |                | <b>Project (Number/Name)</b><br>L70 / Night Vision Dev Ed |                |                         |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                |                |                |  |                | FY 2018        | FY 2019        | FY 2020 Base  | FY 2020 OCO    | FY 2020 Total           |                   |
| <b>FY 2019 Plans:</b><br>FY 2019 Base Funding supports 3GEN LRAS3 market research and documentation updates associated with integration of the 3GEN FLIR B-Kit.  |                |                |                |  |                |                |                |   |                |                         |                   |
| <b>FY 2020 Base Plans:</b><br>FY 2020 Base funding supports the 3GEN LRAS3 documentation updates associated with integration of the 3GEN FLIR B-Kit.   |                |                |                |  |                |                |                |   |                |                         |                   |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>IFLIR/LRAS3: 50% funding cut ? Concentrate 3GEN FLIR on Abrams   |                |                |                |  |                |                |                |   |                |                         |                   |
| <b>Accomplishments/Planned Programs Subtotals</b>  |                |                |                |  |                | 53.681         | 59.670         | 39.026  | -              | 39.026                  |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |                |  |                |                |                |   |                |                         |                   |
| <b>Line Item</b>   | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b>   | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>  | <b>FY 2024</b> | <b>Cost To Complete</b> | <b>Total Cost</b> |
| • 330: Abrams Tank Improve Prog  | 93.739         | 165.655        | 119.645        | -  | 119.645        | 83.983         | 68.332         | 63.419  | 99.979         | Continuing              | Continuing        |
| • 371: Bradley Improve Prog  | 121.374        | 86.877         | 89.697         | -  | 89.697         | 46.925         | 23.381         | 24.843  | 19.974         | Continuing              | Continuing        |
| • K38300: Long Range Advanced Scout Surveillance System  | -              | 2.861          | 0.000          | -  | 0.000          | -              | 2.075          | 39.585  | 50.570         | Continuing              | Continuing        |
| <b>Remarks</b>   |                |                |                |  |                |                |                |   |                |                         |                   |
| <b>D. Acquisition Strategy</b>   |                |                |                |  |                |                |                |   |                |                         |                   |
| 3GEN FLIR: Materiel Development Decision (MDD) was received from the Army Acquisition Executive (AAE) and the Acquisition Decision Memorandum (ADM) was signed on 22-Dec-2014. Per the ADM, 3GEN FLIR entered the acquisition lifecycle at Milestone B (MS B) in 2Q FY 2016. After a successful MS B decision, competitive EMD contracts were awarded to design, develop, integrate and test the 3GEN FLIR B-Kit prior to production and mitigate the industrial base risk. The host platforms are responsible for integration of the 3GEN FLIR B-Kit. |                |                |                |  |                |                |                |   |                |                         |                   |
| 3GEN Long Range Advanced Scout Surveillance System (LRAS3): After a Milestone Decision Authority (MDA) review, 3GEN LRAS3 performed technical trade studies to determine modifications required to the current LRAS3 to integrate 3GEN FLIR B-Kit technology, an Inertial Measurement Unit (IMU), and an M-coded Global Positioning System (GPS) receiver. Market research and documentation update activities are planned for FY 2019 and FY 2020.  |                |                |                |  |                |                |                |   |                |                         |                   |
| Sensor CE: Additional Fiscal Year 2020 activities include continued development of the sensor interoperability requirement and improving the Soldier-machine interface in support of the Army's vision of the Common Operating Environment (COE).  |                |                |                |  |                |                |                |   |                |                         |                   |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army | <b>Date:</b> March 2019   |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5                   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / <i>Night Vision Systems - Eng Dev</i> | <b>Project (Number/Name)</b><br>L70 / <i>Night Vision Dev Ed</i> |
| <b>E. Performance Metrics</b>                                      |   |  |
| N/A  |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army   |                        |                                |             |   |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5  |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |            |         |            | Project (Number/Name)<br>L70 / Night Vision Dev Ed |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                       |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Project Management   | MIPR                   | PM TS : Ft. Belvoir, VA        | 14.092      | 1.410   | Jan 2018   | 1.518   | Jan 2019   | 1.027  | Jan 2020   | -           |            | 1.027            | Continuing       | Continuing | 9.454                    |
|  |                        | <b>Subtotal</b>                | 14.092      | 1.410   |            | 1.518   |            | 1.027  |            | -           |            | 1.027            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                       |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| FY 2012-FY 2013: Develop, Fab, and Qual of a common Ground Platform Engine with Block II EOCCM | C/Various              | Various : Various              | 0.049       | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 0.049      | -                        |
| 3GEN FLIR B-Kit Engineering/Document Prep  | C/Various              | Various : Various              | 21.685      | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 21.685     | -                        |
| 3GEN FLIR B-Kit EMD  | C/CPIF                 | Various : Various              | 50.314      | 48.245  | Dec 2017   | 54.135  | Nov 2018   | 34.354   | Nov 2019   | -           |            | 34.354           | Continuing       | Continuing | -                        |
| 3GEN LRAS3: Tech Trade Studies   | C/TBD                  | Various : Various              | 1.611       | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 1.611      | -                        |
| 3GEN LRAS3: ECP Integration  | C/TBD                  | Various : Various              | -           | 0.313   | Mar 2018   | -       |            | -  |            | -           |            | -                | 0.000            | 0.313      | -                        |
| PSS P3I: CE COE  | C/FP                   | Various : Various              | 19.162      | -   |            | -       |            | -  |            | -           |            | -                | 0.000            | 19.162     | -                        |
|  |                        | <b>Subtotal</b>                | 92.821      | 48.558  |            | 54.135  |            | 34.354   |            | -           |            | 34.354           | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                       |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| 3GEN FLIR B-Kit Support  | C/TBD                  | Various : Various              | 32.066      | 3.354   | Feb 2018   | 3.381   | Feb 2019   | 3.445  | Feb 2020   | -           |            | 3.445            | Continuing       | Continuing | -                        |
| 3GEN LRAS3 - Spec development and acquisition documentation                                    | C/TBD                  | Various : Various              | 0.350       | 0.259   | Feb 2018   | 0.536   | Feb 2019   | 0.100  | Feb 2020   | -           |            | 0.100            | Continuing       | Continuing | -                        |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |  |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|--|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |            |         |            | Project (Number/Name)<br>L70 / Night Vision Dev Ed |              |             |             |                  |                  |                  |                          |                          |
| Support (\$ in Millions)                               |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                       |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| COE Support  | C/CPFF                 | Various : Various              | 1.294       | 0.100   | Feb 2018   | 0.100   | Feb 2019   | 0.100  | Feb 2020     | -           |             | 0.100            | Continuing       | Continuing       | -                        |                          |
|  |                        | <b>Subtotal</b>                | 33.710      | 3.713   |            | 4.017   |            | 3.645  |              | -           |             | 3.645            | Continuing       | Continuing       | N/A                      |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                       |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Other Test Support                                     | MIPR                   | Various : Various              | 15.850      | -   |            | -       |            | -  |              | -           |             | -                | 0.000            | 15.850           | 15.850                   |                          |
|  |                        | <b>Subtotal</b>                | 15.850      | -   |            | -       |            | -  |              | -           |             | -                | 0.000            | 15.850           | 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 |
| <b>Project Cost Totals</b>                             |                        |                                |             | 156.473   | 53.681     |         | 59.670     |  | 39.026       |             | -           |                  | 39.026           | Continuing       | Continuing               | N/A                      |
| <b>Remarks</b>   |                        |                                |             |   |            |         |            |  |              |             |             |                  |                  |                  |                          |                          |

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| 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)     |   |         |   |   |         |                  |   |         |   |         |
| 2040 / 5  |         |   |   | PE 0604710A / Night Vision Systems - Eng Dev |   |   |         | L70 / Night Vision Dev Ed |   |         |   |   |         |                  |   |         |   |         |
| Event Name  | FY 2018 |   |   | FY 2019                                      |   |   | FY 2020 |                           |   | FY 2021 |   |   | FY 2022 |                  |   | FY 2023 |   | FY 2024 |
|   | 1       | 2 | 3 | 4  | 1 | 2 | 3       | 4                         | 1 | 2       | 3 | 4 | 1       | 2                | 3 | 4       | 1 | 2       |
| 3GEN FLIR B-Kit Development, Test, and Integration        |         |   |   |  |   |   |         |                           |   |         |   |   |         |                  |   |         |   |         |
| 3GEN FLIR B-Kit MS C                                      |         |   |   |  |   |   |         |                           |   |         |   |   |         |                  |   |         |   |         |
| 3GEN LRAS3 ECP to Integrate 3GEN FLIR B-Kit: Spec Develop |         |   |   |  |   |   |         |                           |   |         |   |   |         |                  |   |         |   |         |
| Common Operating Environment, Development                 |         |   |   |  |   |   |         |                           |   |         |   |   |         |                  |   |         |   |         |
|   |         |   |   |  |   |   |         |                           |   |         |   |   |         |                  |   |         |   |         |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army                            |   |  |         | Date: March 2019 |
|---|---|--|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5                                     | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev | Project (Number/Name)<br>L70 / Night Vision Dev Ed |         |                  |
| Schedule Details  |   |  |         |                  |
| Events  | Start   | End  | Quarter | Year             |
| 3GEN FLIR B-Kit Development, Test, and Integration                            | 2   | 2016   | 4       | 2022             |
| 3GEN FLIR B-Kit MS C  | 4   | 2022   | 4       | 2022             |
| 3GEN LRAS3 ECP to Integrate 3GEN FLIR B-Kit: Spec Development & Documentation | 1   | 2018   | 4       | 2020             |
| Common Operating Environment, Development                                     | 2   | 2012   | 4       | 2020             |
| 3GEN LRAS3 ECP to Integrate 3GEN FLIR B-Kit: Perform Tech Trade Studies       | 2   | 2017   | 4       | 2017             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)            |               |         |         | Project (Number/Name)                                 |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604710A / Night Vision Systems - Eng Dev |               |         |         | L76 / Dismounted Fire Support Laser Targeting 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 |  |
| L76: Dismounted Fire Support Laser Targeting Systems    | -           | 14.366  | 15.322  | 5.836        | -  | 5.836         | 5.249   | 5.452   | 4.878   | 5.480   | Continuing       | Continuing |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -   | -       |                  |            |  |

| <b>A. Mission Description and Budget Item Justification</b>   |  |  |  |  |
|---|--|--|--|--|
| This project matures and integrates technologies and capabilities which benefit the Joint Effects Targeting System (JETS) and Lightweight Laser Designator Rangefinder (LLDR) systems. These precision targeting and next generation systems are used by dismounted Soldiers to locate, identify, and target enemy assets. This project focuses on reducing size, weight, power and cost, improving imaging performance, and increasing targeting accuracy. Targeting accuracy improvements will focus on developing and integrating affordable, non-magnetic, high accuracy, full-time (24/7), and all weather Precision Azimuth and Vertical Angle Measurement (PAVAM) devices, with reduced size, weight, and power characteristics into the JETS and LLDR systems. Long term goals include improving current celestial navigation systems to increase operational availability, developing precision targeting capabilities that will operate in a Global Positioning System (GPS) contested environment to improve situational awareness, and to integrate Military Global Positioning System (GPS) User Equipment (M-Code) (next-generation GPS) receivers into JETS and LLDR, when available. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy. |  |  |  |  |

| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  |  |  |  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|--|--|--|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Design, Integration, & Qualification of LLDR 3 Systems   |  |  |  |  | 14.366  | 14.761  | 5.836        | -           | 5.836         |
| <b>Description:</b> One contract was competitively awarded to procure LLDR 3 systems with improved imaging performance and 24/7 precision targeting capability. This effort procures and qualifies LLDR 3 systems for production beginning in FY 2021.         |  |  |  |  |         |         |              |             |               |
| <b>FY 2019 Plans:</b><br>Continue integration of improved LLDR (15) systems and initiate qualification testing.  |  |  |  |  |         |         |              |             |               |
| <b>FY 2020 Base Plans:</b><br>Complete the integration efforts for the LLDR 3 (15) systems and continue the qualification testing.   |  |  |  |  |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 funds the completion and qualification of the LLDR 3 test systems. FY 2019 is substantially more because it funds a significant share of hardware and integration costs of the test systems. |  |  |  |  |         |         |              |             |               |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer   |  |  |  |  | -       | 0.561   | -            | -           | -             |
| <b>Description:</b> FY 2019 SBIR / STTR adjustment.  |  |  |  |  |         |         |              |             |               |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |         |         |  |             |               |   |             |               |         | Date: March 2019 |            |  |
|--|---------|---------|--|-------------|---------------|---|-------------|---------------|---------|------------------|------------|--|
| Appropriation/Budget Activity  |         |         | R-1 Program Element (Number/Name)            |             |               | Project (Number/Name)                                 |             |               |         |                  |            |  |
| 2040 / 5   |         |         | PE 0604710A / Night Vision Systems - Eng Dev |             |               | L76 / Dismounted Fire Support Laser Targeting Systems |             |               |         |                  |            |  |
| B. Accomplishments/Planned Programs (\$ in Millions)   |         |         |  | FY 2018     | FY 2019       | FY 2020 Base  | FY 2020 OCO | FY 2020 Total |         |                  |            |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR adjustment.   |         |         |  |             |               |   |             |               |         |                  |            |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR adjustment.                        |         |         |  |             |               |   |             |               |         |                  |            |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |         |         |  |             |               | 14.366  | 15.322      | 5.836         | -       | 5.836            |            |  |
| C. Other Program Funding Summary (\$ in Millions)  |         |         |  |             |               |   |             |               |         |                  |            |  |
| Line Item  | FY 2018 | FY 2019 | FY 2020 Base                                 | FY 2020 OCO | FY 2020 Total | FY 2021   | FY 2022     | FY 2023       | FY 2024 | Cost To Complete | Total Cost |  |
| • KA3100: Mod Of In-Svc Equip (LLDR)   | 9.172   | 24.833  | 6.044  | -           | 6.044         | -   | -           | -             | -       | 0.000            | 40.049     |  |
| • K32307: LLDR 3   | -       | -       | 0.000  | -           | 0.000         | 31.364  | 54.425      | 59.123        | 61.841  | Continuing       | Continuing |  |
| • K32101: JOINT EFFECTS TARGETING SYSTEM (JETS)  | 38.664  | 66.574  | 69.720                                       | -           | 69.720        | 69.714  | 69.707      | 69.701        | 69.694  | Continuing       | Continuing |  |
| • L79: Joint Effects Targeting Systems (JETS)  | 7.824   | 10.463  | 7.810  | -           | 7.810         | 5.571   | 5.608       | 5.040         | 5.609   | Continuing       | Continuing |  |
| • VT8: SOLDIER PRECISION TARGETING DEVICES - ADV DEV   | -       | -       | 1.483  | -           | 1.483         | 2.767   | 2.767       | 2.000         | 2.000   | Continuing       | Continuing |  |
| <b>Remarks</b>   |         |         |  |             |               |   |             |               |         |                  |            |  |
| <b>D. Acquisition Strategy</b>   |         |         |  |             |               |   |             |               |         |                  |            |  |
| This project continues to exercise competitively awarded contracts using best value source selection procedures. |         |         |  |             |               |   |             |               |         |                  |            |  |
| <b>E. Performance Metrics</b>  |         |         |  |             |               |   |             |               |         |                  |            |  |
| N/A  |         |         |  |             |               |   |             |               |         |                  |            |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army  |                        |                                       |             |   |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|---|------------------------|---------------------------------------|-------------|---|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                        |                                       |             | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |            |         |            | Project (Number/Name)<br>L76 / Dismounted Fire Support Laser Targeting Systems |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)  |                        |                                       |             | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location        | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management Support  | MIPR                   | PM-SSL : Ft. Belvoir VA 22060         | 0.104       | 0.216   | Aug 2018   | 0.138   | Nov 2018   | 0.150  | Dec 2019   | -           |            | 0.150            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>   |                        |                                       | 0.104       | 0.216   |            | 0.138   |            | 0.150  |            | -           |            | 0.150            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)  |                        |                                       |             | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location        | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| LLDR Qualification  | C/FFP                  | DRS : Melbourne, FL                   | -           | 14.000  | Sep 2018   | 14.405  | Feb 2019   | 2.995  | Nov 2019   | -           |            | 2.995            | Continuing       | Continuing | -                        |
| FY 2019 SBIR / STTR Transfer  | TBD                    | TBD : TBD                             | -           | -   |            | 0.561   |            | -  |            | -           |            | -                | Continuing       | Continuing | -                        |
| <b>Subtotal</b>   |                        |                                       | -           | 14.000  |            | 14.966  |            | 2.995  |            | -           |            | 2.995            | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>  |                        |                                       |             |   |            |         |            |  |            |             |            |                  |                  |            |                          |
| A competitively awarded contract to integrate and qualify LLDR 3 systems was made in September 2018 to DRS. |                        |                                       |             |   |            |         |            |  |            |             |            |                  |                  |            |                          |
| Support (\$ in Millions)  |                        |                                       |             | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location        | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Matrix Support  | MIPR                   | Various : Various                     | 0.180       | 0.150   |            | 0.168   | Nov 2018   | 0.300  | Nov 2019   | -           |            | 0.300            | Continuing       | Continuing | -                        |
| Science and Engineering Support   | MIPR                   | Johns Hopkins University : Laurel, MD | 3.833       | -   |            | -       |            | 0.500  | Jan 2020   | -           |            | 0.500            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>   |                        |                                       | 4.013       | 0.150   |            | 0.168   |            | 0.800  |            | -           |            | 0.800            | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |   |   |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|---|---|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |   | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |            |         |            | Project (Number/Name)<br>L76 / Dismounted Fire Support Laser Targeting Systems |            |             |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |   |   | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                    | Prior Years   | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Test and Evaluation Support                            | MIPR                   | Army Test and Evaluation Command, WSMR, NM : MIPR | -   | -   |            | 0.050   | Jun 2019   | 1.891  | Feb 2020   | -           |            | 1.891            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |   | -   | -   |            | 0.050   |            | 1.891  |            | -           |            | 1.891            | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>   |                        |   | Contractor will deliver the test systems in late 4th Qtr FY19. The majority of Government qualification testing will occur in FY20. |   |            |         |            |  |            |             |            |                  |                  |            |                          |
|  |                        |   | Prior Years   | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |   | 4.117   | 14.366  |            | 15.322  |            | 5.836  |            | -           |            | 5.836            | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>   |                        |   |   |   |            |         |            |  |            |             |            |                  |                  |            |                          |

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| 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)                                 |   |         |   |   |         |                  |   |         |   |         |
| 2040 / 5   |         |   |   | PE 0604710A / Night Vision Systems - Eng Dev |   |   |         | L76 / Dismounted Fire Support Laser Targeting Systems |   |         |   |   |         |                  |   |         |   |         |
| Event Name   | FY 2018 |   |   | FY 2019                                      |   |   | FY 2020 |   |   | FY 2021 |   |   | FY 2022 |                  |   | FY 2023 |   | FY 2024 |
|  | 1       | 2 | 3 | 4  | 1 | 2 | 3       | 4   | 1 | 2       | 3 | 4 | 1       | 2                | 3 | 4       | 1 | 2       |
| Integration & Production Award - LLDR 3            |         |   |   |  | 1 |   |         |   |   |         |   |   |         |                  |   |         |   |         |
| LLDR 3 Systems (Integration & Production Contract) |         |   |   |  |   |   |         |   |   |         |   |   |         |                  |   |         |   |         |
| Build LLDR 3 Systems for Testing                   |         |   |   |  |   |   |         |   |   |         |   |   |         |                  |   |         |   |         |
| Contractor Testing of LLDR 3 Systems               |         |   |   |  |   |   |         |   |   |         |   |   |         |                  |   |         |   |         |
| Government Testing of LLDR 3 Systems               |         |   |   |  |   |   |         |   |   |         |   |   |         |                  |   |         |   |         |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |   |  |         | Date: March 2019 |
|--|---|--|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev | Project (Number/Name)<br>L76 / Dismounted Fire Support Laser Targeting Systems |         |                  |
| Schedule Details                                   |   |  |         |                  |
| Events   | Start   | End  | Quarter | Year             |
| Integration & Production Award - LLDR 3            | 4   | 2018   | 4       | 2018             |
| LLDR 3 Systems (Integration & Production Contract) | 4   | 2018   | 4       | 2024             |
| Build LLDR 3 Systems for Testing                   | 4   | 2018   | 4       | 2019             |
| Contractor Testing of LLDR 3 Systems               | 4   | 2019   | 4       | 2020             |
| Government Testing of LLDR 3 Systems               | 3   | 2020   | 2       | 2021             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |               |         |         | Project (Number/Name)<br>L79 / Joint Effects Targeting Systems (JETS) |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| L79: Joint Effects Targeting Systems (JETS)             | -           | 7.824   | 10.463  | 7.810        | -   | 7.810         | 5.571   | 5.608   | 5.040   | 5.609   | Continuing       | Continuing |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       |                  |            |  |

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

The Joint Effects Targeting System (JETS) is an Army program with joint information (Air Force and Marine Corps). JETS addresses the one-man, hand-held precision targeting gap identified by the Fires Center of Excellence (FCoE). JETS is a light-weight, handheld system that will provide the single dismounted observer with a common, enhanced day and night thermal capability to rapidly acquire, accurately locate, positively identify, and precisely designate targets. JETS Target Location and Designation System (TLDS) will be able to interface with existing and future Forward Entry Systems (FESs) and operate in environments where global positioning system (GPS) capabilities are degraded or denied including the integration of military GPS user equipment (M-Code) GPS receivers, when they become available. This project will address continued development and integration of improved precision targeting components to reduce size, weight, power, and cost of systems for dismounted precision Fires mission. Funding in this project aligns with the Army's priorities in support of the National Defense Strategy.

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

| Title   | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Joint Effects Targeting System (JETS) Low-Rate Initial Production Qualification Testing<br><br><b>Description:</b> This project supports the Initial Operational Test & Evaluations (IOT&E) for the JETS production representative test systems.  | 2.542   | 1.215   | -            | -           | -             |
| <b>FY 2019 Plans:</b><br>Complete qualification and testing.  |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 is the last year of LRIP support including JETS testing.  |         |         |              |             |               |
| <b>Title:</b> Precision Azimuth and Vertical Angle Measurement (PAVAM) Development<br><br><b>Description:</b> Focuses on developments to improve size, weight, power and cost for inertial navigation PAVAM solutions which provide a 24/7 precision targeting capability. Develop improvements to celestial navigation PAVAM solutions to improve availability of precision measurements over a wider range of environments. | 5.182   | 1.503   | 1.219        | -           | 1.219         |
| <b>FY 2019 Plans:</b>   |         |         |              |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |  |  |                |                     | <b>Date:</b> March 2019 |                      |
|--|--|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / Night Vision Systems - Eng Dev | <b>Project (Number/Name)</b><br>L79 / Joint Effects Targeting Systems (JETS) |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| Continue improvements to current PAVAM technology. Continue development of reduced size, weight, power, and cost for the PAVAM. Continue development of improved celestial navigation PAVAM.   |  |  |                |                     |                         |                      |
| <p><b>FY 2020 Base Plans:</b><br/>Continue improvements to current PAVAM technology. Continue development of reduced size, weight, power, and cost for the PAVAM. Continue development of improved celestial navigation PAVAM.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>FY 2020 reflects a ramp down in PAVAM improvement efforts and a shift to precision targeting and target acquisition.</p>  |  |  |                |                     |                         |                      |
| <p><b>Title:</b> Joint Effects Targeting System (JETS) Threat Mitigation Development and Integration</p> <p><b>Description:</b> Focuses on developing and integrating technologies to counter battlefield threats to the system and the Soldier. This includes technologies and techniques to allow JETS to operate in GPS contested environments, incorporating counter sensor detection, and continuing to improve targeting sensors and lasers to operate in adverse conditions.</p> <p><b>FY 2019 Plans:</b><br/>Continue development of technologies to reduce size, weight, and power (SWAP) and to mitigate the impact when operating in GPS denied environments. Continue counter sensor development. Continue development of improved thermal imager and initiate integration into JETS.</p> <p><b>FY 2020 Base Plans:</b><br/>Continue development of technologies to reduce SWAP and to mitigate the impact when operating in GPS contested environments. Continue counter sensor development. Continue development of improved thermal imager and initiate integration into JETS.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>FY 2020 decrease reflects shift toward improving precision targeting and target acquisition development.</p> |  | -  | 2.219          | 1.491               | -                       | 1.491                |
| <p><b>Title:</b> Precision Targeting and Target Acquisition Development</p> <p><b>Description:</b> This project develops prototype precision targeting systems incorporating improved target acquisition sensors and optics, improved targeting sensors, and updated targeting algorithms while reducing size, weight, and power requirements. Incorporate the Intra Solider Wireless (ISW) capability into the Adaptive Soldier Architecture (ASA).</p>   |  | 0.100  | 5.143          | 5.100               | -                       | 5.100                |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |  |         |  |             |               |  |         |         |         | Date: March 2019 |            |              |             |               |  |  |  |
|---|--|---------|--|-------------|---------------|--|---------|---------|---------|------------------|------------|--------------|-------------|---------------|--|--|--|
| Appropriation/Budget Activity   |  |         | R-1 Program Element (Number/Name)            |             |               | Project (Number/Name)                        |         |         |         |                  |            |              |             |               |  |  |  |
| 2040 / 5  |  |         | PE 0604710A / Night Vision Systems - Eng Dev |             |               | L79 / Joint Effects Targeting Systems (JETS) |         |         |         |                  |            |              |             |               |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |  |         |  |             |               |  |         |         |         | FY 2018          | FY 2019    | FY 2020 Base | FY 2020 OCO | FY 2020 Total |  |  |  |
| <b>FY 2019 Plans:</b><br>Initiate trade studies and design development for improved precision targeting prototypes and component integration.                         |  |         |  |             |               |  |         |         |         |                  |            |              |             |               |  |  |  |
| <b>FY 2020 Base Plans:</b><br>Conduct trade studies and design development for improved precision targeting prototypes, and initiate component integration.           |  |         |  |             |               |  |         |         |         |                  |            |              |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 reflects shift to develop and integrate the latest sensor technologies into the modular components. |  |         |  |             |               |  |         |         |         |                  |            |              |             |               |  |  |  |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer<br><b>Description:</b> FY 2019 SBIR / STTR adjustment.   |  |         |  |             |               |  |         |         |         | -                | 0.383      | -            | -           | -             |  |  |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR adjustment.  |  |         |  |             |               |  |         |         |         |                  |            |              |             |               |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR adjustment.   |  |         |  |             |               |  |         |         |         |                  |            |              |             |               |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |  |         |  |             |               |  |         |         |         | 7.824            | 10.463     | 7.810        | -           | 7.810         |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |  |         |  |             |               |  |         |         |         |                  |            |              |             |               |  |  |  |
| Line Item   | FY 2018  | FY 2019 | FY 2020 Base                                 | FY 2020 OCO | FY 2020 Total | FY 2021                                      | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |              |             |               |  |  |  |
| • K32101: JOINT EFFECTS TARGETING SYSTEM (JETS)   | 38.664   | 66.574  | 69.720                                       | -           | 69.720        | 69.714                                       | 69.707  | 69.701  | 69.694  | Continuing       | Continuing |              |             |               |  |  |  |
| • L76: Dismounted Fire Support Laser Targeting Systems  | 14.366   | 15.322  | 5.836  | -           | 5.836         | 5.249  | 5.452   | 4.878   | 5.480   | Continuing       | Continuing |              |             |               |  |  |  |
| • VT8: SOLDIER PRECISION TARGETING DEVICES - ADV DEV  | -  | -       | 1.483  | -           | 1.483         | 2.767  | 2.767   | 2.000   | 2.000   | 0.000            | 11.017     |              |             |               |  |  |  |
| Remarks   | Funding line VT8 is continuing for "cost to complete." System does not allow this to be updated. |         |  |             |               |  |         |         |         |                  |            |              |             |               |  |  |  |

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|--|---|---|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / <i>Night Vision Systems - Eng Dev</i> | <b>Project (Number/Name)</b><br>L79 / <i>Joint Effects Targeting Systems (JETS)</i> |
| <b>D. Acquisition Strategy</b><br>This project continues to exercise competitively awarded contracts using best value source selection procedures. |   |   |
| <b>E. Performance Metrics</b><br>N/A   |   |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |         |   |         |            |              |   |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---------|---|---------|------------|--------------|---|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             |         | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |         |            |              | Project (Number/Name)<br>L79 / Joint Effects Targeting Systems (JETS) |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |   | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                                 | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date  | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management Support                             | MIPR                   | PM-SSL : Ft Belvoir, VA 22060                                  | 3.747       | 0.133   | Dec 2017  | 0.219   | Dec 2018   | 0.180        | Dec 2019  | -           |            | 0.180            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |  | 3.747       | 0.133   |   | 0.219   |            | 0.180        |   | -           |            | 0.180            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |   | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                                 | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date  | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| PAVAM 2 Development                                    | C/FFP                  | Various : Various  | 7.262       | 2.996   | Mar 2018  | 1.355   | Mar 2019   | 0.950        | Mar 2020  | -           |            | 0.950            | Continuing       | Continuing | Continuing               |
| Threat Mitigation Development                          | C/FFP                  | Various : Various  | 1.415       | -       |   | 0.300   | Mar 2019   | 0.900        | Mar 2020  | -           |            | 0.900            | Continuing       | Continuing | Continuing               |
| Precision Targeting & Target Acquisition Development   | C/FFP                  | Various : Various  | -           | 0.100   | Mar 2018  | 4.636   | Jan 2019   | 3.242        | Mar 2020  | -           |            | 3.242            | Continuing       | Continuing | Continuing               |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | TBD : TBD  | -           | -       |   | 0.383   |            | -            |   | -           |            | -                | Continuing       | Continuing | -                        |
| <b>Subtotal</b>  |                        |  | 8.677       | 3.096   |   | 6.674   |            | 5.092        |   | -           |            | 5.092            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |  |             | FY 2018 |   | FY 2019 |            | FY 2020 Base |   | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                                 | Prior Years | Cost    | Award Date  | Cost    | Award Date | Cost         | Award Date  | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Matrix Support   | MIPR                   | Night Vision Electronics Sensors Directorate : Ft. Belvoir, VA | 12.360      | 0.338   | Dec 2017  | 0.375   | Dec 2018   | 0.388        | Dec 2019  | -           |            | 0.388            | Continuing       | Continuing | -                        |
| Science and Engineering Support                        | SS/CPFF                | Johns Hopkins University : Laurel, MD                          | 3.019       | 2.608   | Apr 2018  | 2.100   | Apr 2019   | 1.500        | Apr 2020  | -           |            | 1.500            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>  |                        |  | 15.379      | 2.946   |   | 2.475   |            | 1.888        |   | -           |            | 1.888            | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |   |              |             | Date: March 2019 |               |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|--------------|-------------|------------------|---------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604710A / Night Vision Systems - Eng Dev |            |         |            | Project (Number/Name)<br>L79 / Joint Effects Targeting Systems (JETS) |              |             |                  |               |                  |                  |                          |                          |
| 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 |                          |
| Testing  | MIPR                   | Various : Various              | 3.651       | 1.649   | Dec 2017   | 1.095   | Dec 2018   | 0.650   | Dec 2020     | -           |                  | 0.650         | Continuing       | Continuing       | -                        |                          |
| <b>Subtotal</b>  |                        |                                |             | 3.651   | 1.649      |         | 1.095      |   | 0.650        |             | -                |               | 0.650            | Continuing       | Continuing               | N/A                      |
|  |                        |                                |             | Prior Years   | FY 2018    |         | FY 2019    |   | FY 2020 Base |             | FY 2020 OCO      |               | FY 2020 Total    | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                |             | 31.454  | 7.824      |         | 10.463     |   | 7.810        |             | -                |               | 7.810            | Continuing       | Continuing               | N/A                      |
| <b>Remarks</b>   |                        |                                |             |   |            |         |            |   |              |             |                  |               |                  |                  |                          |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

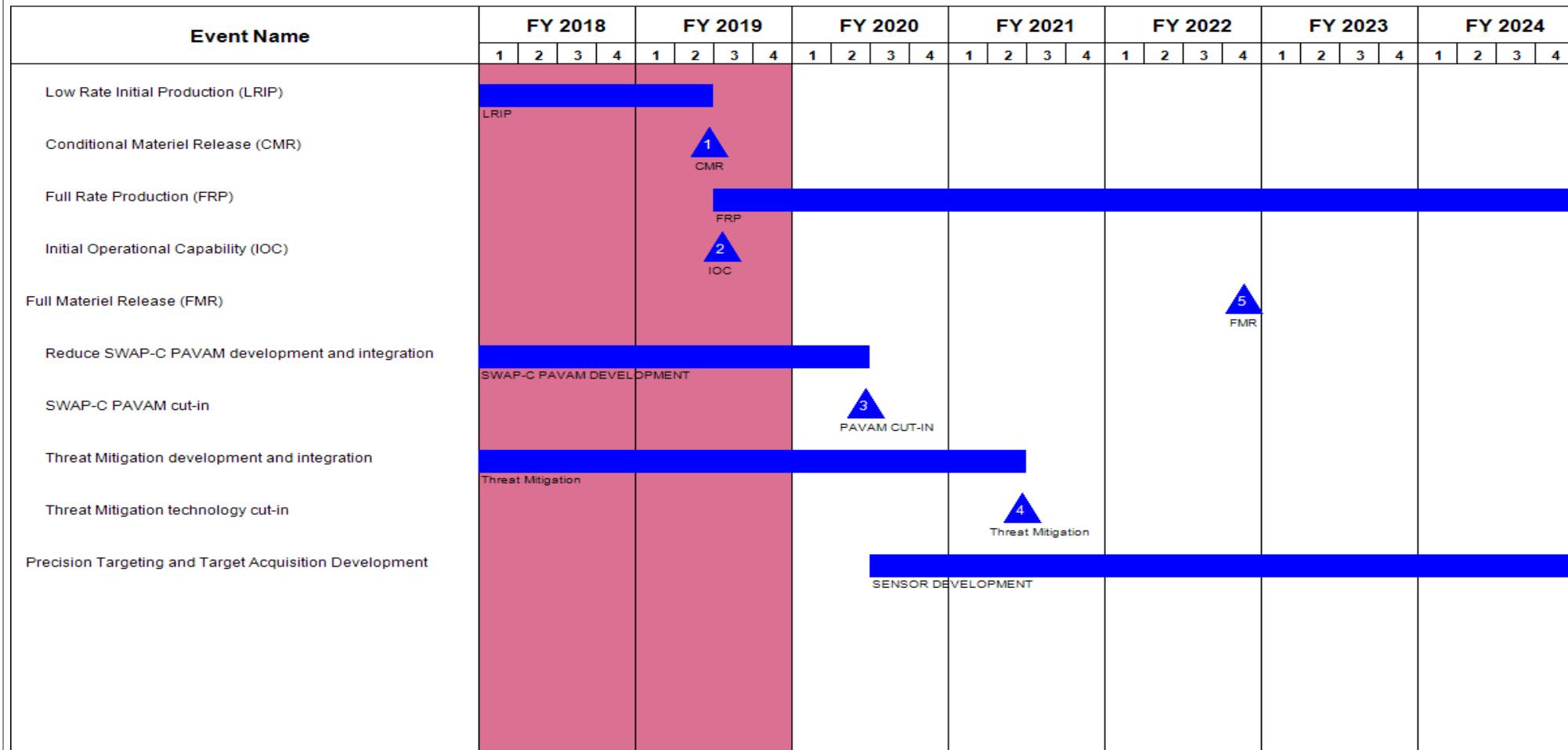
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604710A / Night Vision Systems - Eng Dev

**Project (Number/Name)**

L79 / Joint Effects Targeting Systems (JETS)



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|   |   |   |                         |
|---|---|---|-------------------------|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |   |   | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604710A / <i>Night Vision Systems - Eng Dev</i> | <b>Project (Number/Name)</b><br>L79 / <i>Joint Effects Targeting Systems (JETS)</i> |                         |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Low Rate Initial Production (LRIP)                     | 1              | 2017        | 2              | 2019        |
| Conditional Materiel Release (CMR)                     | 2              | 2019        | 2              | 2019        |
| Full Rate Production (FRP)                             | 3              | 2019        | 4              | 2024        |
| Initial Operational Capability (IOC)                   | 3              | 2019        | 3              | 2019        |
| Full Materiel Release (FMR)                            | 4              | 2022        | 4              | 2022        |
| Reduce SWAP-C PAVAM development and integration        | 3              | 2016        | 2              | 2020        |
| SWAP-C PAVAM cut-in                                    | 2              | 2020        | 2              | 2020        |
| Threat Mitigation development and integration          | 2              | 2017        | 2              | 2021        |
| Threat Mitigation technology cut-in                    | 2              | 2021        | 2              | 2021        |
| Precision Targeting and Target Acquisition Development | 3              | 2020        | 4              | 2024        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)                     |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604713A / Combat Feeding, Clothing, and Equipment |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 8.561   | 4.502   | 2.393        | -   | 2.393         | 2.817   | 1.817   | 1.531   | 1.611   | 0.000            | 23.232     |
| 548: Mil Subsistence Sys  | -           | 0.678   | 1.092   | 2.393        | -   | 2.393         | 2.817   | 1.817   | 1.531   | 1.611   | 0.000            | 11.939     |
| EL2: Army Field Feeding Equipment   | -           | 7.883   | 3.410   | 0.000        | -   | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 11.293     |

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

Projects under this Program Element support the development, demonstration and Non-Developmental Item (NDI) Commercial Off The Shelf (COTS) evaluation of combat feeding equipment to enhance soldier efficiency, improve soldier survivability, and reduce food service logistics requirements for all four services. These Projects support multi-fuel, rapidly deployable field food service equipment initiatives. Efforts also support the Engineering and Manufacturing Development (EMD) phase of programs to improve equipment, enhance safety in food service, and decrease fuel and water requirements. The Projects develop critical enablers that support the Joint Future Capabilities and Joint Expeditionary mindset, by maintaining readiness through integrating new equipment, enhancing the field soldier's well-being, and providing soldiers usable equipment. The Projects also reduce sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands on lift, the combat zone footprint, and costs for logistical support.

This PE/Project supports Field Feeding programs for all the services.

| B. Program Change Summary (\$ in Millions) | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| Previous President's Budget                | 3.702   | 4.507   | 6.141        | -           | 6.141         |
| Current President's Budget                 | 8.561   | 4.502   | 2.393        | -           | 2.393         |
| Total Adjustments                          | 4.859   | -0.005  | -3.748       | -           | -3.748        |
| • Congressional General Reductions         | -0.002  | -0.005  |              |             |               |
| • Congressional Directed Reductions        | -       | -       |              |             |               |
| • Congressional Rescissions                | -       | -       |              |             |               |
| • Congressional Adds                       | 5.000   | -       |              |             |               |
| • Congressional Directed Transfers         | -       | -       |              |             |               |
| • Reprogrammings                           | -       | -       |              |             |               |
| • SBIR/STTR Transfer                       | -0.139  | -       |              |             |               |
| • Adjustments to Budget Years              | -       | -       | -3.748       | -           | -3.748        |

**Change Summary Explanation**

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

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |                           |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------------------------|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                     |               |         |         | Project (Number/Name)     |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604713A / Combat Feeding, Clothing, and Equipment |               |         |         | 548 / Mil Subsistence Sys |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                   | FY 2024 | Cost To Complete | Total Cost |  |
| 548: Mil Subsistence Sys                                | -           | 0.678   | 1.092   | 2.393        | -   | 2.393         | 2.817   | 1.817   | 1.531                     | 1.611   | 0.000            | 11.939     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -                         | -       | -                | -          |  |

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

This Project enables system development and demonstration of Joint Service combat rations and field feeding equipment/systems 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 (DLA). 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 (CFREB) 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.

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

| Title   | FY 2018 | FY 2019 | FY 2020 |
|---|---------|---------|---------|
| <b>Title:</b> Fielded Individual Ration Improvement Project (FIRIP)   | 0.075   | -       | -       |
| <b>Description:</b> Continuous product improvement for the Meal Ready to Eat (MRE). Integrate prototype components/technologies into the MRE menu systems to improve operational effectiveness. Demonstrate system integration and producibility, develop component specifications and transition to Defense Logistics Agency ? Troop Support (DLA-Troop Support) for procurement.  |         |         |         |
| <b>Title:</b> Assault/Special Purpose Ration Improvement Project (ASPIP)  | 0.039   | -       | -       |
| <b>Description:</b> Continuous product improvement of special purpose rations by the integration of new technologies in nutrition, processing and packaging. Special purpose rations include the Meal, Cold Weather(MCW), First Strike Ration (FSR), and Modular Operational Ration Enhancement (MORE).   |         |         |         |
| <b>Title:</b> Fielded Group Ration Improvement Project (FGRIP)  | 0.078   | -       | -       |
| <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). |         |         |         |
| <b>Title:</b> Block Upgrades and Operational Improvements for Expeditionary Field Feeding Equipment   | 0.154   | -       | -       |
| <b>Description:</b> Eliminate the sole sourcing of tray ration heater component parts. Reduce overall water consumption through the use of non-immersive cooking technologies and more efficient ware-washing equipment. Increase Kitchen flexibility through   |         |         |         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |   |  | Date: March 2019 |         |         |
|---|---|--|------------------|---------|---------|
| Appropriation/Budget Activity<br>2040 / 5   | R-1 Program Element (Number/Name)<br>PE 0604713A / Combat Feeding, Clothing,<br>and Equipment | Project (Number/Name)<br>548 / Mil Subsistence Sys |                  |         |         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   |  | FY 2018          | FY 2019 | FY 2020 |
| appliance upgrades. To reduce the overall fuel consumption of Expeditionary Field Feeding Equipment through enhanced combustion technologies.   |   |  |                  |         |         |
| <b>Title:</b> Support to Air Force Field Feeding Modernization Efforts  |   | 0.147  | -                | -       |         |
| <b>Description:</b> Provide continuous R&D efforts for all Expeditionary Air Force squadrons. Modernize and standardize field foodservice equipment to reduce labor, maintenance, pack-out volume and cost. Increase reliability, efficiency and sustainability. Develop comprehensive specifications and technical data packages for recommended Food Service Equipment (FSE) items; test and evaluate newer commercial FSE items for expeditionary use and smaller transportation footprint; develop total overall life cycle cost of each system; test FSE items that use less power; and investigate/develop appliances that use less water, increase competition on standardized designs   |   |  |                  |         |         |
| <b>Title:</b> Modular Integrated Kitchen System (MIKS)  |   | 0.185  | -                | -       |         |
| <b>Description:</b> Design a standardized mounting system for all Galley equipment to significantly reduce technical labor skills required to complete deck modifications. MIKS will standardize electrical and water requirements, enhance procurement options, decrease operating and support (O&S) costs, and increase the speed of installing new technologies into the Galley/Scullery areas.  |   |  |                  |         |         |
| <b>Title:</b> Joint Service Combat Ration System Development  |   | -  | 0.632            | 1.393   |         |
| <b>Description:</b> This effort integrates and demonstrates mature Joint Service combat ration systems that enable warfighter maneuver, readiness and effectiveness during highly mobile, dispersed operations. Prototypes are transitioned from PE 0603747A Project 610 to develop individual and group combat rations with improved capabilities including improved warfighter physical and cognitive performance through optimized nutrition and reduced logistics burden through weight and cube reduction. This effort completes operational test and evaluation (OT&E) to confirm system level performance, and develops ration specifications for transition to Defense Logistics Agency - Troop Support (DLA - Troop Support) for procurement.              |   |  |                  |         |         |
| <b>FY 2019 Plans:</b><br>Integrate prototype components/technologies into individual and group menu systems to improve quality, optimize nutritional content, decrease weight/cube and/or improve modularity; conduct OT&E on ration systems to validate system level performance; present recommendations to the Joint Services Operational Ration Forum for Milestone C approval; finalize procurement documents and initiate transition to DLA-Troop Support; obtain Surgeon General approval of revised menus; execute production testing with industry to ensure consistent ration quality, validate Performance Contract Requirements (PCR), and resolve vendor/supplier issues; and conduct confirmatory sensory, chemical, physical and shelf life testing. |   |  |                  |         |         |
| <b>FY 2020 Plans:</b>   |   |  |                  |         |         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |  |  | Date: March 2019 |         |         |
|--|--|--|------------------|---------|---------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604713A / Combat Feeding, Clothing, and Equipment | Project (Number/Name)<br>548 / Mil Subsistence Sys |                  |         |         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  |  | FY 2018          | FY 2019 | FY 2020 |
| <p>For existing ration platforms (Meal, Ready-to-Eat; First Strike Ration; Meal, Cold Weather, Modular Operational Ration Enhancement; Unitized Group Rations ? A/M/H&amp;S), will integrate prototype components/technologies into menu systems and ration assembly processes to improve quality, optimize nutritional content, decrease weight/cube/cost and/or improve modularity and field utility; will conduct OT&amp;E on ration systems to validate system level performance; present recommendations to the Joint Services Operational Ration Forum (JSORF) for Milestone C approval; will finalize procurement documents and initiate transition to DLA-Troop Support; will obtain Surgeon General approval of revised menus; will execute production testing with industry to ensure consistent ration quality, validate Performance-based Contract Requirements (PCRs), and resolve vendor/supplier issues; will conduct confirmatory sensory, chemical, physical and shelf life testing. For developmental Close Combat Assault Ration (CCAR), will conduct OT&amp;E of capabilities/systems successfully demonstrated in 6.4 that provide Warfighters with lower weight, lower volume, more calorically dense, higher quality, commercially producible ration components; will validate system level performance of prototype CCARs in the context of providing Warfighters with viable nutrition options for a 7-day period without resupply; will present recommendations to the JSORF for Milestone C approval as new components providing advanced nutrition and logistical capabilities within existing ration platforms, as CCAR system concepts mature.</p> |  |  |                  |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Funding increased to support acceleration of Close Combat Assault Ration (CCAR).   |  |  |                  |         |         |
| <b>Title:</b> Joint Service Field Feeding Systems Development<br><br><b>Description:</b> This effort integrates and demonstrates field feeding equipment systems in support of the Navy (USN), Air Force (USAF), and Marine Corps (USMC) that reduce the logistics burden, improve efficiency, and decrease operation and support costs as directed by the DoD CFREB and Joint Service partners. Validated systems, specifications, and technical data packages are transitioned to the appropriate Service partner for procurement and fielding. Service partners include Product Manager Combat Support Equipment (PdM-CSE), Naval Sea Systems Command (NAVSEA), Naval Supply Systems Command (NAVSUP), and USAF Basic Expeditionary Airfield Resources (BEAR) Program Office.   |  | -  | 0.460            | 1.000   |         |
| <b>FY 2019 Plans:</b><br>Conduct OT&E of new integrated mounting system for galley equipment to reduce operation and support costs in support of the USN; support integration and demonstration of efficient refrigeration assets and an Energy Management System (EMS) in support of the USAF BEAR Type I & II kitchen systems; develop reports, Engineering Change Proposals (ECPs) and logistical data to reduce overall fuel and water consumption in support of the USMC; transition validated prototype equipment and technical data to USN, USMC and USAF.  |  |  |                  |         |         |
| <b>FY 2020 Plans:</b><br>Will conduct OT&E of Inflatable Refrigerated Space (IRefS) and Tray Ration Heater - Improved for USMC; will obtain aerial delivery certification for IRefS; will complete OT&E on Mobile Feeding Galley and transition technical data to USN; will continue   |  |  |                  |         |         |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                |                |   |             |  |                |   |              |                | <b>Date:</b> March 2019 |                |                |                         |                   |
|---|----------------|----------------|---|-------------|--|----------------|---|--------------|----------------|-------------------------|----------------|----------------|-------------------------|-------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604713A / Combat Feeding, Clothing, and Equipment |             |  |                | <b>Project (Number/Name)</b><br>548 / Mil Subsistence Sys |              |                |                         |                |                |                         |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b><br><br>OT&E of integrated mounting system for galley equipment to reduce operation and support costs in support of the USN; will develop reports, Engineering Change Proposals (ECPs) and logistical data to reduce overall fuel and water consumption in support of the USMC; will transition other validated prototype equipment and technical data to USN, USMC and USAF.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Funding increased to support OT&E for Joint Services. |                |                |   |             | <b>FY 2018</b>                             | <b>FY 2019</b> | <b>FY 2020</b>  |              |                |                         |                |                |                         |                   |
|   |                |                |   |             | Accomplishments/Planned Programs Subtotals | 0.678          | 1.092   | 2.393        |                |                         |                |                |                         |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |   |             |  |                |   |              |                |                         |                |                |                         |                   |
| <u>Line Item</u>  | <u>FY 2018</u> | <u>FY 2019</u> | <u>FY 2020</u>  | <u>Base</u> | <u>FY 2020</u>                             | <u>OCO</u>     | <u>FY 2020</u>  | <u>Total</u> | <u>FY 2021</u> | <u>FY 2022</u>          | <u>FY 2023</u> | <u>FY 2024</u> | <u>Cost To Complete</u> | <u>Total Cost</u> |
| • 610: Food Adv Development   | 6.286          | 4.593          | 3.721   | -           | 3.721                                      | 3.223          | 3.175   | 3.972        | 4.133          | 0.000                   | 29.103         |                |                         |                   |
| <b>Remarks</b>  |                |                |   |             |  |                |   |              |                |                         |                |                |                         |                   |
| <b>D. Acquisition Strategy</b><br>Complete Engineering and Manufacturing Development (EMD) and Demonstration of food items and equipment for transition into competitive procurement contract. Complete advanced research efforts to support Engineering Change Proposals for previously developed equipment.   |                |                |   |             |  |                |   |              |                |                         |                |                |                         |                   |
| <b>E. Performance Metrics</b><br>N/A  |                |                |   |             |  |                |   |              |                |                         |                |                |                         |                   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |  |            |         |            |  |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|--|------------|---------|------------|--|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604713A / Combat Feeding, Clothing, and Equipment |            |         |            | Project (Number/Name)<br>548 / Mil Subsistence Sys |              |             |             |                  |                  |                  |                          |                          |
| 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 |                          |
| Combat Feeding Program Management                      | C/FP                   | RDECOM : Natick, MA            | 3.002       | 0.139  | Oct 2017   | 0.235   | Oct 2018   | 0.514  | Oct 2019     | -           |             | 0.514            | Continuing       | Continuing       | Continuing               |                          |
| <b>Subtotal</b>  |                        | 3.002                          | 0.139       |  | 0.235      |         | 0.514      |  | -            |             | 0.514       | Continuing       | Continuing       | N/A              |                          |                          |
| Product Development (\$ in Millions)                   |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base                                       |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Joint Service Rations and Combat Feeding Equipment     | Various                | Various : Various              | 5.536       | 0.422  | Oct 2017   | 0.698   | Oct 2018   | 0.204  | Oct 2019     | -           |             | 0.204            | Continuing       | Continuing       | Continuing               |                          |
| <b>Subtotal</b>  |                        | 5.536                          | 0.422       |  | 0.698      |         | 0.204      |  | -            |             | 0.204       | Continuing       | Continuing       | N/A              |                          |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base                                       |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Joint Service Rations and Combat Feeding Equipment     | Allot                  | RDECOM, NSRDEC : Natick, MA    | 0.174       | 0.117  | Oct 2017   | 0.159   | Oct 2018   | 1.675  | Oct 2019     | -           |             | 1.675            | Continuing       | Continuing       | Continuing               |                          |
| <b>Subtotal</b>  |                        | 0.174                          | 0.117       |  | 0.159      |         | 1.675      |  | -            |             | 1.675       | Continuing       | Continuing       | N/A              |                          |                          |
|  |                        |                                |             | Prior Years  | FY 2018    |         | FY 2019    |  | FY 2020 Base |             | FY 2020 OCO |                  | FY 2020 Total    | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                | 8.712       | 0.678  |            | 1.092   |            | 2.393  |              | -           |             | 2.393            | Continuing       | Continuing       | N/A                      |                          |
| <b>Remarks</b>   |                        |                                |             |  |            |         |            |  |              |             |             |                  |                  |                  |                          |                          |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army                                |         |   |   |   |         |   |   |  |         |   |   |   |         | Date: March 2019 |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|--|---------|---|---|---|---------|---|---|--|---------|---|---|---|---------|------------------|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5  |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604713A / Combat Feeding, Clothing,<br>and Equipment |         |   |   | Project (Number/Name)<br>548 / Mil Subsistence Sys |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Event Name   | FY 2018 |   |   |   | FY 2019 |   |   |  | FY 2020 |   |   |   | FY 2021 |                  |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   | FY 2024 |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|  | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4  | 1       | 2 | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Conduct operational testing of combat ration systems                             |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Conduct OT&E of Close Combat Assault Ration (CCAR)                               |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Obtain Joint Service approval of first generation CCAR                           |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Develop CCAR Technical Data Package and contract for Low Rate Initial Production |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Transition CCAR component/packaging documents to DLA-TS for procurement          |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Conduct OT&E of Expeditionary Group Ration (EGR)                                 |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Transition individual ration/ration components/packaging documents               |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Transition Unitized Group Ration components/packaging documents                  |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Refine heat recovery prototype for integration and conduct OT&E                  |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Transition TDP for the EMS, JSERCS, and heat recovery system to USAF             |         |   |   |   |         |   |   |  |         |   |   |   | 1       |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Conduct OT&E of BEAR Type II kitchen system and transition to USAF               |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Conduct OT&E of Energy Conversation technologies for BEAR kitchens to USAF       |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Transition advanced USN equipment and systems to USN for pre                     |         |   |   |   |         |   |   |  |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army                             |         |   |   |   |         |   |   |  |         |   |   |   | Date: March 2019 |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
|---|---------|---|---|---|---------|---|---|--|---------|---|---|---|------------------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|--|
| Appropriation/Budget Activity<br>2040 / 5                                     |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604713A / Combat Feeding, Clothing,<br>and Equipment |         |   |   | Project (Number/Name)<br>548 / Mil Subsistence Sys |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Event Name  | FY 2018 |   |   |   | FY 2019 |   |   |  | FY 2020 |   |   |   | FY 2021          |   |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   | FY 2024 |   |   |   |  |
|   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4  | 1       | 2 | 3 | 4 | 1                | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |  |
| Conduct land-based user evaluation of MIKS and transition data to USN         |         |   |   |   | 2       | 3 | 4 |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Transition Mobile Feeding Galley to USN                                       |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Transition labor & energy saving galley/scullery upgrades to USN              |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Conduct OT&E of expeditionary kitchen systems for shore-based Navy units      |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Conduct OT&E of Improved Tray Ration Heater and transition to USMC            |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Obtain Aerial Delivery Certification of Inflatable Refrigerated Space (IRefS) |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Conduct OT&E of EFK upgrades and transition to USMC                           |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Conduct OT&E of intuitive kitchen equipment and transition to Services        |         |   |   |   |         |   |   |  |         |   |   |   |                  |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |  |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |  | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604713A / <i>Combat Feeding, Clothing, and Equipment</i> | <b>Project (Number/Name)</b><br>548 / <i>Mil Subsistence Sys</i> |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Conduct operational testing of combat ration systems                             | 1              | 2018        | 4              | 2024        |
| Conduct OT&E of Close Combat Assault Ration (CCAR)                               | 1              | 2020        | 4              | 2021        |
| Obtain Joint Service approval of first generation CCAR                           | 1              | 2021        | 2              | 2021        |
| Develop CCAR Technical Data Package and contract for Low Rate Initial Production | 2              | 2021        | 4              | 2021        |
| Transition CCAR component/packaging documents to DLA-TS for procurement          | 1              | 2022        | 2              | 2022        |
| Conduct OT&E of Expeditionary Group Ration (EGR)                                 | 1              | 2022        | 4              | 2022        |
| Transition individual ration/ration components/packaging documents to DLA-TS     | 1              | 2018        | 4              | 2024        |
| Transition Unitized Group Ration components/packaging documents to DLA-TS        | 1              | 2018        | 4              | 2024        |
| Refine heat recovery prototype for integration and conduct OT&E.                 | 1              | 2018        | 3              | 2019        |
| Transition TDP for the EMS, JSERCS, and heat recovery system to USAF             | 4              | 2019        | 4              | 2019        |
| Conduct OT&E of BEAR Type II kitchen system and transition to USAF               | 3              | 2018        | 4              | 2019        |
| Conduct OT&E of Energy Conversation technologies for BEAR kitchens to USAF       | 1              | 2022        | 4              | 2024        |
| Transition advanced USN equipment and systems to USN for procurement.            | 1              | 2014        | 4              | 2022        |
| Conduct land-based user evaluation of MIKS and transition data to USN            | 2              | 2019        | 4              | 2019        |
| Transition Mobile Feeding Galley to USN  | 1              | 2020        | 3              | 2020        |
| Transition labor & energy saving galley/scullery upgrades to USN                 | 1              | 2020        | 4              | 2021        |
| Conduct OT&E of expeditionary kitchen systems for shore-based Navy units         | 1              | 2022        | 4              | 2022        |
| Conduct OT&E of Improved Tray Ration Heater and transition to USMC               | 1              | 2020        | 4              | 2021        |
| Obtain Aerial Delivery Certification of Inflatable Refrigerated Space (IRefS)    | 1              | 2020        | 4              | 2021        |
| Conduct OT&E of EFK upgrades and transition to USMC                              | 1              | 2023        | 4              | 2023        |
| Conduct OT&E of intuitive kitchen equipment and transition to Services           | 1              | 2022        | 4              | 2022        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |   |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---|---------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604713A / Combat Feeding, Clothing, and Equipment |               |         |         | Project (Number/Name)<br>EL2 / Army Field Feeding 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 |
| EL2: Army Field Feeding Equipment                       | -           | 7.883   | 3.410   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 11.293     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -   | -       | -                |            |

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

This Project supports the development, demonstration and Non-Developmental Item (NDI) Commercial Off The Shelf (COTS) evaluation of combat feeding equipment to enhance Soldier efficiency, improve Soldier survivability, and reduce food service logistics requirements for the Army. The Project supports multi-fuel, rapidly deployable field food service equipment initiatives. Efforts also support the Engineering and Manufacturing Development (EMD) phase of programs to improve equipment, enhance safety in food service, and decrease fuel and water requirements. The Projects develop critical enablers that support the Army's Strategic Planning Guidance by developing and integrating critical expeditionary capabilities that maintain readiness, providing effective solutions that reduce the resource and operational energy footprint, providing modernized equipment, and enhancing the field Soldier's well being. This project reduces sustainment requirements, related Combat Support/Combat Service Support (CS/CSS) demands on lift, the combat zone footprint, and costs for logistical support.

This PE/Project supports Field Feeding programs for the Army.

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

|  | FY 2018 | FY 2019 | FY 2020 |
|--|---------|---------|---------|
| <b>Title:</b> Battlefield Kitchen (BK)   | 7.883   | 1.484   | -       |
| <b>Description:</b> Provide replacement of the obsolete Mobile Kitchen Trailer (MKT) system. The BK shall replace the MKT with a kitchen that provides fuel efficient, thermally controlled, closed combustion appliances within an environmentally controlled workspace. The BK shall provide rations for up to 300 Soldiers within 4 hours of setup. The BK provides refrigeration, running water and a heated serving line using the same off-road prime mover as the MKT as well as transportability by rail, sea, fixed and rotary wing aircraft. |         |         |         |
| <b>FY 2019 Plans:</b><br>Complete Limited User Test and Logistics Demonstration. Complete logistics documentation and prepare Milestone C package to obtain Milestone C decision and transition program into Low Rate Initial Production (LRIP).   |         |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Army efforts complete in FY 2019.  |         |         |         |
| <b>Title:</b> Expeditionary Solid Waste Disposal System (ESWDS)  | -       | 0.788   | -       |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                |   |                |             |                                    |            |                | Date: March 2019 |                |                |                |                         |                   |  |  |
|--|----------------|---|----------------|-------------|------------------------------------|------------|----------------|------------------|----------------|----------------|----------------|-------------------------|-------------------|--|--|
| Appropriation/Budget Activity  |                | R-1 Program Element (Number/Name)                     |                |             | Project (Number/Name)              |            |                |                  |                |                |                |                         |                   |  |  |
| 2040 / 5   |                | PE 0604713A / Combat Feeding, Clothing, and Equipment |                |             | EL2 / Army Field Feeding Equipment |            |                |                  |                |                |                |                         |                   |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                |   |                |             | <b>FY 2018</b>                     |            | <b>FY 2019</b> | <b>FY 2020</b>   |                |                |                |                         |                   |  |  |
| <p><b>Description:</b> Provides an integrated waste disposal capability providing substantial improvement over burn pits that pose health risks to Soldiers and/or the logistics burden of backhauling trash. Will safely process 1,000 pounds per day of mixed solid waste.</p> <p><b>FY 2019 Plans:</b><br/>Conduct user test and Logistics Demonstration. Complete program documentation for transition to production.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>Army efforts complete in FY 2019.</p>  |                |   |                |             |                                    |            |                |                  |                |                |                |                         |                   |  |  |
| <p><b>Title:</b> Containerized Kitchen, Modular</p> <p><b>Description:</b> Integrate the Anny's new Modular Appliance Burner and modular appliances developed for the Battlefield Kitchen into the Containerized Kitchen Platform. Replacing the open combustion appliances on the CK eliminates a key safety issue and the modular appliances are 20-40% more fuel efficient. Sharing the modular concept across all Army Field Feeding Platforms cuts the life cycle support costs significantly.</p> <p><b>FY 2019 Plans:</b><br/>Use the government owned technical data package developed by the Army and updated by the BK kitchen development effort to award an integration contract to govern integration of modular burners and appliances onto the Containerized Kitchen Platform. Oversee the Systems Engineering required to develop a comprehensive design for a Containerized Kitchen, Modular.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>Army efforts complete in FY 2019.</p> |                |   |                |             |                                    |            | -              | 1.029            |                |                |                |                         |                   |  |  |
| <p><b>Title:</b> SBIR/STTR</p> <p><b>FY 2019 Plans:</b><br/>SBIR/STTR</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>SBIR/STTR</p>  |                |   |                |             |                                    |            | -              | 0.109            |                |                |                |                         |                   |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |                |   |                |             |                                    |            |                | 7.883            | 3.410          | -              |                |                         |                   |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |   |                |             |                                    |            |                |                  |                |                |                |                         |                   |  |  |
| <u>Line Item</u>   | <u>FY 2018</u> | <u>FY 2019</u>  | <u>FY 2020</u> | <u>Base</u> | <u>FY 2020</u>                     | <u>OCO</u> | <u>FY 2020</u> | <u>FY 2021</u>   | <u>FY 2022</u> | <u>FY 2023</u> | <u>FY 2024</u> | <u>Cost To Complete</u> | <u>Total Cost</u> |  |  |
| • EL1: Army Field Feeding Programs   | 0.430          | 1.346   | 0.000          | -           | 0.000                              | -          | -              | -                | -              | -              | -              | Continuing              | Continuing        |  |  |

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|--|--------|-------|-------|--|-------|---|---|---|---|---|-------------------------|--|--|--|--|--|--|
| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |        |       |       |  |       |   |   |   |   |   | <b>Date:</b> March 2019 |  |  |  |  |  |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |        |       |       | <b>R-1 Program Element (Number/Name)</b><br>PE 0604713A / <i>Combat Feeding, Clothing, and Equipment</i> |       |   |   |   |   | <b>Project (Number/Name)</b><br>EL2 / <i>Army Field Feeding Equipment</i> |                         |  |  |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |        |       |       |  |       |   |   |   |   |   |                         |  |  |  |  |  |  |
| <b>Line Item</b> <b>FY 2018</b> <b>FY 2019</b> <b>FY 2020</b> <b>FY 2020</b> <b>FY 2020</b> <b>FY 2021</b> <b>FY 2022</b> <b>FY 2023</b> <b>FY 2024</b> <b>Cost To Complete</b> <b>Total Cost</b>  |        |       |       |  |       |   |   |   |   |   |                         |  |  |  |  |  |  |
| • R62830: <i>Battlefield Kitchen (BK)</i>  | -      | 2.024 | 0.000 | -  | 0.000 | - | - | - | - | Continuing  | Continuing              |  |  |  |  |  |  |
| • M65801: <i>REFRIGERATED CONTAINER SYSTEMS</i>  | 10.877 | 9.140 | 0.000 | -  | 0.000 | - | - | - | - | Continuing  | Continuing              |  |  |  |  |  |  |
| <b>Remarks</b>   |        |       |       |  |       |   |   |   |   |   |                         |  |  |  |  |  |  |
| <b>D. Acquisition Strategy</b><br>Complete Engineering Manufacturing Decisions (EMD) of food items and equipment for transition into competitive procurement contract. Complete advanced research efforts to support Engineer Change Proposals for previously developed equipment. |        |       |       |  |       |   |   |   |   |   |                         |  |  |  |  |  |  |
| <b>E. Performance Metrics</b><br>N/A   |        |       |       |  |       |   |   |   |   |   |                         |  |  |  |  |  |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army    |                        |                                |             |             |            |         |            |              |              |             |             | Date: March 2019                                      |                  |                  |                          |                          |
|---|------------------------|--------------------------------|-------------|-------------|------------|---------|------------|--------------|--------------|-------------|-------------|---|------------------|------------------|--------------------------|--------------------------|
| <b>Appropriation/Budget Activity</b>                      |                        |                                |             |             |            |         |            |              |              |             |             | <b>R-1 Program Element (Number/Name)</b>              |                  |                  |                          |                          |
| 2040 / 5  |                        |                                |             |             |            |         |            |              |              |             |             | PE 0604713A / Combat Feeding, Clothing, and Equipment |                  |                  |                          |                          |
| <b>Management Services (\$ in Millions)</b>               |                        |                                |             | FY 2018     |            | FY 2019 |            | FY 2020 Base |              | FY 2020 OCO |             | FY 2020 Total   |                  |                  |                          |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | Prior Years | Cost        | Award Date | Cost    | Award Date | Cost         | Award Date   | Cost        | Award Date  | Cost  | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Project Management Support                                | Various                | PMFSS : Natick, MA             | 0.240       | 0.250       |            | 0.324   |            | -            |              | -           |             | -   | 0.000            | 0.814            | -                        |                          |
| SBIR/STTR   | TBD                    | PMFSS : Natick, MA             | -           | -           |            | 0.109   |            | -            |              | -           |             | -   | 0.000            | 0.109            | -                        |                          |
| <b>Subtotal</b>   |                        | 0.240                          | 0.250       |             | 0.433      |         | -          |              | -            |             | -           | -   | 0.000            | 0.923            | N/A                      |                          |
| <b>Product Development (\$ in Millions)</b>               |                        |                                |             | 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 |                          |
| Battlefield Kitchen                                       | Various                | PMFSS : Natick, MA             | 1.120       | 1.081       |            | 1.302   |            | -            |              | -           |             | -   | 0.000            | 3.503            | -                        |                          |
| Containerized Food Sanitation Center (FSC)                | Various                | PMFSS : Natick, MA             | -           | -           |            | 0.460   |            | -            |              | -           |             | -   | 0.000            | 0.460            | -                        |                          |
| Deployable Sustainable Efficient Refrigeration Technology | Various                | Various : Various              | -           | -           |            | 1.054   |            | -            |              | -           |             | -   | 0.000            | 1.054            | -                        |                          |
| <b>Subtotal</b>   |                        | 1.120                          | 1.081       |             | 2.816      |         | -          |              | -            |             | -           | -   | 0.000            | 5.017            | N/A                      |                          |
| <b>Test and Evaluation (\$ in Millions)</b>               |                        |                                |             | 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 |                          |
| Ice Making System   | Various                | ATC/Ft Lee : Virginia          | 0.205       | -           |            | -       |            | -            |              | -           |             | -   | 0.000            | 0.205            | -                        |                          |
| Battlefield Kitchen                                       | Various                | ATC/FT Lee : Virginia          | -           | 6.552       |            | 0.161   |            | -            |              | -           |             | -   | 0.000            | 6.713            | -                        |                          |
| <b>Subtotal</b>   |                        | 0.205                          | 6.552       |             | 0.161      |         | -          |              | -            |             | -           | -   | 0.000            | 6.918            | 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 |
| <b>Project Cost Totals</b>                                |                        |                                |             | 1.565       | 7.883      |         | 3.410      |              | -            |             | -           |   | -                | 0.000            | 12.858                   | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                |         |   |                 |                |   | Date: March 2019    |               |                                |
|--|----------------|---------|---|-----------------|----------------|---|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                |         | R-1 Program Element (Number/Name)<br>PE 0604713A / Combat Feeding, Clothing,<br>and Equipment |                 |                | Project (Number/Name)<br>EL2 / Army Field Feeding Equipment |                     |               |                                |
|  | Prior<br>Years | FY 2018 | FY 2019   | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total  | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
| <b>Remarks</b>   |                |         |   |                 |                |   |                     |               |                                |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

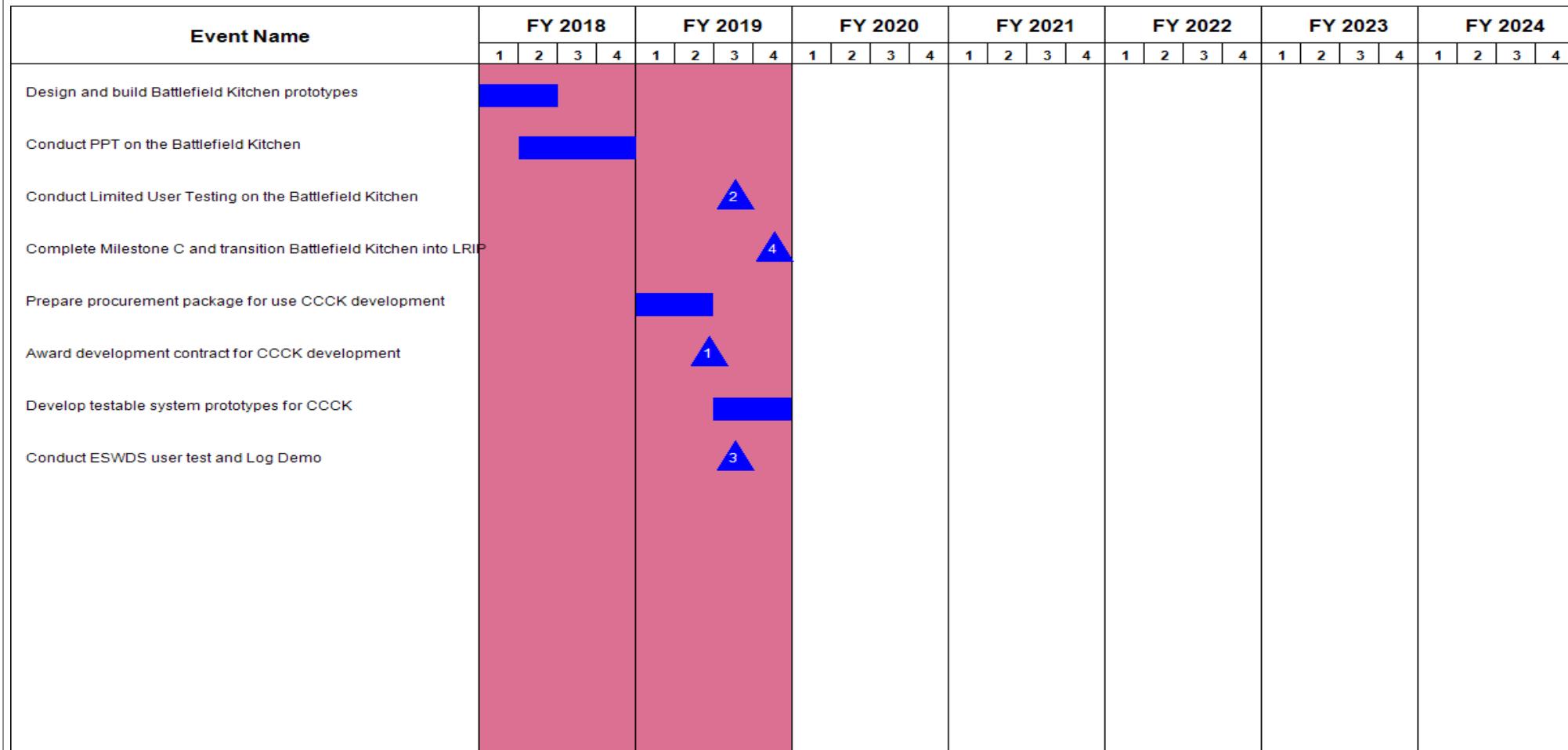
Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604713A / Combat Feeding, Clothing,  
and Equipment**Project (Number/Name)**

EL2 / Army Field Feeding Equipment



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|   |  |   |                         |
|---|--|---|-------------------------|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  |   | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604713A / <i>Combat Feeding, Clothing, and Equipment</i> | <b>Project (Number/Name)</b><br>EL2 / <i>Army Field Feeding Equipment</i> |                         |

**Schedule Details**

| <b>Events</b>   | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Design and build Battlefield Kitchen prototypes                   | 1              | 2017        | 2              | 2018        |
| Conduct PPT on the Battlefield Kitchen                            | 2              | 2018        | 4              | 2018        |
| Conduct Limited User Testing on the Battlefield Kitchen           | 3              | 2019        | 3              | 2019        |
| Complete Milestone C and transition Battlefield Kitchen into LRIP | 4              | 2019        | 4              | 2019        |
| Prepare procurement package for use CCCK development              | 1              | 2019        | 2              | 2019        |
| Award development contract for CCCK development                   | 2              | 2019        | 2              | 2019        |
| Develop testable system prototypes for CCCK                       | 3              | 2019        | 4              | 2019        |
| Conduct ESWDS user test and Log Demo                              | 3              | 2019        | 3              | 2019        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)                   |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604715A / Non-System Training Devices - Eng Dev |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 51.900  | 44.381  | 27.412       | -   | 27.412        | 26.349  | 24.995  | 18.697  | 16.806  | Continuing       | Continuing |
| 241: Nstd Combined Arms   | -           | 51.900  | 44.381  | 27.412       | -   | 27.412        | 26.349  | 24.995  | 18.697  | 16.806  | Continuing       | Continuing |

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

Program Element funds development of Non-System Training Devices to support force-on-force training at the Combat Training Centers (CTC), general military training, and training on more than one item/system, as compared with system devices which are developed in support of a specific item/weapon system. Army training devices and training simulations contribute to the modernization of the forces by enabling readiness and strengthening combat effectiveness through realistic training solutions for the Warfighter. Training devices maximize the transfer of knowledge, skills, and experience from the training situation to a combat situation. Force-on-force training at the National Training Center (NTC), Ft. Irwin, CA; Joint Readiness Training Center (JRTC), Ft. Polk, LA, and Joint Multinational Readiness Center (JMRC), formerly the Combat Maneuver Training Center (CMTC), Hohenfels, Germany; and battle staff training in Battle Command Training Program (BCTP) provide increased combat readiness through realistic collective training in low, mid, and high intensity scenarios. Project 241, Non-System Training Devices-Combined Arms, develops simulation training devices for Army-wide use, including the CTCs.

FY 2020 Project 241 funds significant development efforts in support of U.S. Army Training and Readiness on the Combat Training Center Instrumentation Systems (CTC-IS), Instrumentable-Multiple Integrated Laser Engagement System (I-MILES), Home Station Instrumentation Training System (HITS), Common Training Instrumentation Architecture (CTIA), Digital Range Training System (DRTS), Target Modernization, Medical Simulation Training Center (MSTC), Live, Virtual, Constructive Integrating Architecture (LVC-IA), OPFOR Surrogate Wheeled Vehicles (OSWV), Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS) new start, and Basic Electronics Maintenance Trainer (BEMT) new start.

FY 2020 funding for Suicide Prevention is realigned to PE 0605013A project FL9.

FY 2020 funding for Soldier/Squad Virtual Trainer Program (S/SVT) is realigned to PE 0604121A, Project SV1.

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |         |   |              |             | Date: March 2019 |
|---|---------|---|--------------|-------------|------------------|
| Appropriation/Budget Activity   |         | R-1 Program Element (Number/Name)                   |              |             |                  |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |         | PE 0604715A / Non-System Training Devices - Eng Dev |              |             |                  |
| B. Program Change Summary (\$ in Millions)  | FY 2018 | FY 2019   | FY 2020 Base | FY 2020 OCO | FY 2020 Total    |
| Previous President's Budget   | 43.575  | 49.436  | 26.382       | -           | 26.382           |
| Current President's Budget  | 51.900  | 44.381  | 27.412       | -           | 27.412           |
| Total Adjustments   | 8.325   | -5.055  | 1.030        | -           | 1.030            |
| • Congressional General Reductions  | -0.034  | -0.055  |              |             |                  |
| • Congressional Directed Reductions   | -       | -5.000  |              |             |                  |
| • Congressional Rescissions   | -       | -   |              |             |                  |
| • Congressional Adds  | 10.000  | -   |              |             |                  |
| • Congressional Directed Transfers  | -       | -   |              |             |                  |
| • Reprogrammings  | -0.010  | -   |              |             |                  |
| • SBIR/STTR Transfer  | -1.631  | -   |              |             |                  |
| • Adjustments to Budget Years   | -       | -   | 1.030        | -           | 1.030            |
| Congressional Add Details (\$ in Millions, and Includes General Reductions)                           | FY 2018 | FY 2019   |              |             |                  |
| <b>Project: 241: Nstd Combined Arms</b>   |         |   |              |             |                  |
| Congressional Add: Congressional Add for Combined Arms Center Threat Integrated Air Defense System    | 10.000  | -   |              |             |                  |
| Congressional Add Subtotals for Project: 241  | 10.000  | -   |              |             |                  |
| Congressional Add Totals for all Projects   | 10.000  | -   |              |             |                  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |                          |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--------------------------|---------|------------------|------------|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                   |               |         |         | Project (Number/Name)    |         |                  |            |
| 2040 / 5  |             |         |         |              | PE 0604715A / Non-System Training Devices - Eng Dev |               |         |         | 241 / Nstd Combined Arms |         |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                  | FY 2024 | Cost To Complete | Total Cost |
| 241: Nstd Combined Arms                                 | -           | 51.900  | 44.381  | 27.412       | -   | 27.412        | 26.349  | 24.995  | 18.697                   | 16.806  | Continuing       | Continuing |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -                        | -       |                  |            |

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

The Common Training Instrumentation Architecture (CTIA) program is the foundation architecture of the Live Training Transformation Family of Training Systems (LT2-FTS). The program contains critical core product-line architecture which provides commonality across training instrumentation systems and interoperability across Live, Virtual, Constructive Integrated Training Environment (LVC-ITE) and joint training systems. CTIA includes Army owned software components, architecture services, standards, protocols and governance used by domain-specific Live Training Transformation (LT2) and Live Training Systems (LTS) to include instrumented Force-On-Force (FOF) and Force-On-Target (FOT) training requirements. The CTIA also provides Post Deployment Software Support (PDSS) and technology refresh for the LT2 family of LTS supporting over 22 live instrumented training products which are fielded at over 200 CONUS and OCONUS sites across the Army.

Combat Training Center Instrumentation System (CTC-IS) funds the continued development of the existing Instrumentation Systems (IS) at the National Training Center (NTC), Joint Readiness Training Center (JRTC) and Joint Multinational Readiness Center (JMRC). CTC-IS funds the continued development of the Range Communication System at the NTC and JRTC, to provide high-fidelity live, virtual, and constructive brigade training rotations which prepare Brigade Combat Teams (BCTs), Joint partners, and supporting units to deploy in support of the Army Sustainable Readiness Model (SRM). The CTCs primary goal is to develop agile and adaptive leaders at the tactical, operational and strategic levels while providing BCTs the core training necessary to conduct decisive action in a dynamic operating environment.

The Instrumentable-Multiple Integrated Laser Engagement System (I-MILES) program provides realistic, real-time casualty effects for force-on-force tactical engagement training scenarios. Its ability to integrate into training instrumentation systems provides for high fidelity combined arms combat exercises supporting the 39th Chief of the Staff of the Army's #1 priority of "Readiness" and the closely aligns with the Modernization priority of Soldier Lethality. I-MILES is required for use at Home Stations, the Combat Training Centers (CTCs) and in theater of operations to meet force-on-force training requirements. I-MILES program funding provides for the Development and Integration of new vehicle and dismount weapon systems meeting the Common Operating Environment (COE) requirements, as well as embedded Tactical Engagement Simulation (TES) development. This includes development efforts of the Live Training Engagement Composition (LTEC), increasing simulation by updating the Probability of Kill (Pk) tables for increased training realism and improved integration on new weapon platforms (i.e. Joint Light Tactical Vehicle (JLTV), Armored Multi-Purpose Vehicle (AMPV), Next Generation Combat vehicle, M4A2 plus Rifle and Stryker Engineering Change Proposal (ECP) with 30mm Gun).

The Home Station Instrumentation Training System (HITS) currently provides a high-fidelity deployable instrumented training capability to support platoon thru battalion ground based Soldiers and vehicles in Force-on-Force Training. HITS tracks location of soldiers and vehicles and simulates weapons' effects and engagements, allowing units to "Train as they Fight" against live opponents. HITS provides accurate feedback to training units. HITS consists of light deployable components that can be rapidly assembled/disassembled and transported to support deployed training. HITS is a member of the Live Training Transformation (LT2) product line of training systems implementing hardware and software reuse with other Instrumentation Systems (IS). HITS provides the only Live training component for the large scale Live-

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |   | Date: March 2019         |
|---|---|--------------------------|
| Appropriation/Budget Activity   | R-1 Program Element (Number/Name)                   | Project (Number/Name)    |
| 2040 / 5  | PE 0604715A / Non-System Training Devices - Eng Dev | 241 / Nstd Combined Arms |
| Virtual-Constructive (LVC) military training exercises. HITS begins US Army aviation vehicle integration with Home Station instrumentation to cover comprehensive training engagements between ground and air forces.   |   |                          |
| The Medical Simulation Training Center (MSTC) provides realistic medical training to both medical and non-medical Soldiers in the Active, Reserve, and National Guard. MSTCs provide hands-on instruction on the latest battlefield trauma and critical care techniques based on Army Medical Department (AMEDD) approved performance oriented Program of Instruction (POI). Medical treatment validation exercises simulate the high stress of performing medical interventions in combat. MSTC supports Unit Medical Readiness by validating Combat Medic (68W) Emergency Medical Technician (EMT) biennial recertification requirements and provides Combat Lifesaver (CLS) training to non-medical Soldiers.  |   |                          |
| The Basic Electronics Maintenance Trainer (BEMT) provides the essential modernized electronic system maintenance training capability for the Army, Army National Guard, and the Army Reserve to achieve Military Occupational Specialty-Qualification (MOS-Q) for 40 MOS at 24 Active, National Guard, and Army Reserve camps, posts, and stations. Soldiers utilizing the BEMT system receive highly realistic training using scenarios requiring performance of basic electronic tasks in a virtual environment including tests, diagnosis, and repair while saving institutions significant expenses over live training alternatives. The Army identified the need for modernization of electronics maintenance training. Electronics maintenance is a critical skill, directly contributing to the overall Army mission accomplishment.   |   |                          |
| The Live, Virtual, Constructive Integrating Architecture (LVC-IA) provides a net-centric linkage that collects, retrieves and exchanges data among LVC Training Aids, Devices, Simulations, and Simulators (TADSS) (to include: AVCATT, CCTT, GFT, HITS, JLCCCTC and SE Core) and Mission Command Systems. The LVC-IA defines "how" information is exchanged among the different LVC domains and the Mission Command Systems. The LVC-IA provides enterprise level tools for exercise control, after action review, and system information assurance. It develops hardware and software to interface the different Live, Virtual, Constructive and Gaming communication protocols and to provide a correlated common operating picture for the training audience on their organic Mission Command equipment. The integration of the LVC TADSS with the Mission Command equipment will enable larger and more robust training events, to better prepare U.S. Soldiers for their missions at an overall reduced cost. The end-state goal is to enable an LVC Integrated Training Environment that can replicate Operational Environments in a cost effective manner to provide a high level of value-added training and mission rehearsal opportunities to Army Commanders and their Soldiers. In FY18, the LVC-IA program began design and developmental activities for Version 4 which allowed for Web-based optimization; inclusion of new simulations to the architecture; and concurrency with core system TADSS and Army Mission Command Systems and will continue in FY19 through FY21. FY20 request will continue Version 4 developmental and integration activities (Web-based optimization and Synthetic Training Environment (STE) compatibility), and will continue concurrency with mission command systems. |   |                          |
| The Target Modernization program provides a common open architectural framework, standards, specifications, and interfaces for live fire target devices, a common target control system for all range types, and innovative technologies to enhance training realism and reduce life cycle costs on the ranges. The Target Modernization program's primary innovation goals are the development of trackless moving target systems, high fidelity dynamic infrared representations, non-contact ballistic hit detections, advanced human type targets, and augmented reality on live fire ranges; aimed at increasing training realism and lowering life cycle costs.   |   |                          |
| The Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS) program fields the Combined Arms Collective Training Facility (CACTF), the Collective Training Facility (CTF), Live Fire Shoot House (LFSH), and the Urban Assault Course (UAC). The IMTS training systems provide instrumentation to enable training and After Action Review (AAR) of Soldier training exercises up to the battalion level combined training for the Active and Reserve Component Army. The  |   |                          |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |   |                          | Date: March 2019 |         |              |             |               |
|---|---|--------------------------|------------------|---------|--------------|-------------|---------------|
| Appropriation/Budget Activity   | R-1 Program Element (Number/Name)                   | Project (Number/Name)    |                  |         |              |             |               |
| 2040 / 5  | PE 0604715A / Non-System Training Devices - Eng Dev | 241 / Nstd Combined Arms |                  |         |              |             |               |
| CACTF, CTF, and LFSH enable training and AAR under daylight and night vision environments for units training in urban areas, underground environments, and the approaches to these areas.   |   |                          |                  |         |              |             |               |
| The Army identified an operational gap in the training strategy for the OPFOR Integrated Air Defense System (IADS). It is a collection of enemy weapons systems that engages Army aviation assets. Training Aircraft Survivability Equipment (ASE) Simulation Suite (TASS) is a live training system consisting of aircraft components and ground emitters that replicates current and emerging enemy Air Defense systems. Its fidelity supports individual pilot training as well as the collective training requirements of the Brigade Combat Team to fully plan, prepare, execute and react against an enemy air defense weapons at the Combat Training Centers (CTC).  |   |                          |                  |         |              |             |               |
| The Digital Range Training System (DRTS) provides new and modern ranges capable of training, evaluating and stressing Soldiers and their modern equipment in a realistic train-as-you-fight environment. The system consists of four standard training ranges: Digital Multi-Purpose Range Complex (DMPRC), Digital Multi-Purpose Training Range (DMPTR), Battle Area Complex (BAX) and Digital Air Ground Integration Range (DAGIR) which utilize all available combat systems capabilities, and digitally integrate them to manage all forces undergoing individual and collective live-fire training and qualification. These training systems replicate realistic threat systems, challenge Soldiers, and provide enhanced training data collection and After Action Review (AAR) capabilities. The system provides accurate gunnery qualification information to the training units as well as integrates multiple ranges and training environments. |   |                          |                  |         |              |             |               |
| OPFOR Surrogate Wheeled Vehicles (OSWV) provides a collection of wheeled vehicles, used as training aids to portray threat vehicles including tactical vehicles, technical vehicles, and Civilian on the Battlefield vehicles (COB-V). The program supports the CTC OPFOR/COE Pillar capability through technical vehicles, unique VISMODs, and COB-Vs. This capability provides for an accurate replication of OPFOR and COB-Vs environment that rotational units must train against.  |   |                          |                  |         |              |             |               |
| FY 2020 Project 241 funds significant development efforts in support of U.S. Army Training and Readiness on the Combat Training Center Instrumentation Systems (CTC-IS), Instrumentable-Multiple Integrated Laser Engagement System (I-MILES), Home Station Instrumentation Training System (HITS), Common Training Instrumentation Architecture (CTIA), Digital Range Training System (DRTS), Target Modernization, Medical Simulation Training Center (MSTC), Live, Virtual, Constructive Integrating Architecture (LVC-IA), OPFOR Surrogate Wheeled Vehicles (OSWV), Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS) new start, and Basic Electronics Maintenance Trainer (BEMT) new start.  |   |                          |                  |         |              |             |               |
| FY 2020 funding for Suicide Prevention is realigned to PE 0605013A project FL9.   |   |                          |                  |         |              |             |               |
| FY 2020 funding for Soldier/Squad Virtual Trainer Program (S/SVT) is realigned to PE 0604121A, Project SV1.   |   |                          |                  |         |              |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   |                          | FY 2018          | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Common Training Instrumentation Architecture (CTIA) program.  |   |                          | 2.835            | 1.876   | 2.527        | -           | 2.527         |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |  |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training Devices - Eng Dev | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| <p><b>Description:</b> Continue EMD phase contract activities for the CTIA program to provide common architecture capabilities.</p> <p><b>FY 2019 Plans:</b><br/>Continued development of CTIA to provide the common architecture capabilities that are essential for development, fielding, technology and capability insertion for 22 live training systems at 200+ training locations worldwide, to include the Combat Training Centers-Instrumentation System utilized at the National Training Center, the Joint Readiness Training Center, and at the Joint Multinational Readiness Center; the Home Station Instrumentation System; the Digital Ranges Training System, and the Live, Virtual, Constructive-Integrated Training Environment interoperability initiatives.</p> <p><b>FY 2020 Base Plans:</b><br/>Continued development of CTIA to provide the common architecture capabilities that are essential for development, fielding, technology and capability insertion for 22 live training systems at 200+ training locations worldwide, to include the Combat Training Centers-Instrumentation System utilized at the National Training Center, the Joint Readiness Training Center, and at the Joint Multinational Readiness Center; the Home Station Instrumentation System; the Digital Ranges Training System, and the Live, Virtual, Constructive-Integrated Training Environment interoperability initiatives.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>It appears that there is an increase in FY2020, but this is due to the FY2019 Congressional reduction of \$5 million to 0604715A, Project 241 for historical under execution which impacted multiple programs in this project.</p> |   |  |                |                     |                         |                      |
| <p><b>Title:</b> Government Program Management for the Common Training Instrumentation Architecture (CTIA) program.</p> <p><b>Description:</b> Government Program Management for the CTIA program.</p>  |   | 0.236  | -              | -                   | -                       | -                    |
| <p><b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Combat Training Center Instrumentation System (CTC-IS).</p> <p><b>Description:</b> Continue EMD phase contract activities for the CTC-IS.</p> <p><b>FY 2019 Plans:</b></p>   |   | 3.362  | 3.516          | 4.270               | -                       | 4.270                |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |   |   |         | Date: March 2019 |             |               |
|---|---|---|---------|------------------|-------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5   | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev | Project (Number/Name)<br>241 / Nstd Combined Arms |         |                  |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | FY 2018   | FY 2019 | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |
| FY 2019 Base RDTE dollars in the amount of \$1.670 million will fund the Life Cycle Management (LCM) of Live Training Family of Systems, developing the architecture framework for future Life Cycle Efforts for the Hardware Product Line Framework.   |   |   |         |                  |             |               |
| FY 2019 Base RDTE dollars in the amount of \$1.073 million will fund post deployment software support to pursue changes to current software to stimulate sensors, replicate counter measures that US forces will use against small Unmanned Aerial Systems (UAS), support selective jamming of GPS without impacting the instrumentation use of GPS, and selectively jam radars such as support for suppression of enemy Air Defense Artillery.   |   |   |         |                  |             |               |
| FY 2019 Base RDTE dollars in the amount of \$.773 will fund the 2D Mapping Effort development, testing and integration, and deployment of CTIA4, 2D map product using NASA WWW map to replace Falconview that uses CTIA 3 services, providing minimal capabilities and a software baseline for a CTC to produce an AAR.   |   |   |         |                  |             |               |
| <b>FY 2020 Base Plans:</b><br>FY 2020 Base RDTE dollars in the amount of \$.427 million will fund post deployment software support to reintegrate CBRNE (Chemical, Biological, Radiological, Nuclear and Explosives) training at the CTCs. The effort will integrate the Joint Effects Model into the CTC-IS. The effort will use the Army's Integrated Sensor Architecture that will stimulate CBRNE sensors. The results will be available in the CTC-IS for After Action Review (AAR).<br>FY 2020 Base RDTE dollars in the amount of \$1.677 million will fund the Life Cycle Management (LCM) of Live Training Family of Systems, developing the architecture framework for future Life Cycle Efforts for the Hardware Product Line Framework.<br>FY 2020 Base RDTE dollars in the amount of \$.666 will fund an analysis of NTC Western Training Area (WTA) to provide information to determine path forward to expanded coverage area.<br>FY 2020 Base RDTE dollars in the amount of \$1.500 will fund the SINCGARS replacement study; identify alternate means to collect tactical voice communications at the Combat Training Centers, utilized for ARR purposes, study is intended to identify alternate solutions which are cheaper to purchase and easier to maintain providing life-cycle cost saving across the CTC. |   |   |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>  |   |   |         |                  |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |  |                |                     | <b>Date:</b> March 2019 |                      |
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| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training Devices - Eng Dev | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| FY 2020 increase is due to the new RDTE requirements to complete an analysis of NTC Western Training Area (WTA) and the SINCgars replacement study.   |   |  |                |                     |                         |                      |
| <b>Title:</b> Government Program Management for the Combat Training Center Instrumentation System (CTC-IS) program.<br><b>Description:</b> Government Program Management for the CTC IS program.  |   | 1.257  | -              | -                   | -                       | -                    |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Instrumentable-Multiple Integrated Laser Engagement System (I-MILES).<br><b>Description:</b> EMD phase contract activities for the I-MILES program.   |   | 2.611  | 1.751          | 2.631               | -                       | 2.631                |
| <b>FY 2019 Plans:</b><br>RDTE funding will continue our efforts in analyzing, developing, testing, and implementing the Live Training Engagement Composition (LTEC). LTEC supports integration of the Tactical Engagement Simulation (TES) Componentized Architecture into existing and new I-MILES capabilities to improve training realism during Force on Force (FoF) training increasing performance and reducing overall lifecycle costs. RDTE supports the ability to provide Technical Refreshment for Tactical Vehicle System (TVS) and Combat Vehicle Tactical Engagement Simulation System (CVTESS) vehicle Software Updates, to include LTEC Pk updates. Requirements exist to continue Implementation integration into vehicle weapon platforms and vehicular Integration for Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance/Electronic Warfare (C4ISR/EW) Interoperability to include the (VICTORY) Architecture while maintaining relevancy into emerging Weapon Systems: (Joint Light Tactical Vehicle (JLTV), Armored Multi-Purpose Vehicle (AMPV), Abrams, Bradley and small arms platform. |   |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>RDTE funding will analyze, develop, test and implement the Live Training Engagement Composition (LTEC) through Post Deployment Software Support efforts. Funding will ensure that baseline relevancy is maintained. Funding will also ensure that there is development and integration of new functionality to maintain concurrency.  |   |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>It appears that there is an increase in FY2020, but this is due to the FY2019 Congressional reduction of \$5 million to 0604715A, Project 241 for historical under execution which impacted multiple programs in this project.  |   |  |                |                     |                         |                      |
| <b>Title:</b> Government Program Management for the Instrumentable-Multiple Integrated Laser Engagement System (I-MILES) Program.   |   | 0.207  | -              | -                   | -                       | -                    |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |  |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training Devices - Eng Dev | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| <b>Description:</b> Government Program Management for the I-MILES program.  |   |  |                |                     |                         |                      |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Home Station Instrumentation Training System (HITS) program.  |   | 1.646  | 0.725          | 3.640               | -                       | 3.640                |
| <b>Description:</b> EMD phase contract activities for the HITS program.   |   |  |                |                     |                         |                      |
| <b>FY 2019 Plans:</b><br>Continued integration and testing of the interface between HITS and the latest versions of the Live, Virtual and Constructive Integrating Architecture (LVC-IA), which ensures continued interoperability with other simulation system for combined arms, collective training. Additionally, will improve HITS Exercise Planning and Scenario Development to assist the unit leader in being able to rapidly, readily and easily conduct exercise planning and scenario development through cloud based technologies for on demand and at point-of-need access. The cloud based access allows the unit leader to prepare for the training of over 1,000 Soldiers and vehicles before arriving at the site of training with HITS. |   |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>HITS will begin US Army aviation vehicle integration with Home Station instrumentation to provide comprehensive training engagements between ground and air forces. Efforts will add aviation specific interfaces, visual indicators, and required messaging for HITS and Live, Virtual and Constructive Integrating Architecture (LVC-IA) interoperability. LVC-IA and HITS encompass simulated combined arms, collective training. This will create a cloud based HITS After Action Review capability so that distributed unit leaders can readily have on demand and point-of-need access. The cloud based access will allow the unit leader to reinforce training of over 1,000 Soldiers after training with HITS.      |   |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 increase is due to the new HITS aviation requirement.   |   |  |                |                     |                         |                      |
| <b>Title:</b> Government Program Management for the Home Station Instrumentation System (HITS) program.   |   | 0.241  | -              | -                   | -                       | -                    |
| <b>Description:</b> Government Program Management for the Home Station Instrumentation System (HITS) program.   |   |  |                |                     |                         |                      |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Medical Simulation Training Center (MSTC).  |   | 0.200  | -              | 0.682               | -                       | 0.682                |
| <b>Description:</b> EMD phase contract activities for the MSTC program.   |   |  |                |                     |                         |                      |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |  |   |         |              | Date: March 2019 |               |
|--|--|---|---------|--------------|------------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training Devices - Eng Dev | Project (Number/Name)<br>241 / Nstd Combined Arms |         |              |                  |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | FY 2018   | FY 2019 | FY 2020 Base | FY 2020 OCO      | FY 2020 Total |
| <b>FY 2020 Base Plans:</b><br>Complete enhancement of the Instructor Support System (ISS) by improving the combat training environments to enhance the Soldier's training experience through more realistic training scenarios.  |  |   |         |              |                  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>It appears that there is an increase in FY2020, but this is due to the FY2019 Congressional reduction of \$5 million to 0604715A, Project 241 for historical under execution which impacted multiple programs in this project.   |  |   |         |              |                  |               |
| <b>Title:</b> Government Program Management for the Medical Simulation Training Center (MSTC) program.<br><b>Description:</b> Government Program Management for the MSTC program.  |  | 0.153   | -       | -            | -                | -             |
| <b>Title:</b> Soldier/Squad Virtual Trainer Program (S/SVT) Engineering, Support, Test & Evaluation<br><b>Description:</b> Engineering, support, and any related test and evaluation for the development of the S/SVT Program.   |  | -   | 5.534   | -            | -                | -             |
| <b>FY 2019 Plans:</b><br>Develops and demonstrates prototype designs to reduce technical risk, validates designs, validates cost estimates, evaluates processes, and refines requirements. Based on refined requirements and demonstrated prototype designs in User Assessments, integrated system design of the end-item system can be initiated. |  |   |         |              |                  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 funding for Soldier/Squad Virtual Trainer Program (S/SVT) is realigned to PE 0604121A, Project SV1.  |  |   |         |              |                  |               |
| <b>Title:</b> Government Program Management for the Soldier Virtual Trainer Program (SVT)<br><b>Description:</b> Government program management for SVT (New start in FY 2018).   |  | 0.049   | -       | -            | -                | -             |
| <b>Title:</b> Live, Virtual, Constructive Integrating Architecture (LVC-IA) Engineering and Manufacturing Development (EMD) phase contract activity.<br><b>Description:</b> Continue EMD phase contract activities for the LVC-IA program.   |  | 2.762   | 2.774   | 3.616        | -                | 3.616         |
| <b>FY 2019 Plans:</b><br>Live, Virtual, and Constructive-Integrating Architecture (LVC-IA) program continues system development, integration and demonstration of the LVC-IA Version 4 capability which includes the developmental activities  |  |   |         |              |                  |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |  |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training Devices - Eng Dev | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| for Web-based optimization; inclusion of new simulations to the architecture; and concurrency with core system TADSS and Army Mission Command Systems.  |   |  |                |                     |                         |                      |
| <p><b>FY 2020 Base Plans:</b><br/>           Live, Virtual, and Constructive-Integrating Architecture (LVC-IA) program will continue system development, integration and demonstration of the LVC-IA Version 4 capability which includes the developmental activities for Web-based optimization, Synthetic Training Environment (STE) compatibility, and concurrency with core system TADSS and Army Mission Command Systems.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           Increase in FY 2020 is for developmental activities associated with Synthetic Training Environment (STE) compatibility.</p>   |   |  |                |                     |                         |                      |
| <p><b>Title:</b> Live, Virtual, Constructive Integrating Architecture (LVC-IA) Program Government System Test and Evaluation.</p> <p><b>Description:</b> Government System Test and Evaluation for the LVC-IA Program.</p> <p><b>FY 2019 Plans:</b><br/>           LVC-IA will perform Federation Integration and System Measurement of Performance (SMP) events. Additionally, LVC-IA will continue integration testing and evaluation activities in support of LVC-IA interoperability with TADSS and other Mission Command Systems.</p> <p><b>FY 2020 Base Plans:</b><br/>           LVC-IA will continue Federation Integration and System Measurement of Performance (SMP) events, and commence Functional Verification, Test Readiness Review (TRR) and Government Acceptance Testing for Version 4. Additionally, LVC-IA will continue integration testing and evaluation activities in support of LVC-IA interoperability with TADSS and other Mission Command Systems.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           Decrease in FY 2020 due to the number of Federation Integration events supporting Version 4 testing being conducted in FY20.</p> |   | 2.113  | 1.619          | 1.219               | -                       | 1.219                |
| <p><b>Title:</b> Government Program Management for the Live, Virtual, Constructive Integrating Architecture (LVC-IA) Program.</p> <p><b>Description:</b> Government Program Management for the LVC-IA Program.</p>  |   | 1.679  | 0.399          | 0.251               | -                       | 0.251                |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |   |   |         | Date: March 2019 |             |               |
|---|---|---|---------|------------------|-------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5   | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev | Project (Number/Name)<br>241 / Nstd Combined Arms |         |                  |             |               |
| <u>B. Accomplishments/Planned Programs (\$ in Millions)</u>   |   | FY 2018   | FY 2019 | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |
| <b>FY 2019 Plans:</b><br>Provides program management, engineering and technical oversight, contract support, and travel for the LVC-IA Program.   |   |   |         |                  |             |               |
| <b>FY 2020 Base Plans:</b><br>Will provide program management, engineering and technical oversight, contract support, and travel for the LVC-IA Program.  |   |   |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease in FY 2020 is due to a shift in the level of effort required for on-going Version 4 development activities.  |   |   |         |                  |             |               |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Target Modernization program.<br><br><b>Description:</b> EMD phase contract activities for the Target Modernization program. The Target Modernization program will initiate an EMD contract for the finalization of the Trackless Moving Target Infantry variant, as a lead into the Low-Rate Initial Production for both the Vehicle and Infantry variants for the TMT program.  |   | 2.152   | 1.656   | 2.077            | -           | 2.077         |
| <b>FY 2019 Plans:</b><br>RDTE of \$.507 million provides for the design, development, and testing of the Trackless Moving Target - Vehicle (TMT-V) platform system. The TMT-V effort will design and prototype an inexpensive trackless vehicle/armor moving type target that can be utilized on unimproved terrain. The TMT-V is capable of replicating behaviors based on training doctrine, skills, readiness and style of learning to enhance realism and feedback for the trainee.<br><br>RDTE of \$1.149 million provides for the design and development of the Dynamic Infrared Projection (DIRP) system. The DIRP system will provide for an inexpensive and ruggedized infrared projection system that can be utilized to create accurate real-time dynamic thermal representations on target silhouettes or other mediums based on training doctrine within the various live and virtual training applications to enhance realism and feedback for the trainee. The DIRP system technology would support the creation of a high fidelity, time and posture based, thermal replication system for live fire target systems. Current solutions are heating pads adhered to the target silhouette. The shapes are not accurate, get damaged with live fire engagements, and create thermal bleeding; the shapes are static with respect to time, and do not support changes in thermal intensity over time, movement or posture changes. The DIRP solution will remove the threat signature thermal generation from the line of fire (damage), and support the recognition of combat vehicles with high resolution |   |   |         |                  |             |               |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |   |         | Date: March 2019 |             |               |
|--|---|---|---------|------------------|-------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev | Project (Number/Name)<br>241 / Nstd Combined Arms |         |                  |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   | FY 2018   | FY 2019 | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |
| imaging. The thermal images will support time or movement based increases in temperature, and enhanced thermal representation (muzzle flash, burning vehicle), resulting in enhanced training realism. The FY19 efforts include conducting a domain analysis, completing the detail design, and image modeling and development.  |   |   |         |                  |             |               |
| <p><b>FY 2020 Base Plans:</b><br/>           RDTE of \$2.077 million provides for the incremental funding of the Non-Contact Hit Sensor (NCHS) research and development. FY2020 should see the development and field testing of the NCHS prototype system. Funding will also initiate the Phase III SBIR contract for the Dynamic Infrared Projection Systems. The DIRP system will provide for an inexpensive and ruggedized infrared projection system that can be utilized to create accurate real-time dynamic thermal representations on target silhouettes or other mediums based on training doctrine within the various live and virtual training applications to enhance realism and feedback for the trainee. The DIRP system technology would support the creation of a high fidelity, time and posture based, thermal replication system for live fire target systems. Current solutions are heating pads adhered to the target silhouette. The shapes are not accurate, get damaged with live fire engagements, and create thermal bleeding; the shapes are static with respect to time, and do not support changes in thermal intensity over time, movement or posture changes. The DIRP solution will remove the threat signature thermal generation from the line of fire (damage), and support the recognition of combat vehicles with high resolution imaging. The thermal images will support time or movement based increases in temperature, and enhanced thermal representation (muzzle flash, burning vehicle), resulting in enhanced training realism.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           It appears that there is an increase in FY2020, but this is due to the FY2019 Congressional reduction of \$5 million to 0604715A, Project 241 for historical under execution which impacted multiple programs in this project.</p> |   |   |         |                  |             |               |
| <p><b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Digital Range Training System (DRTS)</p> <p><b>Description:</b> Conduct research into the development of an Army Data Center "cloud" migration strategy to assist in understanding the risks and technical challenges associated with taking software that is run at numerous (24) DRTS standalone sites, connecting them to communications infrastructure, and managing the software and cybersecurity aspects through shared Information Technology (IT).</p> <p><b>FY 2020 Base Plans:</b><br/>           RDTE of \$1.600 million begins investigating the cybersecurity aspects of utilizing an Army Data Center to centrally manage the DRTS software by examining current DoD policy, exploring commercial applications</p>   |   | 1.539   | -       | 1.600            | -           | 1.600         |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   |  |                |                     | <b>Date:</b> March 2019 |                      |
|--|---|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training Devices - Eng Dev | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| of cybersecurity, and developing the Risk Management Framework implementation plan. DRTS will also investigate the implementation approach for migrating software capabilities from each of the ranges into the cloud while still providing uninterrupted training capability locally on the range should the cloud linkage be interrupted. This will allow for prototyping the DRTS software utilizing a "local" cloud environment at the Fort Benning Digital Multipurpose Range Complex (DMPRC) as the initial step in the overall DRTS migration strategy. This includes an investigation of OT requirements to operate DRTS and other training systems software on a consolidated set of IT hardware.   |   |  |                |                     |                         |                      |
| <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           FY2020 increase is due to the new Cloud RDTE requirement.</p> <p><b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS)</p> <p><b>Description:</b> Conduct research into the development of an Army Data Center "cloud" migration strategy to assist in understanding the risks and technical challenges associated with taking software that is run at numerous (70+) IMTS standalone sites, connecting them to communications infrastructure, and managing the software and cybersecurity aspects through shared Information Technology (IT).</p>  |   | -  | -              | 1.000               | -                       | 1.000                |
| <p><b>FY 2020 Base Plans:</b><br/>           RDTE of \$1.000 million will prototype the Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS) software utilizing a "local" cloud environment at the Fort Benning CACTF as the initial step in the overall IMTS migration strategy. This includes an investigation of OT requirements to operate IMTS and other training systems software on a consolidated set of IT hardware.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           This is a new start in FY 2020.</p> <p><b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for OPFOR Surrogate Wheeled Vehicles (OSWV)</p> <p><b>Description:</b> EMD phase contract activities for the OSWV program.</p> <p><b>FY 2019 Plans:</b></p> |   |  |                |                     |                         |                      |
|  |   | -  | 2.783          | 3.718               | -                       | 3.718                |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |         |   | <b>Date:</b> March 2019 |  |               |
|--|---------|---|-------------------------|--|---------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |         | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training Devices - Eng Dev |                         | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |         |   |                         |  |               |
|  | FY 2018 | FY 2019   | FY 2020 Base            | FY 2020 OCO  | FY 2020 Total |
| RDTE Funding will assist in technical vehicle studies, engineering, prototype design, technical integration, first article tests and integration tests of the Visual Modifications to the Tactical Vehicles. This is the first year of RDTE for the OSWV program.  |         |   |                         |  |               |
| <b>FY 2020 Base Plans:</b><br>RDTE Funding will continue to assist in the first article of testing for tactical vehicles, tactical vehicle engineering design and visual modification. Funding will also allow for the modification and testing of technical vehicles.   |         |   |                         |  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>It appears that there is an increase in FY2020, but this is due to the FY2019 Congressional reduction of \$5 million to 0604715A, Project 241 for historical under execution which impacted multiple programs in this project.   |         |   |                         |  |               |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the OPFOR Integrated Air Defense System (IADS)   | 15.319  | 8.275   | -                       | -  | -             |
| <b>Description:</b> EMD phase contract activities for the IADS Program   |         |   |                         |  |               |
| <b>FY 2019 Plans:</b><br>RDTE funding will support the continuing development, integration, test and evaluation of the IADS embedded software to model the Aircraft Survivability Equipment (ASE) and stimulate the helicopter display to inform pilots of opposing threats, and for the Ground Threat Emitter (GTE) to simulate Threat air defense weapons. Modification efforts will also integrate the software into the Combat Training Centers (CTC) Instrumentation System (IS) to support force on force collective training exercises. |         |   |                         |  |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 is the last year of RDTE funding.  |         |   |                         |  |               |
| <b>Title:</b> Radar Signal Emulator Development for Integrated Air Defense Systems (IADS)  | -       | 9.520   | -                       | -  | -             |
| <b>Description:</b> Radar Signal Emulator Development for Integrated Air Defense Systems (IADS)  |         |   |                         |  |               |
| <b>FY 2019 Plans:</b><br>Engineering and development of a dedicated SAM/HIMAD threat solution for the Combat Training Center (CTCs), supporting multiple threat configurations. This funding will develop four Radar Signal Emulators (RSEs) fully integrated with CTC Instrumentation System (IS) providing a fielded capability for replicating an enemy   |         |   |                         |  |               |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |   |   |         | Date: March 2019 |             |               |
|--|---|---|---------|------------------|-------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev | Project (Number/Name)<br>241 / Nstd Combined Arms |         |                  |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   | FY 2018   | FY 2019 | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |
| multi-layered, short-range, medium and high altitude air-defense system to execute unified land operations against a current and projected peer/near peer threat in accordance with current and emerging doctrine.   |   |   |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 is the last year of RDTE funding.  |   |   |         |                  |             |               |
| <b>Title:</b> Government Program Management for the OPFOR Integrated Air Defense System (IADS) Program   | 0.554   | -   | -       | -                | -           | -             |
| <b>Description:</b> Government Program Management for the OPFOR Integrated Air Defense System (IADS) Program   |   |   |         |                  |             |               |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for Basic Electronics Maintenance Trainer (BEMT)   | -   | -   | 0.181   | -                | 0.181       |               |
| <b>Description:</b> BEMT provides the essential modernized electronic system maintenance training capability for the Army, Army National Guard, and the Army Reserve to achieve Military Occupational Specialty-Qualification (MOS-Q) for 40 MOS at 24 Active, National Guard, and Army Reserve camps, posts, and stations. BEMT will be modernizing the electronics maintenance training. BEMT provides training in basic electronics, while saving institutions significant administrative expenses over live training alternatives. |   |   |         |                  |             |               |
| <b>FY 2020 Base Plans:</b><br>Enhancement of the Learning Management System courseware and Army Enterprise server capability.  |   |   |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This is a new start in FY 2020. - Increase of \$.181 million dollars in FY 2020 for Development of Army Enterprise Network Server Courseware.  |   |   |         |                  |             |               |
| <b>Title:</b> Suicide Prevention Program   | 2.139   | 2.174   | -       | -                | -           | -             |
| <b>Description:</b> Suicide Prevention Program   |   |   |         |                  |             |               |
| FY 2020 funding for Suicide Prevention is realigned to PE 0605013A project FL9.  |   |   |         |                  |             |               |
| <b>FY 2019 Plans:</b><br>Dollars belong to the Suicide Prevention Program.   |   |   |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>   |   |   |         |                  |             |               |

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|  |  |                |                |   |             |                |              |  |                |                   |                |  |  |  |  |
|--|--|----------------|----------------|---|-------------|----------------|--------------|--|----------------|-------------------|----------------|--|--|--|--|
| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |  |                |                |   |             |                |              |  |                | Date: March 2019  |                |  |  |  |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |  |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training Devices - Eng Dev |             |                |              | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |                |                   |                |  |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  |                |                |   |             |                |              |  |                | FY 2018           | FY 2019        |  |  |  |  |
| FY 2020 funding for Suicide Prevention is realigned to PE 0605013A project FL9.  |  |                |                |   |             |                |              |  |                | FY 2020 Base      | FY 2020 OCO    |  |  |  |  |
| <b>Title:</b> Soldier Fitness Program<br><b>Description:</b> Dollars belong to the Soldier Fitness Program.  |  |                |                |   |             |                |              |  |                | 0.846             | -              |  |  |  |  |
| <b>Title:</b> FY19 SBIR/STTR Transfer<br><b>Description:</b> Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)<br><b>FY 2019 Plans:</b><br>FY19 SBIR/STTR Transfer                       |  |                |                |   |             |                |              |  |                | -                 | 1.779          |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY19 SBIR/STTR Transfer  |  |                |                |   |             |                |              |  |                | -                 | -              |  |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |  |                |                |   |             |                |              |  |                | 41.900            | 44.381         |  |  |  |  |
| <b>Congressional Add:</b> Congressional Add for Combined Arms Center Threat Integrated Air Defense System<br><b>FY 2018 Accomplishments:</b> Congressional Add for Combined Arms Center Threat Integrated Air Defense System |  |                |                |   |             |                |              |  |                | FY 2018           | FY 2019        |  |  |  |  |
| <b>Congressional Adds Subtotals</b>  |  |                |                |   |             |                |              |  |                | 10.000            | -              |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |  |                |                |   |             |                |              |  |                | <b>FY 2020</b>    | <b>FY 2020</b> |  |  |  |  |
| <b>Line Item</b>   |  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b>  | <b>Base</b> | <b>FY 2020</b> | <b>Total</b> | <b>FY 2021</b>   | <b>FY 2022</b> | <b>FY 2023</b>    | <b>FY 2024</b> |  |  |  |  |
| • MA6600: Combat Training Centers Support  |  | 126.600        | 117.584        | 123.411   | -           | 123.411        | 96.692       | 96.186   | 91.276         | 73.483            | 0.000          |  |  |  |  |
| • NA0100: Training Devices, Nonsystem  |  | 275.629        | 217.598        | 220.707   | 2.106       | 222.813        | 171.314      | 174.812  | 183.435        | 190.967           | 0.000          |  |  |  |  |
| <b>Cost To Complete</b>  |  |                |                |   |             |                |              |  |                | <b>Total Cost</b> |                |  |  |  |  |
| 725.232  |  |                |                |   |             |                |              |  |                | 1,436.568         |                |  |  |  |  |
| <b>Remarks</b>   |  |                |                |   |             |                |              |  |                |                   |                |  |  |  |  |
| <b>D. Acquisition Strategy</b>   |  |                |                |   |             |                |              |  |                |                   |                |  |  |  |  |
| Competitive development efforts based on performance specifications.   |  |                |                |   |             |                |              |  |                |                   |                |  |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |  | <b>Date:</b> March 2019                                  |
|--|--|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training<br>Devices - Eng Dev | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |
| 1. In FY 2019 - 2020, Combat Training Center Instrumentation Systems (CTC-IS) RDTE will be used to fund a Life Cycle Product-line Management (LCPM) contract structured as a 5 year Single Award Indefinite-Delivery/Indefinite-Quantity (IDIQ) for the implementation of a Hardware Product Line (HPL), the contractor was selected. The strategy is to establish a deliberate approach to Life Cycle Management (LCM) of Live Training Family of Systems, providing the framework for future Life Cycle Efforts for the Hardware Product Line Framework.   |  |  |
| 2. In FY 2019, Instrumentable-Multiple Integrated Laser Engagement System (I-MILES) will award a new Competitive 7 year Single Award Indefinite-Delivery/Indefinite-Quantity (IDIQ) Contract for relevancy.  |  |  |
| 3. In FY 2016, the Home Station Instrumentation Training System (HITS) program awarded a delivery order (DO) to General Dynamics Missions Systems under the LT2 CPM Next contract. The DO has a one-year base and four single-year option periods beginning in January 2016. In FY 2020, HITS will begin US Army aviation vehicle integration.   |  |  |
| 4. In FY15, an Indefinite-Delivery/Indefinite-Quantity (IDIQ) contract with a 1-year base and 4 single-year option periods was awarded to General Dynamics Mission Systems - CTIA is executed under this contract. In FY20, a new competitive IDIQ contract with a 1-year base and 7 single-year option periods will be awarded - CTIA will be executed under this contract.   |  |  |
| 5. In FY 2018 - FY 2019, the Target Modernization (Target Mod) program incrementally funds the Phase III SBIR contract to Pratt & Miller Engineering for the Trackless Moving Target (TMT) which has a three-year period of performance. Contract provides for the continued product development (TRL7 to TRL9), originally initiated under a Small Business Innovation Research (SBIR) contract. In FY 2019 - FY 2020, Target Mod will initiate the first year of a projected three-year Phase III SBIR to SensorMetrix for the maturation and product development of the Non-Contact Hit Sensor. |  |  |
| 6. The LVC-IA Enhanced Capability contract is the competitively awarded follow-on effort awarded in 3rd Quarter FY 2016. This contract has a two-year base and four single-year option periods to provide the additional capabilities for Versions 3, 4 and beyond. The contract was awarded to Cole Engineering and Science, Inc. (CESI) to provide for the development, fielding and training of each version capability for the designated Basis of Issue Plan (BOIP) sites and provide Post-Deployment Software Support (PDSS) for all currently fielded versions.                             |  |  |
| 7. Soldier/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. Competitive prototyping development efforts will be conducted through Other Transactional Authority.  |  |  |
| 8. In FY 2018 and FY 2020, Digital Range Training System (DRTS) will exercise options under the Consolidated Product-line Management (CPM) Next Delivery Order to General Dynamics Mission Systems which will be a 12-month prototyping effort in FY 2020 to prototype the migration of the DRTS software into the Army Data Center's cloud environments.  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   | <b>Date:</b> March 2019                                  |
|--|---|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604715A / Non-System Training Devices - Eng Dev | <b>Project (Number/Name)</b><br>241 / Nstd Combined Arms |
| 9. In FY 2020, Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS) will exercise options under the Consolidated Product-line Management (CPM) Next Delivery Order to General Dynamics Mission Systems which will be a 12-month prototyping effort. This is the first year of a multiple year effort of RDTE funding for this program to prototype the migration of the IMTS software into the Army Data Center's cloud environments. |   |  |
| 10. In FY 2017, OPFOR Integrated Air Defense System (IADS) awarded a new standalone contract with a base, plus 4 option year periods.  |   |  |
| 11. In FY 2019, OPFOR Surrogate Wheeled Vehicles (OSWV) will pursue an organic solution to develop, integrate and test Visual Modifications for Tactical and Technical Vehicles.   |   |  |
| 12. In FY 2020, BEMT will exercise the first option year of Indefinite Delivery/Indefinite Quantity (IDIQ) contract which is to be awarded in Jan 2019.  |   |  |
| <b>E. Performance Metrics</b><br>N/A   |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army        |                        |                                |             |   |            |         |            |   |            |                |            | Date: March 2019 |                  |            |                          |
|---|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                     |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev |            |         |            | Project (Number/Name)<br>241 / Nstd Combined Arms |            |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                          |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| OneTESS Program Management                                    | Various                | PEO STRI : Orlando, FL         | 8.046       | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 8.046      | 8.046                    |
| OneTESS Program Management                                    | Various                | PEO STRI : Orlando, FL         | 2.040       | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 2.040      | 2.040                    |
| HITS Program Management                                       | Various                | PEO STRI : Orlando, FL         | 1.107       | 0.241   | Nov 2017   | -       |            | -   |            | -              |            | -                | 0.000            | 1.348      | 1.348                    |
| CTC-IS Program Management                                     | Various                | PEO STRI : Orlando, FL         | 7.761       | 1.257   | Nov 2017   | -       |            | -   |            | -              |            | -                | 0.000            | 9.018      | 9.018                    |
| MSTC Program Management                                       | Various                | PEO STRI : Orlando, FL         | 0.799       | 0.153   | Nov 2017   | -       |            | -   |            | -              |            | -                | 0.000            | 0.952      | 0.952                    |
| I-MILES Program Management                                    | Various                | PEO STRI : Orlando, FL         | 0.304       | 0.207   | Oct 2017   | -       |            | -   |            | -              |            | -                | 0.000            | 0.511      | 0.511                    |
| EST Program Management  | Various                | PEO STRI : Orlando, FL         | 0.214       | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 0.214      | 0.214                    |
| LVC-IA Program Management                                     | Various                | PEO STRI : Orlando, FL         | 8.787       | 1.679   | Nov 2017   | 0.399   | Nov 2018   | 0.251   | Nov 2019   | -              |            | 0.251            | Continuing       | Continuing | Continuing               |
| Target Modernization  | Various                | PEO STRI : Orlando, FL         | 0.614       | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 0.614      | 0.614                    |
| ETC-IS Program Management                                     | Various                | PEO STRI : Orlando, FL         | 0.164       | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 0.164      | 0.164                    |
| CTIA  | Various                | PEO STRI : ORLANDO, FL         | 0.640       | 0.236   | Oct 2017   | -       |            | -   |            | -              |            | -                | 0.000            | 0.876      | 0.876                    |
| Soldier Fitness Program                                       | TBD                    | Mulitple : Various             | 1.254       | 0.846   | Jun 2018   | -       |            | -   |            | -              |            | -                | 0.000            | 2.100      | 2.100                    |
| Suicide Prevention  | TBD                    | Multiple : Various             | -           | 2.139   | Jun 2018   | 2.174   | Jun 2019   | -   |            | -              |            | -                | 0.000            | 4.313      | 4.313                    |
| SVT Program Management  | Various                | PEO STRI : Orlando, FL         | -           | 0.049   | Oct 2017   | -       |            | -   |            | -              |            | -                | 0.000            | 0.049      | 0.049                    |
| OPFOR Integrated Air Defense System (IADS) Program Management | Various                | PEO STRI : Orlando, FL         | 0.188       | 0.554   | Oct 2017   | -       |            | -   |            | -              |            | -                | 0.000            | 0.742      | 0.742                    |
| Congressional Add for Combined Arms Center                    | Various                | PEO STRI : Huntsville, AL      | -           | 0.177   |            | -       |            | -   |            | -              |            | -                | 0.000            | 0.177      | 0.177                    |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |   |            |         |            |   |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|---|------------|---------|------------|---|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev |            |         |            | Project (Number/Name)<br>241 / Nstd Combined Arms |            |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                  | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Threat Integrated Air Defense System                   |                        |   |             |   |            |         |            |   |            |                |            |                  |                  |            |                          |
| SBIR/STTR Transfer                                     | TBD                    | PEO STRI : Orlando, FL                          | -           | -   |            | 1.779   | Oct 2018   | -   | -          | -              | -          | 0.000            | 1.779            | -          |                          |
| <b>Subtotal</b>  |                        |   | 31.918      | 7.538   |            | 4.352   |            | 0.251   |            | -              | -          | 0.251            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |   |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                  | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| OneTESS  | SS/CPFF                | General Dynamics : Fairfax, VA                  | 124.769     | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 124.769    | 124.769                  |
| OneTESS  | SS/CPFF                | General Dynamics C4 Systems : Orlando, FL 32826 | 10.430      | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 10.430     | 10.430                   |
| CTIA   | Option/ IDIQ           | General Dynamics Mission Systems : Orlando, FL  | 16.097      | 2.835   | Jan 2018   | 1.876   | Jan 2019   | -   |            | -              |            | -                | 0.000            | 20.808     | 20.808                   |
| CTIA   | C/CPFF                 | TBD : Orlando, FL                               | -           | -   |            | -       |            | 2.527   | Jan 2020   | -              |            | 2.527            | Continuing       | Continuing | Continuing               |
| I-MILES  | Option/ IDIQ           | General Dynamics Mission Systems : Orlando, FL  | 1.041       | 0.440   | Oct 2017   | -       |            | 1.343   | Oct 2019   | -              |            | 1.343            | Continuing       | Continuing | Continuing               |
| I-MILES RELEVANCY                                      | SS/IDIQ                | Lockheed Martin : Orlando, FL                   | -           | 2.171   | May 2018   | 1.751   | May 2019   | 1.288   | May 2020   | -              |            | 1.288            | Continuing       | Continuing | Continuing               |
| CTC-IS   | C/IDIQ                 | General Dynamics Mission Systems : Orlando, FL  | 37.378      | 3.362   | Jul 2018   | 1.846   | Mar 2019   | 2.593   | Feb 2020   | -              |            | 2.593            | Continuing       | Continuing | Continuing               |
| CTC-IS   | C/IDIQ                 | GENERAL DYNAMICS ONE SOURCE : Orlando, FL       | 2.766       | -   |            | 1.670   | Aug 2019   | 1.677   | Aug 2020   | -              |            | 1.677            | Continuing       | Continuing | Continuing               |
| HITS   | C/FFP                  | Riptide : Orlando, FL                           | 1.379       | -   |            | -       |            | -   |            | -              |            | -                | 0.000            | 1.379      | 1.379                    |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                                    |                           |  |                |   |               |         |               |   |               |                |               | Date: March 2019 |                     |               |                                |
|---|---------------------------|--|----------------|---|---------------|---------|---------------|---|---------------|----------------|---------------|------------------|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                           |  |                | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev |               |         |               | Project (Number/Name)<br>241 / Nstd Combined Arms |               |                |               |                  |                     |               |                                |
| Product Development (\$ in Millions)  |                           |  |                | FY 2018   |               | FY 2019 |               | FY 2020<br>Base                                   |               | FY 2020<br>OCO |               | FY 2020<br>Total |                     |               |                                |
| Cost Category Item  | Contract<br>Method & 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 |
| HITS  | C/IDIQ                    | General Dynamics<br>Mission Systems :<br>Orlando, FL 32826           | 3.109          | 0.900   | Aug 2018      | -       |               | 2.500   | Jul 2020      | -              |               | 2.500            | Continuing          | Continuing    | Continuing                     |
| HITS  | Option/<br>IDIQ           | General Dynamics<br>Mission Systems<br>(GDMS) : Orlando,<br>FL 32826 | 1.683          | 0.746   | Oct 2017      | 0.725   | Jan 2019      | 1.140   | Jan 2020      | -              |               | 1.140            | Continuing          | Continuing    | Continuing                     |
| MSTC Development  | C/FP                      | Multiple : Various   | 4.928          | 0.200   | Mar 2018      | -       |               | 0.682   | Jul 2020      | -              |               | 0.682            | Continuing          | Continuing    | Continuing                     |
| EST Development   | C/FP                      | Cubic Simulation<br>Systems, Inc. :<br>Orlando, FL<br>32809-3813     | 1.528          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 1.528         | 1.528                          |
| EST   | C/FP                      | Nova Technologies :<br>Panama City, FL<br>32404-6747                 | 0.609          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 0.609         | 0.609                          |
| EST Enhanced<br>Capabilities  | C/FFP                     | Meggitt Training<br>Systems, Inc. :<br>Suwanee, GA<br>30024-1247     | 2.075          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 2.075         | 2.075                          |
| EST Enhanced<br>Capabilities Adaptive<br>Marksmanship and<br>Intelligent Tutoring         | C/FFP                     | Dignitas<br>Technologies :<br>Orlando, FL 32817                      | 0.776          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 0.776         | 0.776                          |
| CFFT Enhanced Joint<br>Fires Observer (JFO)<br>Training and Certification<br>Requirements | C/IDIQ                    | Nova Technologies :<br>Panama City, FL<br>32404-6747                 | 1.242          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 1.242         | 1.242                          |
| LVC-IA Development  | C/CPFF                    | Cole Engineering<br>Services, Inc :<br>Orlando, FL                   | 29.822         | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 29.822        | 29.822                         |
| LVC-IA Enhanced<br>Capability   | C/CPFF                    | Cole Engineering<br>Services, Inc<br>(CESI) : Orlando, FL            | 5.706          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 5.706         | 5.706                          |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army   |                        |   |             |  |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|-------------|--|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5  |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training Devices - Eng Dev |            |         |            | Project (Number/Name)<br>241 / Nstd Combined Arms |            |             |            |                  |                  |            |                          |
| 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 |
| LVC-IA Enhanced Capability   | Option/ CPFF           | Cole Engineering Services, Inc (CESI) : Orlando, FL                   | 4.232       | 2.762  | Nov 2017   | 2.774   | Dec 2018   | 3.616   | Nov 2019   | -           |            | 3.616            | Continuing       | Continuing | Continuing               |
| Target Modernization   | C/IDIQ                 | Pratt and Miller Engineering : Orlando, FL                            | 6.600       | -  |            | -       |            | -   |            | -           |            | -                | 0.000            | 6.600      | 6.600                    |
| Target Modernization   | Option/ CPFF           | Pratt and Miller Engineering (P&M) : Orlando, FL                      | 2.054       | 2.152  | Jan 2018   | 0.507   | Oct 2018   | -   |            | -           |            | -                | 0.000            | 4.713      | 4.713                    |
| Target Modernization   | C/CPFF                 | JRM Technologies : Orlando  | -           | -  |            | 1.149   | Dec 2018   | -   |            | -           |            | -                | 0.000            | 1.149      | 1.149                    |
| Target Modernization   | C/CPFF                 | SensorMetrix : San Diego, CA  | -           | -  |            | -       |            | 2.077   | Jan 2020   | -           |            | 2.077            | Continuing       | Continuing | Continuing               |
| Congressional Add Center of Excellence for Military Operations in Urban Terrain and Cultural Trn | C/FP                   | Multiple : Various  | 2.996       | -  |            | -       |            | -   |            | -           |            | -                | 0.000            | 2.996      | 2.996                    |
| ETC-IS   | SS/CPFF                | General Dynamics C4 Systems : Orlando, FL 32826                       | 4.836       | -  |            | -       |            | -   |            | -           |            | -                | 0.000            | 4.836      | 4.836                    |
| Digital Range Training System (DRTS)   | C/CPFF                 | General Dynamics Mission Systems : Orlando, FL                        | -           | 1.539  | Mar 2018   | -       |            | 1.600   | Jan 2020   | -           |            | 1.600            | Continuing       | Continuing | Continuing               |
| OPFOR Integrated Air Defense System (IADS)   | MIPR                   | PEO IEWS, PM Aircraft Survivability Equipment (ASE) : Huntsville, AL  | 2.046       | 14.019   | Jan 2018   | 5.306   | Feb 2019   | -   |            | -           |            | -                | 0.000            | 21.371     | 21.371                   |
| OPFOR Integrated Air Defense System (IADS)   | MIPR                   | Target Systems Management Office, PEO STRI, PEO STRI : Huntsville, AL | 0.915       | -  |            | -       |            | -   |            | -           |            | -                | 0.000            | 0.915      | 0.915                    |
| Radar Signal Emulator Development for IADS   | C/TBD                  | To Be Determined : Orlando, FL  | -           | -  |            | 9.520   | Feb 2019   | -   |            | -           |            | -                | 0.000            | 9.520      | 9.520                    |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                          |                           |  |                |   |               |         |               |   |               |                |               | Date: March 2019 |                     |               |                                |
|---|---------------------------|--|----------------|---|---------------|---------|---------------|---|---------------|----------------|---------------|------------------|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5                                       |                           |  |                | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev |               |         |               | Project (Number/Name)<br>241 / Nstd Combined Arms |               |                |               |                  |                     |               |                                |
| Product Development (\$ in Millions)  |                           |  |                | FY 2018   |               | FY 2019 |               | FY 2020<br>Base                                   |               | FY 2020<br>OCO |               | FY 2020<br>Total |                     |               |                                |
| Cost Category Item  | Contract<br>Method & 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 |
| Soldier/Squad Virtual Trainer (S/VT) Program                                    | C/TBD                     | PEO STRI : Orlando, FL   | -              | -   |               | 5.534   | Mar 2019      | -   |               | -              |               | -                | 0.000               | 5.534         | 5.534                          |
| OPFOR Surrogate Wheeled Vehicles (OSWV)   | IA                        | Tank Automotive Research Development and Engineering Center : Warren, MI | -              | -   |               | 2.783   | Mar 2019      | 3.718   | Mar 2020      | -              |               | 3.718            | Continuing          | Continuing    | Continuing                     |
| Basic Electronics Maintenance Trainer (BEMT)                                    | SS/TBD                    | ACC Orlando : Orlando, FL  | -              | -   |               | -       |               | 0.181   | Jan 2020      | -              |               | 0.181            | Continuing          | Continuing    | Continuing                     |
| Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS)   | C/CPFF                    | General Dynamics Mission Systems : Orlando, FL                           | -              | -   |               | -       |               | 1.000   | Jan 2020      | -              |               | 1.000            | 0.000               | 1.000         | 1.000                          |
| Congressional Add for Combined Arms Center Threat Integrated Air Defense System | C/CPFF                    | Scientific Research Corporation : Huntsville, AL                         | -              | 9.823   |               | -       |               | -   |               | -              |               | -                | 0.000               | 9.823         | 9.823                          |
| <b>Subtotal</b>   |                           | 269.017  | 40.949         |   | 35.441        |         | 25.942        |   | -             |                | 25.942        | Continuing       | Continuing          | N/A           |                                |
| Support (\$ in Millions)  |                           |  |                | FY 2018   |               | FY 2019 |               | FY 2020<br>Base                                   |               | FY 2020<br>OCO |               | FY 2020<br>Total |                     |               |                                |
| Cost Category Item  | Contract<br>Method & 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 |
| OneTESS   | Various                   | Various : Orlando, FL  | 6.596          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 6.596         | 6.596                          |
| OneTESS   | Various                   | Various : Various  | 0.262          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 0.262         | 0.262                          |
| CTIA  | Various                   | Various : Various  | 12.844         | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 12.844        | 12.844                         |
| Target Modernization  | Various                   | Various : Various  | 0.192          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 0.192         | 0.192                          |
| <b>Subtotal</b>   |                           | 19.894   | -              |   | -             |         |               | -   |               | -              |               | -                | 0.000               | 19.894        | N/A                            |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                           |  |                |   |               |         |               |   |               |                |               | Date: March 2019 |                     |               |                                |
|--|---------------------------|--|----------------|---|---------------|---------|---------------|---|---------------|----------------|---------------|------------------|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                           |  |                | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev |               |         |               | Project (Number/Name)<br>241 / Nstd Combined Arms |               |                |               |                  |                     |               |                                |
| Test and Evaluation (\$ in Millions)                   |                           |  |                | FY 2018   |               | FY 2019 |               | FY 2020<br>Base                                   |               | FY 2020<br>OCO |               | FY 2020<br>Total |                     |               |                                |
| Cost Category Item                                     | Contract<br>Method & 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 |
| OneTESS Development & Test                             | Various                   | Multiple : Orlando, FL                     | 4.162          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 4.162         | 4.162                          |
| OneTESS Test Support                                   | Various                   | Multiple : Orlando, FL                     | 1.280          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 1.280         | 1.280                          |
| HITS   | Various                   | Various : Orlando, FL                      | 0.740          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 0.740         | 0.740                          |
| LVC-IA Test Support                                    | Various                   | Multiple : Orlando, FL                     | 7.501          | 2.113   | Nov 2017      | 1.619   | Dec 2018      | 1.219   | Nov 2019      | -              |               | 1.219            | Continuing          | Continuing    | Continuing                     |
| IEDES  | Various                   | Multiple : Orlando, FL                     | 0.519          | -   |               | -       |               | -   |               | -              |               | -                | 0.000               | 0.519         | 0.519                          |
| OPFOR Integrated Air Defense System (IADS)             | SS/CPFF                   | Inter-Coastal Electronics, Inc. : Mesa, AZ | 1.851          | 1.300   | Jul 2018      | 2.969   | Aug 2019      | -   |               | -              |               | -                | 0.000               | 6.120         | 6.120                          |
| <b>Subtotal</b>  |                           | 16.053                                     | 3.413          |   |               | 4.588   |               | 1.219   |               | -              |               | 1.219            | Continuing          | Continuing    | N/A                            |
|  |                           |  | Prior<br>Years | FY 2018   |               | FY 2019 |               | FY 2020<br>Base                                   |               | FY 2020<br>OCO |               | FY 2020<br>Total | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
| <b>Project Cost Totals</b>                             |                           |  | 336.882        | 51.900  |               | 44.381  |               | 27.412  |               | -              |               | 27.412           | Continuing          | Continuing    | N/A                            |

Remarks

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army                        |  |  |  |   |   |         |   |         |   |         |                          |         |   | Date: March 2019 |   |         |   |  |  |  |  |
|--|--|--|--|---|---|---------|---|---------|---|---------|--------------------------|---------|---|------------------|---|---------|---|--|--|--|--|
| Appropriation/Budget Activity  |  |  |  | R-1 Program Element (Number/Name)                   |   |         |   |         |   |         | Project (Number/Name)    |         |   |                  |   |         |   |  |  |  |  |
| 2040 / 5   |  |  |  | PE 0604715A / Non-System Training Devices - Eng Dev |   |         |   |         |   |         | 241 / Nstd Combined Arms |         |   |                  |   |         |   |  |  |  |  |
|  |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
|  |  |  |  | FY 2018   |   | FY 2019 |   | FY 2020 |   | FY 2021 |                          | FY 2022 |   | FY 2023          |   | FY 2024 |   |  |  |  |  |
|  |  |  |  | 1   | 2 | 3       | 4 | 1       | 2 | 3       | 4                        | 1       | 2 | 3                | 4 | 1       | 2 |  |  |  |  |
| CTIA Development and Architectural Evolution                             |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| CTC IS Development   |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| I-MILES Development  |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| I-MILES RELEVANCY  |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| HITS Development   |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| MSTC MT-C2 Development   |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| MSTC Trainer Developments  |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| EST Enhanced Capabilities  |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| CFFT Enhanced Joint Fires Observer (JFO) Training and Certifications     |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| LVC-IA - Version 3 (Development, Integration, Demonstration and Testing) |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| LVC-IA - Version 4 (Development, Integration, Demonstration and Testing) |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| LVC-IA - Concurrency with Mission Command Systems                        |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |
| Target Modernization Development   |  |  |  |   |   |         |   |         |   |         |                          |         |   |                  |   |         |   |  |  |  |  |

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| 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)    |         |   |                  |   |         |   |   |   |  |  |
| 2040 / 5  |  |  |  | PE 0604715A / Non-System Training Devices - Eng Dev |   |   |   |         |   |   | 241 / Nstd Combined Arms |         |   |                  |   |         |   |   |   |  |  |
| Event Name  |  |  |  | FY 2018   |   |   |   | FY 2019 |   |   |                          | FY 2020 |   |                  |   | FY 2021 |   |   |   |  |  |
|   |  |  |  | 1   | 2 | 3 | 4 | 1       | 2 | 3 | 4                        | 1       | 2 | 3                | 4 | 1       | 2 | 3 | 4 |  |  |
| S/SVT - Development   |  |  |  |   |   |   |   |         |   |   |                          |         |   |                  |   |         |   |   |   |  |  |
| Digital Range Training System (DRTS)  |  |  |  |   |   |   |   |         |   |   |                          |         |   |                  |   |         |   |   |   |  |  |
| OPFOR Integrated Air Defense System (IADS)                                    |  |  |  |   |   |   |   |         |   |   |                          |         |   |                  |   |         |   |   |   |  |  |
| OPFOR Surrogate Wheeled Vehicles (OSWV)                                       |  |  |  |   |   |   |   |         |   |   |                          |         |   |                  |   |         |   |   |   |  |  |
| BEMT Army Enterprise Network Server Development                               |  |  |  |   |   |   |   |         |   |   |                          |         |   |                  |   |         |   |   |   |  |  |
| Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS) |  |  |  |   |   |   |   |         |   |   |                          |         |   |                  |   |         |   |   |   |  |  |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army                               |   |   |         | Date: March 2019 |
|--|---|---|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev | Project (Number/Name)<br>241 / Nstd Combined Arms |         |                  |
| Schedule Details   |   |   |         |                  |
| Events   | Start   | End   | Quarter | Year             |
| OneTESS Development  | 1   | 2013  | 4       | 2014             |
| CTIA Development and Architectural Evolution                                     | 1   | 2012  | 4       | 2025             |
| CTC IS Development   | 1   | 2010  | 4       | 2025             |
| I-MILES Development  | 2   | 2017  | 4       | 2021             |
| I-MILES RELEVANCY  | 2   | 2018  | 4       | 2024             |
| HITS Development   | 3   | 2012  | 4       | 2024             |
| MSTC MT-C2 Development   | 2   | 2016  | 3       | 2018             |
| MSTC Trainer Developments  | 2   | 2017  | 4       | 2023             |
| EST Enhanced Capabilities Adaptive Marksmanship and Intelligent Tutoring         | 3   | 2015  | 2       | 2016             |
| EST Enhanced Capabilities  | 3   | 2016  | 2       | 2018             |
| CFFT Enhanced Joint Fires Observer (JFO) Training and Certification Requirements | 2   | 2017  | 3       | 2018             |
| LVC-IA - Version 1   | 1   | 2010  | 4       | 2012             |
| LVC-IA - Version 2 (Development, Integration, Demonstration and Testing)         | 1   | 2014  | 3       | 2016             |
| LVC-IA - Version 3 (Development, Integration, Demonstration and Testing)         | 4   | 2016  | 3       | 2018             |
| LVC-IA - Version 4 (Development, Integration, Demonstration and Testing)         | 4   | 2018  | 3       | 2021             |
| LVC-IA - Concurrency with Mission Command Systems                                | 4   | 2021  | 4       | 2032             |
| Target Modernization Development   | 1   | 2016  | 4       | 2025             |
| CSF2   | 1   | 2015  | 4       | 2016             |
| S/SVT - Development  | 3   | 2019  | 4       | 2021             |
| Digital Range Training System (DRTS)   | 2   | 2018  | 4       | 2023             |
| OPFOR Integrated Air Defense System (IADS)                                       | 4   | 2017  | 4       | 2021             |
| OPFOR Surrogate Wheeled Vehicles (OSWV)  | 2   | 2019  | 4       | 2021             |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army                            |   |   |         | Date: March 2019 |
|---|---|---|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5                                     | R-1 Program Element (Number/Name)<br>PE 0604715A / Non-System Training<br>Devices - Eng Dev | Project (Number/Name)<br>241 / Nstd Combined Arms |         |                  |
| Events  | Start   |   | End     |                  |
|   | Quarter   | Year  | Quarter | Year             |
| BEMT Army Enterprise Network Server Development                               | 2   | 2020  | 2       | 2024             |
| Integrated Military Operations in Urban Terrain (MOUT) Training System (IMTS) | 2   | 2020  | 4       | 2025             |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)                                     |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 190.385 | 212.373 | 43.502       | -   | 43.502        | 24.944  | 7.068   | 1.228   | 3.405   | Continuing       | Continuing |
| 126: PEO Electronic Protect   | -           | 0.000   | 0.000   | 27.925       | -   | 27.925        | 15.634  | 4.153   | 0.000   | 0.000   | 0.000            | 47.712     |
| 146: Air & Msl Defense Planning Control Sys   | -           | 23.335  | 24.296  | 14.300       | -   | 14.300        | 8.401   | 2.915   | 1.228   | 3.405   | Continuing       | Continuing |
| 149: Counter-Rockets, Artillery & Mortar  | -           | 17.250  | 14.844  | 1.277        | -   | 1.277         | 0.909   | 0.000   | 0.000   | 0.000   | Continuing       | Continuing |
| FG5: Counter Unmanned Aerial Systems (UAS)  | -           | 149.800 | 173.233 | 0.000        | -   | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 323.033    |

**Note**

ALPS was previously funded under PE 0603327A.

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

Army Long-Range Persistent Surveillance (ALPS) is a passive sensor that provides long range surveillance against Cruise Missile (CM), Fixed Wing (FW), Rotary Wing (RW), and Unmanned Aircraft System (UAS) threats. Prototype systems will be provided to meet multiple Combatant Command identified operational needs and to conduct an assessment. The objectives of this effort are to provide component and subsystem maturity in a system-of-systems environment and to reduce subsequent integration risk. This program will also integrate ALPS to support the Army Integrated Air and Missile Defense (AIAMD) architecture.

The Air and Missile Defense Planning and Control System (AMDPCS) provides integration of air and missile defense operations at all echelon. Specifically, Air and Missile Defense Workstation (AMDWS) provides a correlated air picture using local radars, allowing the Commander the visibility and situational understanding of airspace; other automated defense design and staff planning tools in AMDWS afford Soldiers horizontal and vertical collaborative planning with adjacent units. Air Defense System Integrator (ADSI) serves as a joint tactical data link gateway/air picture, and when correlated by Forward Area Air Defense Command and Control (FAAD C2) and displayed on AMDWS, provides a near-real time, three dimensional joint air picture for the Commander. Joint Tactical Terminal (JTT) provides Soldiers theater ballistic missile (TBM) early warning, allowing them to take appropriate actions. AMDPCS is fielded to Army air and missile defense commands (AAMDC), air defense artillery brigades (ADA BDE), air and missile defense battalions (AMD BN), and Terminal High Altitude Area Air Defense batteries (THAAD BTRY). Air Defense Airspace Management (ADAM), a variant of AMDPCS with similar capabilities, is fielded to corps, divisions, brigade combat teams (BCT), and multi-functional support brigades. As part of capability and technology reuse, AMDWS and FAAD C2 are core components of the Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems currently deployed in multiple areas of operation.

The Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems (SoS) is an evolutionary program that detects RAM launches, provides localized warning to the defended area, intercepts rounds in flight, and enhances response to and defeat of enemy forces. C-RAM combines multi-service fielded and non-developmental item sensors, command and control (C2) equipment, a commercial industry-produced warning system, and a modified U.S. Navy intercept system (Land-based Phalanx

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>  |   | <b>Date:</b> March 2019 |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
|--|---|-------------------------|---------------------|--------------------|----------------------|---------------------|--------------------|----------------------|-----------------------------|--------|---------|--------|---|--------|----------------------------|---------|---------|--------|---|--------|-------------------|---------|--------|--------|---|--------|------------------------------------|--------|--------|--|--|--|-------------------------------------|---|---------|--|--|--|-----------------------------|---|---|--|--|--|----------------------|---------|--------|--|--|--|------------------------------------|---|---|--|--|--|------------------|---|---|--|--|--|----------------------|--------|---|--|--|--|-------------------------------|---|---|--------|---|--------|
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| Weapon System [LPWS]), all connected via a wireless local area network. The Forward Area Air Defense Command and Control (FAAD C2) system, also under the management of the C-RAM Project Office, has been enhanced to integrate the sensors, weapons, and warning systems to provide C2 for the C-RAM SoS. C-RAM C2 software correlates the RAM sensor data, evaluates the threat, provides early warning, directs engagements, and cues counterfire systems and reaction forces. C-RAM C2 employs an agile software development, maintenance, and sustainment strategy, with Urgent Materiel Releases (UMR) every 6 months and Full Materiel Releases (FMR) every 15-18 months, to keep pace with rapidly fielding integrated systems to meet operational needs. The C-RAM SoS capability in theater is supported through the Overseas Contingency Operations (OCO) process. Base RDT&E supports C-RAM C2 basic Air Defense functionality as well as directed enhancements to the C-RAM SoS capability, such as development and integration of C-RAM network security enhancements and development of all-digital radar technology to address emerging threats.  |   |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| The Counter-Unmanned Aircraft Systems (C-UAS) effort is in response to Joint Urgent Operational Need (JUON) CC-0558 to support identification, development, testing, evaluation, and integration of technologies to provide an overall evolutionary capability to defeat small UAS threats at 89 U.S. Central Command (CENTCOM) sites. The C-UAS effort provides warfighters the ability to comprehensively detect, track, identify, and defeat enemy Groups 1 and 2 lightweight, low altitude, commercial off-the-shelf (COTS) UASs.  |   |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| <b>B. Program Change Summary (\$ in Millions)</b> <table> <thead> <tr> <th></th> <th align="right"><b>FY 2018</b></th> <th align="right"><b>FY 2019</b></th> <th align="right"><b>FY 2020 Base</b></th> <th align="right"><b>FY 2020 OCO</b></th> <th align="right"><b>FY 2020 Total</b></th> </tr> </thead> <tbody> <tr> <td>Previous President's Budget</td> <td align="right">28.726</td> <td align="right">214.472</td> <td align="right">15.577</td> <td align="right">-</td> <td align="right">15.577</td> </tr> <tr> <td>Current President's Budget</td> <td align="right">190.385</td> <td align="right">212.373</td> <td align="right">43.502</td> <td align="right">-</td> <td align="right">43.502</td> </tr> <tr> <td>Total Adjustments</td> <td align="right">161.659</td> <td align="right">-2.099</td> <td align="right">27.925</td> <td align="right">-</td> <td align="right">27.925</td> </tr> <tr> <td>    • Congressional General Reductions</td> <td align="right">-0.023</td> <td align="right">-0.099</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    • Congressional Directed Reductions</td> <td align="right">-</td> <td align="right">-15.000</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    • Congressional Rescissions</td> <td align="right">-</td> <td align="right">-</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    • Congressional Adds</td> <td align="right">162.800</td> <td align="right">13.000</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    • Congressional Directed Transfers</td> <td align="right">-</td> <td align="right">-</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    • Reprogrammings</td> <td align="right">-</td> <td align="right">-</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    • SBIR/STTR Transfer</td> <td align="right">-1.118</td> <td align="right">-</td> <td></td> <td></td> <td></td> </tr> <tr> <td>    • Adjustments to Budget Years</td> <td align="right">-</td> <td align="right">-</td> <td align="right">27.925</td> <td align="right">-</td> <td align="right">27.925</td> </tr> </tbody> </table> |   |                         |                     | <b>FY 2018</b>     | <b>FY 2019</b>       | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> | Previous President's Budget | 28.726 | 214.472 | 15.577 | - | 15.577 | Current President's Budget | 190.385 | 212.373 | 43.502 | - | 43.502 | Total Adjustments | 161.659 | -2.099 | 27.925 | - | 27.925 | • Congressional General Reductions | -0.023 | -0.099 |  |  |  | • Congressional Directed Reductions | - | -15.000 |  |  |  | • Congressional Rescissions | - | - |  |  |  | • Congressional Adds | 162.800 | 13.000 |  |  |  | • Congressional Directed Transfers | - | - |  |  |  | • Reprogrammings | - | - |  |  |  | • SBIR/STTR Transfer | -1.118 | - |  |  |  | • Adjustments to Budget Years | - | - | 27.925 | - | 27.925 |
|  | <b>FY 2018</b>  | <b>FY 2019</b>          | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b> |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| Previous President's Budget  | 28.726  | 214.472                 | 15.577              | -                  | 15.577               |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| Current President's Budget   | 190.385   | 212.373                 | 43.502              | -                  | 43.502               |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| Total Adjustments  | 161.659   | -2.099                  | 27.925              | -                  | 27.925               |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| • Congressional General Reductions   | -0.023  | -0.099                  |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| • Congressional Directed Reductions  | -   | -15.000                 |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| • Congressional Rescissions  | -   | -                       |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| • Congressional Adds   | 162.800   | 13.000                  |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| • Congressional Directed Transfers   | -   | -                       |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| • Reprogrammings   | -   | -                       |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| • SBIR/STTR Transfer   | -1.118  | -                       |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| • Adjustments to Budget Years  | -   | -                       | 27.925              | -                  | 27.925               |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| <b>Congressional Add Details (\$ in Millions, and Includes General Reductions)</b> <table> <thead> <tr> <th align="right"><b>FY 2018</b></th> <th align="right"><b>FY 2019</b></th> </tr> </thead> <tbody> <tr> <td align="right">8.000</td> <td align="right">8.000</td> </tr> <tr> <td align="right">5.000</td> <td align="right">5.000</td> </tr> <tr> <td align="right">13.000</td> <td align="right">13.000</td> </tr> <tr> <td align="right">13.000</td> <td align="right">13.000</td> </tr> </tbody> </table>   |   |                         | <b>FY 2018</b>      | <b>FY 2019</b>     | 8.000                | 8.000               | 5.000              | 5.000                | 13.000                      | 13.000 | 13.000  | 13.000 |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| <b>FY 2018</b>   | <b>FY 2019</b>  |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| 8.000  | 8.000   |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| 5.000  | 5.000   |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| 13.000   | 13.000  |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| 13.000   | 13.000  |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |
| <b>Project: 149: Counter-Rockets, Artillery &amp; Mortar</b> <p>Congressional Add: All-Digital Radar Development</p> <p>Congressional Add: C-RAM Network Security Enhancements</p> <p align="right">Congressional Add Subtotals for Project: 149</p> <p align="right">Congressional Add Totals for all Projects</p>  |   |                         |                     |                    |                      |                     |                    |                      |                             |        |         |        |   |        |                            |         |         |        |   |        |                   |         |        |        |   |        |                                    |        |        |  |  |  |                                     |   |         |  |  |  |                             |   |   |  |  |  |                      |         |        |  |  |  |                                    |   |   |  |  |  |                  |   |   |  |  |  |                      |        |   |  |  |  |                               |   |   |        |   |        |

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2020 Army  | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i> | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / <i>Air Defense Command, Control and Intelligence - Eng Dev</i> |
| <b><u>Change Summary Explanation</u></b><br>The FY 2020 base funding increase of \$27.925 million is due to the transition of ALPS efforts from PE 0603327A. |  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |               |         |         | Project (Number/Name)<br>126 / PEO Electronic Protect |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| 126: PEO Electronic Protect                             | -           | 0.000   | 0.000   | 27.925       | -   | 27.925        | 15.634  | 4.153   | 0.000   | 0.000   | 0.000            | 47.712     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                |            |  |

**Note**  
ALPS was previously funded under PE 0603327A.

**A. Mission Description and Budget Item Justification**  
Army Long-Range Persistent Surveillance (ALPS) is a passive sensor that provides long range surveillance against Cruise Missile (CM), Fixed Wing (FW), Rotary Wing (RW), and Unmanned Aircraft System (UAS) threats. Prototype systems will be provided to meet multiple Combatant Command identified operational needs and to conduct an assessment. The objectives of this effort are to provide component and subsystem maturity in a system-of-systems environment and to reduce subsequent integration risk. This program will also integrate ALPS to support the Army Integrated Air and Missile Defense (AIAMD) architecture.

| B. Accomplishments/Planned Programs (\$ in Millions)  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> ALPS Development and Integration<br><b>Description:</b> Provide ALPS systems to meet multiple Combatant Command operational needs and integrate ALPS to support the AIAMD architecture.<br><br>Prototype systems will be provided to meet multiple Combatant Command operational needs and to conduct an assessment. The objectives of this effort are to prove component and subsystem maturity in a system-of-systems environment and to reduce subsequent integration risk. This program will also integrate ALPS to support the AIAMD architecture. | -       | -       | 27.925       | -           | 27.925        |
| <b>FY 2020 Base Plans:</b><br>Continue providing additional ALPS prototype systems to meet multiple Combatant Command identified operational needs and continue the assessment. Continue integration of ALPS to support the overall AIAMD architecture.   |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>ALPS was previously funded under PE 0603327A.   |         |         |              |             |               |
| <b>Accomplishments/Planned Programs Subtotals</b>   | -       | -       | 27.925       | -           | 27.925        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army             |           |           |         |   |                |                  |         |   |         |            | Date: March 2019    |            |
|---|-----------|-----------|---------|---|----------------|------------------|---------|---|---------|------------|---------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5                           |           |           |         | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |                |                  |         | Project (Number/Name)<br>126 / PEO Electronic Protect |         |            |                     |            |
| C. Other Program Funding Summary (\$ in Millions)                   |           |           |         |   |                |                  |         |   |         |            |                     |            |
| Line Item   | FY 2018   | FY 2019   | FY 2020 | FY 2020<br>Base   | FY 2020<br>OCO | FY 2020<br>Total | FY 2021 | FY 2022   | FY 2023 | FY 2024    | Cost To<br>Complete | Total Cost |
| • EF9: System Integration and Test                                  | 69.558    | 77.188    | 107.746 | -   | 107.746        | 111.080          | 121.308 | 37.186  | 40.999  | 0.000      | 565.065             |            |
| • EX2: Lower Tier Air Missile Defense (LTAMD) Capability            | 57.437    | 89.248    | 427.772 | -   | 427.772        | 376.738          | 332.322 | 241.461   | 87.500  | 0.000      | 1,612.478           |            |
| • C50016: System Integration and Test Procurement                   | 136.579   | 105.395   | 0.000   | 113.857   | 113.857        | 105.044          | 107.288 | 86.178  | 87.410  | Continuing | Continuing          |            |
| • FM3: Future Interceptor   | -         | -         | 8.000   | -   | 8.000          | 8.000            | 8.000   | 88.918  | 120.000 | 0.000      | 232.918             |            |
| • C53101: MSE Missile   | 1,103.040 | 1,131.276 | 0.000   | 736.541   | 736.541        | 767.495          | 749.530 | 999.731   | 898.131 | 793.430    | 7,179.174           |            |
| • 0604319A: Indirect Fire Protection Capability                     | 10.871    | 40.979    | 0.000   | -   | 0.000          | -                | -       | -   | -       | 0.000      | 51.850              |            |
| Increment 2-Intercept (IFPC2)                                       |           |           |         |   |                |                  |         |   |         |            |                     |            |
| • C62001: IFPC Inc 2-I Block 1 Missile 1                            | 50.056    | 145.636   | 0.000   | -   | 0.000          | -                | -       | -   | -       | 0.000      | 195.692             |            |
| • C62002: IFPC INC 2-I BLOCK 1 SYSTEM                               | -         | 31.286    | 0.000   | 9.337   | 9.337          | 241.387          | 446.464 | 424.568   | 446.541 | 0.000      | 1,599.583           |            |
| • 0604117A: Maneuver - Short Range Air Defense (M-SHORAD)           | 19.201    | 79.016    | 33.100  | 6.000   | 39.100         | 105.700          | 341.100 | 382.600   | 308.700 | 0.000      | 1,275.417           |            |
| • C14300: M-SHORAD - Procurement                                    | -         | -         | 0.000   | 262.100   | 262.100        | 537.400          | 292.200 | 80.500  | 78.600  | Continuing | Continuing          |            |
| • 0604820A: Radar Development                                       | 31.651    | 39.289    | 105.243 | -   | 105.243        | 103.427          | 105.394 | 65.574  | 69.407  | 0.000      | 519.985             |            |
| • S40: Army Integrated Air and Missile Defense                      | 339.051   | 322.263   | 208.938 | -   | 208.938        | 130.859          | 63.738  | 33.193  | 94.845  | 0.000      | 1,192.887           |            |
| • BZ5075: IAMD Battle Command System                                | -         | -         | 29.629  | -   | 29.629         | 254.834          | 353.929 | 417.426   | 413.775 | Continuing | Continuing          |            |
| • 0604741A: Air Defense Command, Control and Intelligence - Eng Dev | 190.385   | 212.373   | 43.502  | -   | 43.502         | 24.944           | 7.068   | 1.228   | 3.405   | 0.000      | 482.905             |            |
| • AD5070: AIR & MSL Defense Planning & Control Sys                  | 132.713   | 29.913    | 24.730  | 14.331  | 39.061         | 49.147           | 106.671 | 63.143  | 0.075   | 0.000      | 420.723             |            |
| • 0605052A: Indirect Fire Protection Capability Inc 2 - Block 1     | 156.361   | 132.283   | 243.228 | -   | 243.228        | 101.000          | 58.000  | 45.000  | 5.000   | 0.000      | 740.872             |            |
| • 149: Counter-Rockets, Artillery & Mortar                          | 17.250    | 14.844    | 1.277   | -   | 1.277          | 0.909            | -       | -   | -       | 0.000      | 34.280              |            |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |         |         |                 |                |                  |   |         |         |  | <b>Date:</b> March 2019 |            |
|--|---------|---------|-----------------|----------------|------------------|---|---------|---------|--|-------------------------|------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |         |         |                 |                |                  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |         |         | <b>Project (Number/Name)</b><br>126 / PEO Electronic Protect |                         |            |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |         |         |                 |                |                  |   |         |         |  |                         |            |
| Line Item  | FY 2018 | FY 2019 | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total | FY 2021   | FY 2022 | FY 2023 | FY 2024  | Cost To<br>Complete     | Total Cost |
| • 146: Air & Msl Defense Planning Control Sys  | 23.335  | 24.296  | 14.300          | -              | 14.300           | 8.401   | 2.915   | 1.228   | 3.405  | 0.000                   | 77.880     |
| <b>Remarks</b><br>ALPS was previously funded under PE 0603327A.  |         |         |                 |                |                  |   |         |         |  |                         |            |
| <b>D. Acquisition Strategy</b><br>ALPS utilizes an existing Defense Ordnance Technology Consortium (DOTC) Other Transaction Authority (OTA) to develop and integrate prototypes systems to meet multiple Combatant Command operational needs. An assessment of the prototype systems provided in response to the Combatant Command operational needs will be used to refine requirements and assess the Army's longer-term strategy. |         |         |                 |                |                  |   |         |         |  |                         |            |
| <b>E. Performance Metrics</b><br>N/A   |         |         |                 |                |                  |   |         |         |  |                         |            |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army    |                        |                                |             |   |            |         |            |   |                 |                |                | Date: March 2019 |                  |                  |                          |                          |
|---|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|-----------------|----------------|----------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                 |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |            |         |            | Project (Number/Name)<br>126 / PEO Electronic Protect |                 |                |                |                  |                  |                  |                          |                          |
| Management Services (\$ in Millions)                      |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                       |                 | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | 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 & Government Program Management | Various                | Various : Various              | -           | -   |            | -       |            | 1.432   |                 | -              |                | 1.432            | Continuing       | Continuing       | Continuing               |                          |
| <b>Subtotal</b>   |                        |                                |             | -   | -          | -       |            | 1.432   |                 | -              |                | 1.432            | Continuing       | Continuing       | N/A                      |                          |
| Product Development (\$ in Millions)                      |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base                                       |                 | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date      | Cost           | Award Date     | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| ALPS Development and Integration                          | Various                | Various : Various              | -           | -   |            | -       |            | 26.493  | May 2020        | -              |                | 26.493           | Continuing       | Continuing       | Continuing               |                          |
| <b>Subtotal</b>   |                        |                                |             | -   | -          | -       |            | 26.493  |                 | -              |                | 26.493           | Continuing       | Continuing       | N/A                      |                          |
|   |                        |                                |             | Prior Years   | FY 2018    |         | FY 2019    |   | FY 2020<br>Base |                | FY 2020<br>OCO |                  | FY 2020<br>Total | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>                                |                        |                                |             | -   | -          | 0.000   |            | 27.925  |                 | -              |                | 27.925           | Continuing       | Continuing       | N/A                      |                          |

**Remarks**

ALPS was previously funded under PE 0603327A.

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army |         |   |   |   |         |   |   |   |         |   |   |   |         | Date: March 2019 |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|------------------|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|
| Appropriation/Budget Activity<br>2040 / 5         |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |         |   |   | Project (Number/Name)<br>126 / PEO Electronic Protect |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| Event Name  | FY 2018 |   |   |   | FY 2019 |   |   |   | FY 2020 |   |   |   | FY 2021 |                  |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   | FY 2024 |   |   |   |
|   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |
| ALPS Prototype Development and Integration        |         |   |   |   |         |   |   |   |         |   |   |   |         |                  |   |   |         |   |   |   |         |   |   |   |         |   |   |   |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |   |   | Date: March 2019 |
|--|---|---|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev | Project (Number/Name)<br>126 / PEO Electronic Protect |                  |
| Schedule Details                                   |   |   |                  |
| Events   | Start   | End   |                  |
| ALPS Prototype Development and Integration         | Quarter<br>1  | Year<br>2017  | Quarter<br>4     |
|  | Year<br>2022  |   |                  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                                     |               |         |         | Project (Number/Name)                        |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |               |         |         | 146 / Air & Msl Defense Planning Control Sys |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                                      | FY 2024 | Cost To Complete | Total Cost |  |
| 146: Air & Msl Defense Planning Control Sys             | -           | 23.335  | 24.296  | 14.300       | -   | 14.300        | 8.401   | 2.915   | 1.228  | 3.405   | Continuing       | Continuing |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -       |                  |            |  |

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

The Air and Missile Defense Planning and Control System (AMDPCS) provides integration of air and missile defense operations at all echelon. Specifically, Air and Missile Defense Workstation (AMDWS) provides a correlated air picture using local radars, allowing the Commander the visibility and situational understanding of airspace; other automated defense design and staff planning tools in AMDWS afford Soldiers horizontal and vertical collaborative planning with adjacent units. Air Defense System Integrator (ADSI) serves as a joint tactical data link gateway/air picture, and when correlated by Forward Area Air Defense Command and Control (FAAD C2) and displayed on AMDWS, provides a near-real time, three dimensional joint air picture for the Commander. Joint Tactical Terminal (JTT) provides Soldiers theater ballistic missile (TBM) early warning, allowing them to take appropriate actions. AMDPCS is fielded to Army air and missile defense commands (AAMDC), air defense artillery brigades (ADA BDE), air and missile defense battalions (AMD BN), and Terminal High Altitude Area Air Defense batteries (THAAD BTRY). Air Defense Airspace Management (ADAM), a variant of AMDPCS with similar capabilities, is fielded to corps, divisions, brigade combat teams (BCT), and multi-functional support brigades. As part of capability and technology reuse, AMDWS and FAAD C2 are core components of the Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems currently deployed in multiple areas of operation.

FY 2020 Base dollars in the amount of \$14.300 million fund development, engineering, testing, and certification of AMDWS software; interoperability engineering, testing, and evaluation of AMDPCS family-of-systems shelters; and software system certification testing, accreditation, and approval of authority-to-operate (ATO).

| B. Accomplishments/Planned Programs (\$ in Millions)   |  |  |  |  | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|--|--|--|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> AMDWS Software Development   |  |  |  |  | 12.715  | 12.438  | 11.726       | -           | 11.726        |
| <b>Description:</b> AMDWS development and support of LandWarNet as well as various Common Operating Environments (COE). AMDWS software engineering and development are consistent with COE requirements, evolving the AMDPCS requirements to a net-centric environment, and fulfilling the air defense force operations capabilities identified in the AMD TRADOC capabilities requirement list. Virtualize AMDWS software development and rehost onto COE Real-Time Computing Environment common hardware systems. Support the evolving development of the force operations portion of the Integrated Air and Missile Defense (IAMD) system-of-systems. |  |  |  |  |         |         |              |             |               |
| <b>FY 2019 Plans:</b>  |  |  |  |  |         |         |              |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |   |  |                |                     | <b>Date:</b> March 2019 |                      |
|---|---|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev | <b>Project (Number/Name)</b><br>146 / Air & Msl Defense Planning Control Sys |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| <p>Continue AMDWS software engineering consistent with COE v3 requirements. Finalize development of a Windows 10 version of AMDWS, test, and work material release for fielding to replace all Windows 7 AMDWS. Support COE v3 integration activities with both Real Time Safety Critical Embedded Computing Environment (RTSCE CE) and Command Post Computing Environment (CP CE). Continue to implement interface to the Passive Identification, Friend or Foe (PIFF) in support of commercial aircraft de-confliction.</p> <p><b>FY 2020 Base Plans:</b><br/>           Will continue AMDWS software engineering consistent with COE requirements. Upgrade the Windows 10 compliant version of AMDWS with BitLocker encryption features and replace all Windows 7 AMDWS. Perform COE integration activities with both RTSCE CE and CP CE. Continue software interoperability modifications with C2BMC, C2IS, C2AOS, AOC WS, Patriot, IBCS, THAAD, C-RAM C2, TBMCS, COE, and ABCS to support warfighter functions. Build threat sets and weapon platform capabilities for Counter-Unmanned Aerial Systems (C-UAS) planning and defense design capabilities to support the C-RAM C-UAS planning requirements. This effort's funding will be executed by the AMDPCS program.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           FY 2020 adjustment due to revised economic assumptions.</p> |   |  |                |                     |                         |                      |
| <p><b>Title:</b> Passive Identification, Friend or Foe (PIFF)</p> <p><b>Description:</b> PIFF receives position and identification data from self-reporting aircraft, to include UAS, within 250 nautical miles. This capability supports the air picture and situational awareness for commanders and staff, thereby enhancing survivability and reducing the risk of fratricide.</p> <p><b>FY 2019 Plans:</b><br/>           Continue system engineering which includes cyber, data at rest, and a new IFF Response Processor (IRP) Card design. This non-recurring engineering effort will support the development of a common product for AMDPCS and Integrated Air and Missile Defense Battle Command Systems (IBCS).</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           FY 2019 funding completes PIFF research and development efforts.</p>  |   | 7.960  | 8.211          | -                   | -                       | -                    |
| <p><b>Title:</b> Engineering, Development, Test and Evaluation</p> <p><b>Description:</b> Engineering, development, test, and evaluation of the AMDPCS family-of-systems shelters objective configuration; evaluation and finalization of the AMDPCS tactical communications, data processing, and vehicle/shelter/power generation/environmental system block upgrade program for fielded systems.</p>   |   | 1.867  | 1.905          | 1.859               | -                       | 1.859                |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |  |   |                |                         | <b>Date:</b> March 2019 |                          |
|--|--|---|----------------|-------------------------|-------------------------|--------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev | <b>Project (Number/Name)</b><br>146 / Air & Msl Defense Planning Control<br>Sys |                |                         |                         |                          |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020<br/>Base</b> | <b>FY 2020<br/>OCO</b>  | <b>FY 2020<br/>Total</b> |
| <b>FY 2019 Plans:</b><br>Continue evaluations of emerging technologies and hardware interoperability. Continue support and development of IBCS-ADAM COE configurations and PIFF integration/testing at NIE 19.1, 19.2, 20.1 and 20.2. Assess system to ensure equipment meets Army requirements IAW Command Post Directed Requirement, 14 Dec 17.  |  |   |                |                         |                         |                          |
| <b>FY 2020 Base Plans:</b><br>Will continue evaluations of emerging technologies and hardware interoperability. Continue support and development of IBCS-ADAM COE configurations. Analyze system hardware to ensure equipment meets Army requirements IAW command post directed requirement, 14 Dec 17. Test and evaluate replacement equipment needed to maintain cyber and command post directed requirement compliance. This effort's funding will be executed by the AMDPCS program. |  |   |                |                         |                         |                          |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 adjustment due to revised economic assumptions.  |  |   |                |                         |                         |                          |
| <b>Title:</b> Software System Certification Testing, Accreditation, and Approval of Authority-to-Operate (ATO)<br><b>Description:</b> Software system certification testing, accreditation, and approval of ATOs for the various software systems; BitLocker encryption and other authorized/approved G6 software implementation; Army and joint integration and interoperability assessments.   |  | 0.793   | 0.851          | 0.715                   | -                       | 0.715                    |
| <b>FY 2019 Plans:</b><br>Continue software systems certification testing, accreditation, and approval of ATOs as required by the DOD Risk Management Framework process. Continue Army and Joint integration and interoperability assessments.  |  |   |                |                         |                         |                          |
| <b>FY 2020 Base Plans:</b><br>Will continue software systems certification testing, accreditation, and approval of ATOs as required by the DOD risk management framework process. Continue Army and joint integration and interoperability assessments. This effort's funding will be executed by the AMDPCS program.  |  |   |                |                         |                         |                          |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 adjustment due to revised economic assumptions.  |  |   |                |                         |                         |                          |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer<br><b>Description:</b> FY 2019 SBIR / STTR Transfer   |  | -   | 0.891          | -                       | -                       | -                        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |         |         |   |             |               |         |  |         |              |                  | Date: March 2019 |  |  |  |  |
|--|---------|---------|---|-------------|---------------|---------|--|---------|--------------|------------------|------------------|--|--|--|--|
| Appropriation/Budget Activity  |         |         | R-1 Program Element (Number/Name)                                     |             |               |         | Project (Number/Name)                        |         |              |                  |                  |  |  |  |  |
| 2040 / 5   |         |         | PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |             |               |         | 146 / Air & Msl Defense Planning Control Sys |         |              |                  |                  |  |  |  |  |
| <u>B. Accomplishments/Planned Programs (\$ in Millions)</u>  |         |         |   |             |               |         | FY 2018                                      | FY 2019 | FY 2020 Base | FY 2020 OCO      | FY 2020 Total    |  |  |  |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer  |         |         |   |             |               |         |  |         |              |                  |                  |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR Transfer               |         |         |   |             |               |         |  |         |              |                  |                  |  |  |  |  |
| <u>Accomplishments/Planned Programs Subtotals</u>  |         |         |   |             |               |         | 23.335                                       | 24.296  | 14.300       | -                | 14.300           |  |  |  |  |
| <u>C. Other Program Funding Summary (\$ in Millions)</u>   |         |         |   |             |               |         |  |         |              |                  |                  |  |  |  |  |
| Line Item  | FY 2018 | FY 2019 | FY 2020 Base  | FY 2020 OCO | FY 2020 Total | FY 2021 | FY 2022                                      | FY 2023 | FY 2024      | Cost To Complete | Total Cost       |  |  |  |  |
| • AD5070: AIR & MSL Defense Planning & Control Sys   | 132.713 | 29.913  | 24.730  | 14.331      | 39.061        | 49.147  | 106.671                                      | 63.143  | 0.075        | 0.000            | 420.723          |  |  |  |  |
| • 149: Counter-Rockets, Artillery & Mortar   | 17.250  | 14.844  | 1.277   | -           | 1.277         | 0.909   | -  | -       | -            | -                | Continuing       |  |  |  |  |
| • H30503: Rocket, Artillery, Mortar (RAM) Warn   | 31.380  | 34.393  | 0.000   | -           | 0.000         | -       | -  | -       | -            | 0.000            | 65.773           |  |  |  |  |
| • H30504: C-RAM Enhancements   | 63.000  | 6.304   | 9.127   | -           | 9.127         | 0.703   | -  | -       | -            | 0.000            | 79.134           |  |  |  |  |
| • DU3: IFPC2   | 10.871  | 40.979  | 0.000   | -           | 0.000         | -       | -  | -       | -            | -                | Continuing       |  |  |  |  |
| • 0605457A: Army Integrated Air and Missile Defense (AIAMD)  | 339.051 | 322.263 | 208.938   | -           | 208.938       | 130.859 | 63.738                                       | 33.193  | 94.845       | 0.000            | 1,192.887        |  |  |  |  |
| • BZ5075: IAMD Battle Command System   | -       | -       | 29.629  | -           | 29.629        | 254.834 | 353.929                                      | 417.426 | 413.775      | Continuing       | Continuing       |  |  |  |  |
| • E10: Sentinel  | 31.651  | 39.289  | 105.243   | -           | 105.243       | 103.427 | 105.394                                      | 65.574  | 69.407       | Continuing       | Continuing       |  |  |  |  |
| • FG5: Counter Unmanned Aerial Systems (UAS)   | 149.800 | 173.233 | 0.000   | -           | 0.000         | -       | -  | -       | -            | 0.000            | 323.033          |  |  |  |  |
| • H30505: Counter Unmanned Aerial Systems (C-UAS) Efforts  | 571.733 | 250.800 | 20.000  | -           | 20.000        | -       | -  | -       | -            | 0.000            | 842.533          |  |  |  |  |
| • 0604117A: Maneuver - Short Range Air Defense (M-SHORAD)  | 19.201  | 79.016  | 33.100  | 6.000       | 39.100        | 105.700 | 341.100                                      | 382.600 | 308.700      | 0.000            | 1,275.417        |  |  |  |  |
| <u>Remarks</u>   |         |         |   |             |               |         |  |         |              |                  |                  |  |  |  |  |
| This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture. |         |         |   |             |               |         |  |         |              |                  |                  |  |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |  | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev | <b>Project (Number/Name)</b><br>146 / Air & Msl Defense Planning Control<br>Sys |
| <b>D. Acquisition Strategy</b><br>The acquisition strategy relies on non-development items (NDI) and evolutionary software development to rapidly meet the demands of air defense battle management command, control, communications, computers, and intelligence (BM/C4I) requirements and to keep pace with automated information technologies. The concept of evolutionary software development will be accomplished in a series of AMDWS block releases and upgrades. AMDPCS is being developed for both the Army's Active and Reserve components. |  |   |
| AMDWS software development is contracted sole source (SS)/cost plus fixed fee (CPFF) to Northrop Grumman. PIFF development was competitively awarded to Telephonics, Inc. on a CPFF OTA contract.  |  |   |
| AMDWS is a prime component of C-RAM. It provides the forward operating base (FOB) commander with clearance of fires display and enemy munitions flight paths.  |  |   |
| <b>E. Performance Metrics</b><br>N/A   |  |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                     |             |   |            |         |            |  |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|-------------------------------------|-------------|---|------------|---------|------------|--|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                     |             | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |            |         |            | Project (Number/Name)<br>146 / Air & MsI Defense Planning Control<br>Sys |            |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                     |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location      | 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 Administration                      | Various                | Various : Various                   | 30.956      | 1.143   | Dec 2017   | 1.170   | Dec 2018   | 1.158  | Dec 2019   | -              |            | 1.158            | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>                     | 30.956      | 1.143   |            | 1.170   |            | 1.158  |            | -              |            | 1.158            | Continuing       | Continuing | N/A                      |
| <b>Remarks</b><br>Not Applicable                       |                        |                                     |             |   |            |         |            |  |            |                |            |                  |                  |            |                          |
| Product Development (\$ in Millions)                   |                        |                                     |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location      | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| AMDW Software Development and Engineering              | SS/CPFF                | Northrop Grumman : Huntsville AL    | 143.651     | 12.228  | Oct 2017   | 12.018  | Oct 2018   | 10.276   | Oct 2019   | -              |            | 10.276           | Continuing       | Continuing | Continuing               |
| PIFF Development Engineering                           | C/FFP                  | Telephonics : Farmingdale NY        | -           | 6.893   | Aug 2018   | 6.804   | Dec 2018   | -  |            | -              |            | -                | 0.000            | 13.697     | -                        |
| ADSI Software Development and Engineering              | SS/T&M                 | Ultra Electronics : Austin, TX      | 6.859       | -   |            | -       |            | -  |            | -              |            | -                | 0.000            | 6.859      | -                        |
| Developmental Engineering                              | Various                | Various : Various                   | 41.582      | 2.768   | Dec 2017   | 3.092   | Dec 2018   | 2.717  | Dec 2019   | -              |            | 2.717            | Continuing       | Continuing | Continuing               |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | To Be Determined : To Be Determined | -           | -   |            | 0.891   |            | -  |            | -              |            | -                | 0.000            | 0.891      | -                        |
|  |                        | <b>Subtotal</b>                     | 192.092     | 21.889  |            | 22.805  |            | 12.993   |            | -              |            | 12.993           | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |                                     |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location      | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Certification/Testing                                  | Various                | JITC : Ft Huachuca, AZ              | 1.182       | 0.140   | Feb 2018   | 0.148   | Feb 2019   | 0.063  | Feb 2020   | -              |            | 0.063            | Continuing       | Continuing | Continuing               |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |  |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|--|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |            |         |            | Project (Number/Name)<br>146 / Air & MsI Defense Planning Control<br>Sys |            |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Interoperability Assessment                            | Various                | CTSF : Ft Hood, TX             | 1.567       | 0.163   | May 2018   | 0.173   | May 2019   | 0.086  | May 2020   | -              |            | 0.086            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                | 2.749       | 0.303   |            | 0.321   |            | 0.149  |            | -              |            | 0.149            | Continuing       | Continuing | N/A                      |
|  |                        |                                | Prior Years | FY 2018   |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                | 225.797     | 23.335  |            | 24.296  |            | 14.300   |            | -              |            | 14.300           | Continuing       | Continuing | N/A                      |

**Remarks**

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army              |         |   |   |   |   |   |         |  |   |         |   |   | Date: March 2019 |   |   |         |         |   |   |   |
|--|---------|---|---|---|---|---|---------|--|---|---------|---|---|------------------|---|---|---------|---------|---|---|---|
| Appropriation/Budget Activity                                  |         |   |   | R-1 Program Element (Number/Name)                                     |   |   |         | Project (Number/Name)                        |   |         |   |   |                  |   |   |         |         |   |   |   |
| 2040 / 5   |         |   |   | PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |   |   |         | 146 / Air & MsI Defense Planning Control Sys |   |         |   |   |                  |   |   |         |         |   |   |   |
| Event Name   | FY 2018 |   |   | FY 2019   |   |   | FY 2020 |  |   | FY 2021 |   |   | FY 2022          |   |   | FY 2023 | FY 2024 |   |   |   |
|  | 1       | 2 | 3 | 4   | 1 | 2 | 3       | 4  | 1 | 2       | 3 | 4 | 1                | 2 | 3 | 4       | 1       | 2 | 3 | 4 |
| Full Operational Capability AMDPCS                             |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| AMDWS Block V Contract   |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| AMDWS Contract   |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| AMDWS Software Block Development, Testing, Certification       |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| AMDWS Capability Set (CS) and COE Development / Test           |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| AMDWS AMD Interfaces: C2BMC, C2IS, C2AOS, AOC WS, etc          |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| Passive Identification, Friend or Foe (PIFF) Eng./Integration  |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| Army Warfighting Assess. 18.1 / Network Integration Eval. 18.2 |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| Joint Warfighting Assessment (JWA) 19.1                        |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| JWA 20.1   |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| JWA 21.1   |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |
| JWA 22.1   |         |   |   |   |   |   |         |  |   |         |   |   |                  |   |   |         |         |   |   |   |

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|---|--|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |  | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev | <b>Project (Number/Name)</b><br>146 / Air & MsI Defense Planning Control<br>Sys |

**Schedule Details**

| Events   | Start   |      | End     |      |
|--|---------|------|---------|------|
|  | Quarter | Year | Quarter | Year |
| Full Operational Capability AMDPCS                             | 1       | 2023 | 1       | 2023 |
| AMDWS Block V Contract   | 2       | 2011 | 4       | 2021 |
| AMDWS Contract   | 2       | 2021 | 2       | 2026 |
| AMDWS Software Block Development, Testing, Certification       | 3       | 2007 | 4       | 2023 |
| AMDWS Capability Set (CS) and COE Development / Test           | 1       | 2013 | 4       | 2023 |
| AMDWS AMD Interfaces: C2BMC, C2IS, C2AOS, AOC WS, etc          | 4       | 2012 | 4       | 2021 |
| Passive Identification, Friend or Foe (PIFF) Eng./Integration  | 4       | 2018 | 1       | 2021 |
| ADSI Software Engineering Development and Test                 | 1       | 2005 | 4       | 2017 |
| AWA 16.1 (COE ADAM) DOTMLPF Eval / NIE 16.2                    | 4       | 2015 | 3       | 2016 |
| Army Warfighting Assessment (AWA) 17.1 / NIE 17.2              | 4       | 2016 | 3       | 2017 |
| Army Warfighting Assess. 18.1 / Network Integration Eval. 18.2 | 4       | 2017 | 3       | 2018 |
| Joint Warfighting Assessment (JWA) 19.1                        | 4       | 2018 | 3       | 2019 |
| JWA 20.1   | 4       | 2019 | 3       | 2020 |
| JWA 21.1   | 4       | 2020 | 3       | 2021 |
| JWA 22.1   | 4       | 2021 | 4       | 2021 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                                     |               |         |         | Project (Number/Name)                     |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |               |         |         | 149 / Counter-Rockets, Artillery & Mortar |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                                   | FY 2024 | Cost To Complete | Total Cost |  |
| 149: Counter-Rockets, Artillery & Mortar                | -           | 17.250  | 14.844  | 1.277        | -   | 1.277         | 0.909   | 0.000   | 0.000                                     | 0.000   | Continuing       | Continuing |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       |                  |            |  |

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

The Counter-Rocket, Artillery, Mortar (C-RAM) system-of-systems (SoS) is an evolutionary program that detects RAM launches, provides localized warning to the defended area, intercepts rounds in flight, and enhances response to and defeat of enemy forces. C-RAM combines multi-service fielded and non-developmental item sensors, command and control (C2) equipment, a commercial industry-produced warning system, and a modified U.S. Navy intercept system (Land-based Phalanx Weapon System [LPWS]), all connected via a wireless local area network. The Forward Area Air Defense Command and Control (FAAD C2) system, also under the management of the C-RAM Project Office, has been enhanced to integrate the sensors, weapons, and warning systems to provide C2 for the C-RAM SoS. C-RAM C2 software correlates the RAM sensor data, evaluates the threat, provides early warning, directs engagements, and cues counterfire systems and reaction forces. C-RAM C2 employs an agile software development, maintenance, and sustainment strategy, with Urgent Materiel Releases (UMR) every 6 months and Full Materiel Releases (FMR) every 15-18 months, to keep pace with rapidly fielding integrated systems to meet operational needs. The C-RAM SoS capability in theater is supported through the Overseas Contingency Operations (OCO) process. Base RDT&E supports C-RAM C2 basic Air Defense functionality as well as directed enhancements to the C-RAM SoS capability, such as development and integration of C-RAM network security enhancements and development of all-digital radar technology to address emerging threats.

FY 2020 Base RDT&E dollars in the amount of \$1.277 million provide FAAD/C-RAM C2 development and enhancements based on changes in threat, integration of new interfaces, technology insertions, and interoperability requirements, and provide development and regression testing to ensure C-RAM C2 enhancements do not negatively impact C-RAM SoS performance.

| B. Accomplishments/Planned Programs (\$ in Millions)   | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|--|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> FAAD/C-RAM C2 Software Development and Enhancements<br><b>Description:</b> Funds system-of-systems development and upgrades based on the bi-annual release of the Army Air and Missile Defense System (AAMDS) System Threat Assessment Report (STAR) and changes in threat, integration of emerging requirements from external PMs (Mission Command) and other services/agencies, technology insertions (IP-based communications), and interoperability requirements (joint interoperability, military standard, information assurance compliance, external interface updates). Provides development and regression testing to ensure C-RAM C2 enhancements do not negatively impact the performance of the other C-RAM pillars (Shape, Sense, Warn, Intercept, Respond, and Protect). Includes continued development of electronic warfare capabilities to counter evolving threats. Includes product assurance, test cycles, live fire | 4.250   | 1.785   | 1.277        | -           | 1.277         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |   |  |         | Date: March 2019 |             |               |  |
|---|---|--|---------|------------------|-------------|---------------|--|
| Appropriation/Budget Activity<br>2040 / 5   | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev | Project (Number/Name)<br>149 / Counter-Rockets, Artillery & Mortar |         |                  |             |               |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | FY 2018  | FY 2019 | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |  |
| verification testing, safety, training and training documentation, integrated logistics support, and all other required functions associated with fielding a major C2 system.   |   |  |         |                  |             |               |  |
| <b>FY 2019 Plans:</b><br>Implement new sensors, effectors, electronic warfare, and camera systems to support C-UAS and M-SHORAD initiatives and continue IAMD convergence and strategic planning. Conduct Army Interoperability Certification testing to support Full Materiel Release (FMR) of C-RAM C2 v5.6A. |   |  |         |                  |             |               |  |
| <b>FY 2020 Base Plans:</b><br>Support role-based user interface, initiate development of advanced battle manager and data link manager with external link forwarding and on-the-move command and control. This effort's funding will be executed by the FAAD/C-RAM program.                                     |   |  |         |                  |             |               |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2020 adjustment due to revised economic assumptions.   |   |  |         |                  |             |               |  |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer  |   | -  | 0.059   | -                | -           | -             |  |
| <b>Description:</b> FY 2019 SBIR / STTR Transfer  |   |  |         |                  |             |               |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer   |   |  |         |                  |             |               |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR Transfer  |   |  |         |                  |             |               |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |   | 4.250  | 1.844   | 1.277            | -           | 1.277         |  |
|   |   | FY 2018  | FY 2019 |                  |             |               |  |
| <b>Congressional Add:</b> All-Digital Radar Development   |   | 8.000  | 8.000   |                  |             |               |  |
| <b>FY 2018 Accomplishments:</b> All-Digital Radar Development   |   |  |         |                  |             |               |  |
| <b>FY 2019 Plans:</b> All-Digital Radar Development   |   |  |         |                  |             |               |  |
| <b>Congressional Add:</b> C-RAM Network Security Enhancements   |   | 5.000  | 5.000   |                  |             |               |  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army             |         |         |   |                |                  |         |   |         |         | Date: March 2019             |            |  |  |  |  |
|---|---------|---------|---|----------------|------------------|---------|---|---------|---------|------------------------------|------------|--|--|--|--|
| Appropriation/Budget Activity                                       |         |         | R-1 Program Element (Number/Name)                                     |                |                  |         | Project (Number/Name)                     |         |         |                              |            |  |  |  |  |
| 2040 / 5  |         |         | PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |                |                  |         | 149 / Counter-Rockets, Artillery & Mortar |         |         |                              |            |  |  |  |  |
|   |         |         |   |                |                  |         |   |         |         | FY 2018                      | FY 2019    |  |  |  |  |
| <b>FY 2018 Accomplishments:</b> C-RAM Network Security Enhancements |         |         |   |                |                  |         |   |         |         |                              |            |  |  |  |  |
| <b>FY 2019 Plans:</b> C-RAM Network Security Enhancements           |         |         |   |                |                  |         |   |         |         |                              |            |  |  |  |  |
|   |         |         |   |                |                  |         |   |         |         | Congressional Adds Subtotals | 13.000     |  |  |  |  |
|   |         |         |   |                |                  |         |   |         |         |                              | 13.000     |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>            |         |         |   |                |                  |         |   |         |         |                              |            |  |  |  |  |
| Line Item   | FY 2018 | FY 2019 | FY 2020<br>Base   | FY 2020<br>OCO | FY 2020<br>Total | FY 2021 | FY 2022                                   | FY 2023 | FY 2024 | Cost To<br>Complete          | Total Cost |  |  |  |  |
| • H30503: Rocket, Artillery, Mortar (RAM) Warn                      | 31.380  | 34.393  | 0.000   | -              | 0.000            | -       | -   | -       | -       | 0.000                        | 65.773     |  |  |  |  |
| • H30504: C-RAM Enhancements  | 63.000  | 6.304   | 9.127   | -              | 9.127            | 0.703   | -   | -       | -       | 0.000                        | 79.134     |  |  |  |  |
| • 146: Air & Msl Defense Planning Control Sys                       | 23.335  | 24.296  | 14.300  | -              | 14.300           | 8.401   | 2.915                                     | 1.228   | 3.405   | Continuing                   | Continuing |  |  |  |  |
| • AD5070: AIR & MSL Defense Planning & Control Sys                  | 132.713 | 29.913  | 24.730  | 14.331         | 39.061           | 49.147  | 106.671                                   | 63.143  | 0.075   | 0.000                        | 420.723    |  |  |  |  |
| • DU3: IFPC2  | 10.871  | 40.979  | 0.000   | -              | 0.000            | -       | -   | -       | -       | Continuing                   | Continuing |  |  |  |  |
| • S40: Army Integrated Air and Missile Defense                      | 339.051 | 322.263 | 208.938   | -              | 208.938          | 130.859 | 63.738                                    | 33.193  | 94.845  | Continuing                   | Continuing |  |  |  |  |
| • BZ5075: IAMD Battle Command System                                | -       | -       | 29.629  | -              | 29.629           | 254.834 | 353.929                                   | 417.426 | 413.775 | Continuing                   | Continuing |  |  |  |  |
| • E10: Sentinel   | 31.651  | 39.289  | 105.243   | -              | 105.243          | 103.427 | 105.394                                   | 65.574  | 69.407  | Continuing                   | Continuing |  |  |  |  |
| • L86: LIGHTWEIGHT COUNTER MORTAR RADAR (LCMR)                      | 2.051   | 4.189   | 4.913   | -              | 4.913            | 5.379   | 3.459                                     | 4.288   | 4.557   | Continuing                   | Continuing |  |  |  |  |
| • L88: Enhanced AN/TPQ 36   | 7.149   | 5.655   | 12.381  | -              | 12.381           | 14.647  | 8.961                                     | 9.450   | 10.040  | Continuing                   | Continuing |  |  |  |  |
| • B05201: Lightweight Counter Mortar Radar                          | 17.080  | 6.107   | 5.400   | -              | 5.400            | 5.500   | 8.326                                     | 7.380   | 10.072  | Continuing                   | Continuing |  |  |  |  |
| • B05310: AN/TPQ-53 Counterfire Target Acquisition Radar            | 400.530 | 324.150 | 16.416  | -              | 16.416           | 10.267  | 12.175                                    | 30.239  | 42.312  | Continuing                   | Continuing |  |  |  |  |
| • FG5: Counter Unmanned Aerial Systems (UAS)                        | 149.800 | 173.233 | 0.000   | -              | 0.000            | -       | -   | -       | -       | Continuing                   | Continuing |  |  |  |  |
| • H30505: Counter Unmanned Aerial Systems (C-UAS) Efforts           | 571.733 | 250.800 | 20.000  | -              | 20.000           | -       | -   | -       | -       | Continuing                   | Continuing |  |  |  |  |
| • 0604117A: Maneuver - Short Range Air Defense (M-SHORAD)           | 19.201  | 79.016  | 33.100  | 6.000          | 39.100           | 105.700 | 341.100                                   | 382.600 | 308.700 | 0.000                        | 1,275.417  |  |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |         |         |                 |   |                  |         |         | <b>Date:</b> March 2019   |         |                             |
|--|---------|---------|-----------------|---|------------------|---------|---------|---|---------|-----------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |         |         |                 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |                  |         |         | <b>Project (Number/Name)</b><br>149 / Counter-Rockets, Artillery & Mortar |         |                             |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |         |         |                 |   |                  |         |         |   |         |                             |
| Line Item  | FY 2018 | FY 2019 | FY 2020<br>Base | FY 2020<br>OCO  | FY 2020<br>Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete Total Cost |
| <b>Remarks</b><br>This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.   |         |         |                 |   |                  |         |         |   |         |                             |
| <b>D. Acquisition Strategy</b><br>The C-RAM program is following an evolutionary acquisition strategy for rapid fielding of mature technology to the user. The objective of the strategy is to balance needs, available technology, and resources to quickly provide a robust capability to engage RAM threats. Multiple C-RAM systems have transitioned to acquisition programs, including C-RAM Intercept, which fields existing LPWS guns to two Indirect Fire Protection Capability/Avenger battalions, and RAM Warn, which provides early, localized warning to all maneuver brigade combat teams. Development and upgrade of FAAD/C-RAM C2 software, to include enhanced capability to support emerging mission command requirements, technology insertion, and interoperability, is accomplished through a five-year CPIF contract awarded to Northrop Grumman Mission Systems. |         |         |                 |   |                  |         |         |   |         |                             |
| <b>E. Performance Metrics</b><br>N/A   |         |         |                 |   |                  |         |         |   |         |                             |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                      |             |  |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------------|-------------|--|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                      |             | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |            |         |            | Project (Number/Name)<br>149 / Counter-Rockets, Artillery & Mortar |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                      |             | FY 2018  |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management Administration                      | Various                | Various : Various                    | 26.249      | 0.353  | Nov 2017   | 0.149   | Nov 2018   | 0.102  | Nov 2019   | -           |            | 0.102            | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>                      | 26.249      | 0.353  |            | 0.149   |            | 0.102  |            | -           |            | 0.102            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                   |                        |                                      |             | FY 2018  |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| C-RAM C2 Development and Enhancements                  | C/CPIF                 | Northrop Grumman : Redondo Beach, CA | 104.639     | 1.950  | Apr 2018   | 0.895   | Apr 2019   | 1.175  | Apr 2020   | -           |            | 1.175            | Continuing       | Continuing | Continuing               |
| Secure Communications                                  | SS/CPFF                | Northrop Grumman : Huntsville, AL    | 9.578       | -  |            | -       |            | -  |            | -           |            | -                | 0.000            | 9.578      | -                        |
| Secure Communications (Next Gen)                       | C/CPFF                 | Northrop Grumman : Huntsville AL     | 5.000       | 5.000  | Jun 2019   | 5.000   | Jun 2019   | -  |            | -           |            | -                | 0.000            | 15.000     | -                        |
| All-Digital Radar Development                          | C/FFP                  | TBD : TBD                            | -           | 8.000  | Feb 2019   | 8.000   | Feb 2019   | -  |            | -           |            | -                | Continuing       | Continuing | Continuing               |
| LPWS Enhancements                                      | C/CPIF                 | Raytheon Company : Tucson, AZ        | 10.307      | -  |            | -       |            | -  |            | -           |            | -                | 0.000            | 10.307     | -                        |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | To Be Determined : To Be Determined  | -           | -  |            | 0.059   |            | -  |            | -           |            | -                | 0.000            | 0.059      | -                        |
|  |                        | <b>Subtotal</b>                      | 129.524     | 14.950   |            | 13.954  |            | 1.175  |            | -           |            | 1.175            | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |                                      |             | FY 2018  |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Miscellaneous Test Support                             | Various                | Various : Various                    | 23.394      | 0.574  | Aug 2018   | 0.242   | Jan 2019   | -  |            | -           |            | -                | Continuing       | Continuing | Continuing               |
| End-to-End Modeling & Simulation                       | SS/CPFF                | Northrop Grumman : Redondo Beach, CA | 12.748      | 1.373  | Aug 2018   | 0.499   | Sep 2019   | -  |            | -           |            | -                | 0.000            | 14.620     | -                        |
|  |                        | <b>Subtotal</b>                      | 36.142      | 1.947  |            | 0.741   |            | -  |            | -           |            | -                | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |             |         |   |         |  |  |  |             | Date: March 2019 |                  |            |                          |
|--|-------------|---------|---|---------|--|--|--|-------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |             |         | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |         |  | Project (Number/Name)<br>149 / Counter-Rockets, Artillery & Mortar |  |             |                  |                  |            |                          |
|  | 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                                    | 191.915     | 17.250  |   | 14.844  |  | 1.277  |  | -           | 1.277            | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>   |             |         |   |         |  |  |  |             |                  |                  |            |                          |

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|---|--|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev | <b>Project (Number/Name)</b><br>149 / Counter-Rockets, Artillery & Mortar |

**Schedule Details**

| <b>Events</b>  | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| C-RAM System-of-Systems (SoS)  | 1              | 2007        | 4              | 2019        |
| FAAD/C-RAM C2 Development  | 1              | 2013        | 4              | 2021        |
| C-RAM Directed Enhancements - Integration & Test                     | 1              | 2012        | 4              | 2017        |
| C-RAM Enhancements - Development, Integration & Test                 | 1              | 2016        | 2              | 2020        |
| C-RAM C2 v5.5C-2.2p3 Full Software Release                           | 3              | 2018        | 3              | 2018        |
| C-RAM C2 v5.6A-1.0p1.1 and v5.6A-1.0p3 Urgent Materiel Release (UMR) | 4              | 2018        | 4              | 2018        |
| LPWS Sp. 6.4.3.1 and C-RAM C2 v5.6A-2.2 UMR                          | 2              | 2019        | 2              | 2019        |
| C-RAM C2 v5.6A Full Materiel Release (FMR)                           | 3              | 2019        | 3              | 2019        |
| C-RAM C2 v5.6B FMR   | 3              | 2020        | 3              | 2020        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5   |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |               |         |         | Project (Number/Name)<br>FG5 / Counter Unmanned Aerial Systems<br>(UAS) |         |                  |            |  |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| FG5: Counter Unmanned Aerial Systems (UAS)  | -           | 149.800 | 173.233 | 0.000        | -   | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 323.033    |  |
| Quantity of RDT&E Articles  | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                |            |  |
| <b>A. Mission Description and Budget Item Justification</b>   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| The Counter-Unmanned Aircraft Systems (C-UAS) effort is in response to Joint Urgent Operational Need (JUON) CC-0558 to support identification, development, testing, evaluation, and integration of technologies to provide an overall evolutionary capability to defeat small UAS threats at 89 U.S. Central Command (CENTCOM) sites. The C-UAS effort provides warfighters the ability to comprehensively detect, track, identify, and defeat enemy Groups 1 and 2 lightweight, low altitude, commercial off-the-shelf (COTS) UASs. |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Title:</b> Counter-UAS Capability Development  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Description:</b> Development, integration, and test of electronic warfare and kinetic kill defeat options for the Low-slow-small UAS Integrated Defeat System (LIDS).  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 Plans:</b><br>Develop, integrate, and test kinetic, or hard kill, defeat solutions into the Low-slow-small UAS Integrated Defeat System (LIDS): 1) develop Coyote medium range seeker; 2) develop lightweight flat panel radar; 3) increase range of mobile gun weapon; and 4) develop and integrate multi-function Electronic Warfare (EW) with full On-The-Move (OTM) capability.  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 is the last year of funding to complete C-UAS development in support of JUON CC-0558.   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Description:</b> FY 2019 SBIR / STTR Transfer  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 SBIR / STTR Transfer  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| 149.800      173.233      -      -      -   |             |         |         |              |   |               |         |         |   |         |                  |            |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |         |         |                 |   |                  |         |         |   |         | <b>Date:</b> March 2019 |            |
|--|---------|---------|-----------------|---|------------------|---------|---------|---|---------|-------------------------|------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |         |         |                 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command, Control and Intelligence - Eng Dev |                  |         |         | <b>Project (Number/Name)</b><br>FG5 / Counter Unmanned Aerial Systems (UAS) |         |                         |            |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |         |         |                 |   |                  |         |         |   |         |                         |            |
| Line Item  | FY 2018 | FY 2019 | FY 2020<br>Base | FY 2020<br>OCO  | FY 2020<br>Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To<br>Complete     | Total Cost |
| • H30505: Counter Unmanned Aerial Systems (C-UAS) Efforts  | 571.733 | 250.800 | 20.000          | -   | 20.000           | -       | -       | -   | -       | 0.000                   | 842.533    |
| <b>Remarks</b>   |         |         |                 |   |                  |         |         |   |         |                         |            |
| <b>D. Acquisition Strategy</b><br>The C-UAS program is executing an acquisition strategy for rapid development, integration, testing, and deployment of emerging technologies to selected CENTCOM sites. Capabilities are being deployed in increments, with an interim capability delivered now and spiral enhancements to be provided over time. The C-UAS effort utilizes multiple contract vehicles, types, and vendors. |         |         |                 |   |                  |         |         |   |         |                         |            |
| <b>E. Performance Metrics</b><br>N/A   |         |         |                 |   |                  |         |         |   |         |                         |            |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                      |             |   |            |         |            |   |            |                |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------------|-------------|---|------------|---------|------------|---|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                      |             | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |            |         |            | Project (Number/Name)<br>FG5 / Counter Unmanned Aerial Systems<br>(UAS) |            |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                      |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management                                     | Various                | Various : Various                    | 12.640      | 13.031  | Jun 2018   | 9.930   |            | -   |            | -              |            | -                | 0.000            | 35.601     | -                        |
|  |                        | <b>Subtotal</b>                      | 12.640      | 13.031  |            | 9.930   |            | -   |            | -              |            | -                | 0.000            | 35.601     | N/A                      |
| Product Development (\$ in Millions)                   |                        |                                      |             | FY 2018   |            | FY 2019 |            | FY 2020<br>Base   |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location       | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Fixed/Mobile System Development                        | Various                | Various : Various                    | 38.244      | 29.400  | Sep 2018   | 17.081  |            | -   |            | -              |            | -                | 0.000            | 84.725     | -                        |
| Kinetic Defeat Development                             | Various                | Various : Various                    | 35.808      | 44.000  | Sep 2018   | 66.955  | Feb 2019   | -   |            | -              |            | -                | 0.000            | 146.763    | -                        |
| Sensor Development                                     | Various                | Various : Various                    | 19.099      | 20.800  | Sep 2018   | 42.820  | Mar 2019   | -   |            | -              |            | -                | 0.000            | 82.719     | -                        |
| C-UAS C2 Software Development                          | C/CPIF                 | Northrop Grumman : Redondo Beach, CA | 6.000       | 19.191  | Apr 2018   | 7.500   | Jun 2019   | -   |            | -              |            | -                | 0.000            | 32.691     | -                        |
| Dismounted/Handheld Systems Development                | Various                | Various : Various                    | 13.300      | 4.054   | Jul 2018   | -       |            | -   |            | -              |            | -                | 0.000            | 17.354     | -                        |
| FY 2019 SBIR / STTR Transfer                           | TBD                    | To Be Determined : To Be Determined  | -           | -   |            | 2.458   |            | -   |            | -              |            | -                | 0.000            | 2.458      | -                        |
|  |                        | <b>Subtotal</b>                      | 112.451     | 117.445   |            | 136.814 |            | -   |            | -              |            | -                | 0.000            | 366.710    | N/A                      |

**Remarks**

The original Counter UAS Systems Development line was broken out to include a greater level of detail for each of the system/subsystem development efforts (i.e., fixed/mobile, kinetic defeat, sensor, C2 software, and dismounted/handheld); however, the FY 2019 cost column was locked and could not be adjusted to reflect this breakout.

| Test and Evaluation (\$ in Millions) |                        |                                |             | FY 2018 |            | FY 2019 |            | FY 2020<br>Base |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
|--------------------------------------|------------------------|--------------------------------|-------------|---------|------------|---------|------------|-----------------|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Cost Category Item                   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost    | Award Date | Cost    | Award Date | Cost            | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Test Support                         | Various                | Various : Various              | 18.809      | 19.324  | May 2018   | 26.489  | Apr 2019   | -               |            | -              |            | -                | 0.000            | 64.622     | -                        |
|                                      |                        | <b>Subtotal</b>                | 18.809      | 19.324  |            | 26.489  |            | -               |            | -              |            | -                | 0.000            | 64.622     | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |             |         |   |  |              |  |   |  |               | Date: March 2019 |            |                          |
|--|-------------|---------|---|--|--------------|--|---|--|---------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |             |         | R-1 Program Element (Number/Name)<br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev |  |              |  | Project (Number/Name)<br>FG5 / Counter Unmanned Aerial Systems<br>(UAS) |  |               |                  |            |                          |
|  | Prior Years | FY 2018 | FY 2019   |  | FY 2020 Base |  | FY 2020 OCO   |  | FY 2020 Total | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             | 143.900     | 149.800 | 173.233   |  | -            |  | -   |  | -             | 0.000            | 466.933    | N/A                      |
| <b>Remarks</b>   |             |         |   |  |              |  |   |  |               |                  |            |                          |

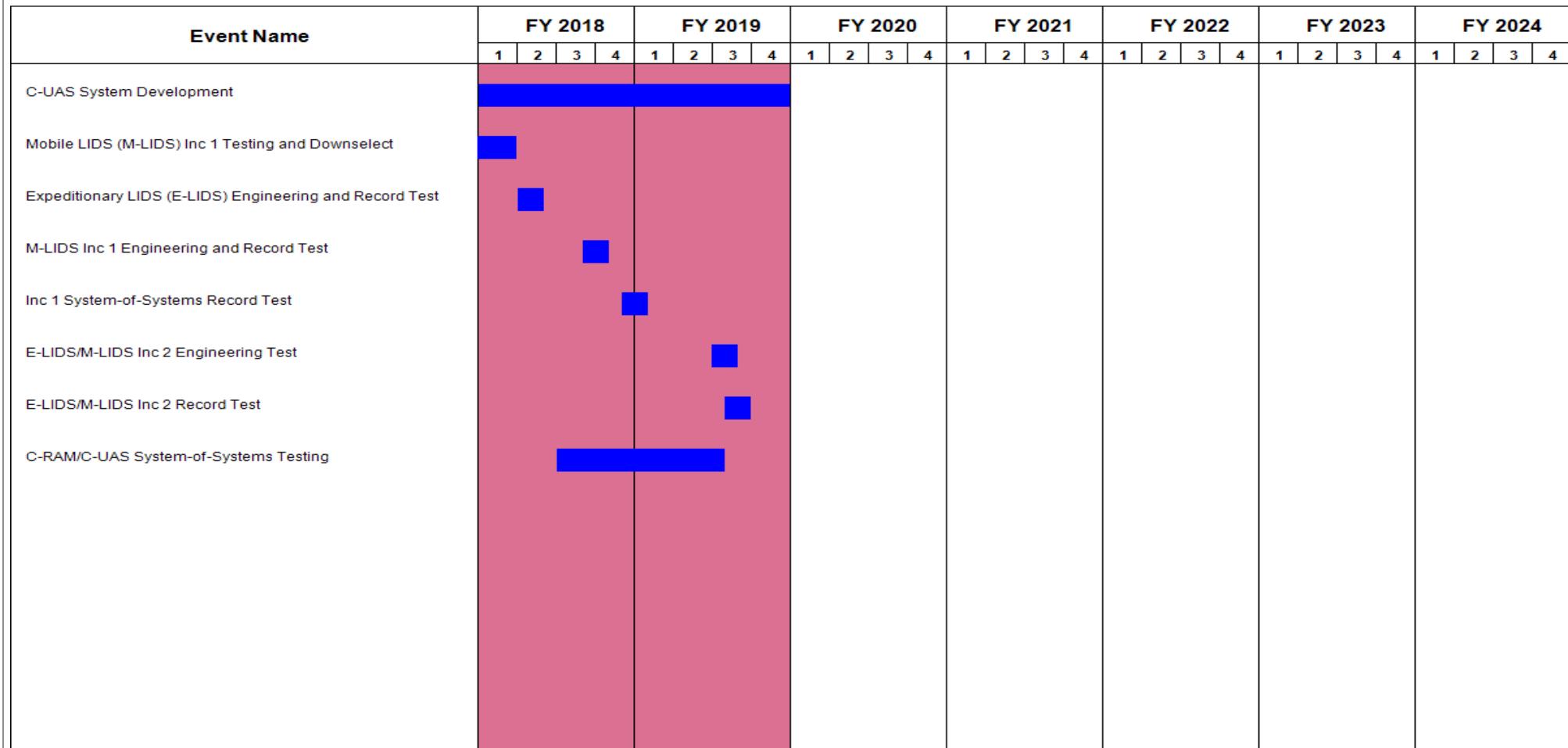
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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604741A / Air Defense Command,  
Control and Intelligence - Eng Dev**Project (Number/Name)**FG5 / Counter Unmanned Aerial Systems  
(UAS)

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604741A / Air Defense Command,<br>Control and Intelligence - Eng Dev | <b>Project (Number/Name)</b><br>FG5 / Counter Unmanned Aerial Systems<br>(UAS) |

**Schedule Details**

| <b>Events</b>   | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| C-UAS System Development                                | 1              | 2017        | 4              | 2019        |
| Mobile LIDS (M-LIDS) Inc 1 Testing and Downselect       | 1              | 2018        | 1              | 2018        |
| Expeditionary LIDS (E-LIDS) Engineering and Record Test | 2              | 2018        | 2              | 2018        |
| M-LIDS Inc 1 Engineering and Record Test                | 3              | 2018        | 4              | 2018        |
| Inc 1 System-of-Systems Record Test                     | 4              | 2018        | 1              | 2019        |
| E-LIDS/M-LIDS Inc 2 Engineering Test                    | 3              | 2019        | 3              | 2019        |
| E-LIDS/M-LIDS Inc 2 Record Test                         | 3              | 2019        | 3              | 2019        |
| C-RAM/C-UAS System-of-Systems Testing                   | 3              | 2018        | 3              | 2019        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)                         |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604742A / Constructive Simulation Systems 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   | -           | 17.921  | 22.600  | 11.636       | -   | 11.636        | 8.096   | 5.504   | 5.511   | 7.184   | 0.000            | 78.452     |
| 361: Intelligence Simulation Systems  | -           | 6.094   | 5.340   | 3.026        | -   | 3.026         | 2.026   | 0.000   | 0.000   | 0.000   | 0.000            | 16.486     |
| 362: Jnt Land Component Constructive Trng   | -           | 11.827  | 17.260  | 8.610        | -   | 8.610         | 6.070   | 5.504   | 5.511   | 7.184   | 0.000            | 61.966     |

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

This program element funds the development of constructive and wargame simulations used to realistically train commanders and their battle staffs on today's complex battlefield conditions.

Project 361 funds the development of the Intelligence Electronic Warfare Tactical Proficiency Trainer (IEWTPT). IEWTPT is a Non-System Training Device (NSTD) which supports intelligence soldier readiness by simulating and stimulating Military Intelligence (MI) organic or surrogate equipment. It enables sustainment of critical individual and collective tasks/skills and is the core of the United States Army Intelligence Center of Excellence (USAICoEs) Military Intelligence (MI) holistic training strategy and includes both stand-alone and network enabled training capabilities. IEWTPT provides a realistic Intelligence target environment for Multi-Intelligence disciplines such as All Source Analysis, Signals Intelligence (SIGINT), Imagery Intelligence (IMINT), Human Intelligence (HUMINT), Counterintelligence (CI), Geospatial Intelligence (GEOINT) and must stimulate and emulate multiple Intelligence, Surveillance, Reconnaissance (ISR) platform systems such as: Prophet, Distributed Common Ground Station-Army (DCGS-A); Tactical Ground Station (TGS); and Aerial Intelligence assets such as Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS), Airborne Reconnaissance Low-Enhanced (ARL-E), and Guardrail Common Sensor (GRCS). IEWTPT provides training capabilities supporting detailed ISR individual, crew, and collective level mission rehearsals/exercises. IEWTPT can utilize a constructive simulation feed or operate in a stand-alone mode. IEWTPT is composed of two major components: Technical Control Cell (TCC) and the HUMINT Control Cell (HCC). The IEWTPT TCC provides critical Intel enhancements to a constructive simulation to stimulate go-to-war or surrogate ISR systems where system operators/analysts are able to exploit exercise intelligence data during training, just as they would in a "real world" operation.

FY 2020 funding supports U.S. Army readiness by developing interface capabilities with Intelligence, Surveillance, Reconnaissance (ISR) platform programs/systems of records to train detailed military intelligence mission essential tasks in a simulation environment. The funds provide the development of web-enabled capabilities and common operating environment/computing environment (COE/CE) migration for Command Post, Sensor, and Cloud requirements for both Human Control Cell (HCC) and Technical Control Cell (TCC).

Project 362, Joint Land Component Constructive Training Capability (JLCCTC) supports Army Title X training worldwide for Army Commanders and their staff at Mission Training Complexes (MTCs), Training and Doctrine Command (TRADOC) facilities, and other customer locations. JLCCTC trains Commanders and their staff in Decisive Actions to include offensive, defensive, stability, and civil support operations. JLCCTC is a software modeling and simulation capability that contributes to Army Training Mission Area by providing appropriate levels of model and simulation resolution and fidelity to support unit collective and combined arms training. The JLCCTC

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>  |  |                |                     | <b>Date:</b> March 2019 |                      |  |  |  |
|--|--|----------------|---------------------|-------------------------|----------------------|--|--|--|
| <b>Appropriation/Budget Activity</b>   | <b>R-1 Program Element (Number/Name)</b>   |                |                     |                         |                      |  |  |  |
| 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>   | PE 0604742A / <i>Constructive Simulation Systems Development</i>                               |                |                     |                         |                      |  |  |  |
| provides a composable federation configurable to any combination of models and simulations, as required by training exercise intent/design. The JLCCTC provides accurate representations of tactically and operationally relevant land warfare operations executed in a contemporary Joint operating environment/context in support of Army Training and Readiness.  |  |                |                     |                         |                      |  |  |  |
| FY 2020 funding in the amount of \$8.610 million will be used to continue development, integration and test, and verification and validation activities of JLCCTC Version 9.x/10.0 to train Commanders and their Staff. JLCCTC will continue to support emerging Common Operating Environment / Computing Environment (COE/CE), Mission Command (MC), Cyber Security/Risk Management Framework (RMF), and Concurrency warfighter requirements. In addition, JLCCTC will continue to support the integration activities with Live, Virtual, Constructive-Integrated Architecture (LVC-IA) and Combat Training Center Instrumentation System (CTC-IS). |  |                |                     |                         |                      |  |  |  |
| <b>B. Program Change Summary (\$ in Millions)</b>  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |  |  |  |
| Previous President's Budget  | 18.562   | 22.628         | 10.978              | -                       | 10.978               |  |  |  |
| Current President's Budget   | 17.921   | 22.600         | 11.636              | -                       | 11.636               |  |  |  |
| Total Adjustments  | -0.641   | -0.028         | 0.658               | -                       | 0.658                |  |  |  |
| • Congressional General Reductions   | -0.012   | -0.028         |                     |                         |                      |  |  |  |
| • Congressional Directed Reductions  | -  | -              |                     |                         |                      |  |  |  |
| • Congressional Rescissions  | -  | -              |                     |                         |                      |  |  |  |
| • Congressional Adds   | -  | -              |                     |                         |                      |  |  |  |
| • Congressional Directed Transfers   | -  | -              |                     |                         |                      |  |  |  |
| • Reprogrammings   | -0.052   | -              |                     |                         |                      |  |  |  |
| • SBIR/STTR Transfer   | -0.577   | -              |                     |                         |                      |  |  |  |
| • Adjustments to Budget Years  | -  | -              | 0.658               | -                       | 0.658                |  |  |  |
| <b>Change Summary Explanation</b>  | Decrease in funding from FY 2019 to FY 2020 was because one effort was funded in FY 2019 only. |                |                     |                         |                      |  |  |  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|---------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604742A / Constructive Simulation Systems Development |               |         |         | Project (Number/Name)<br>361 / Intelligence Simulation 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 |
| 361: <i>Intelligence Simulation Systems</i>             | -           | 6.094   | 5.340   | 3.026        | -  | 3.026         | 2.026   | 0.000   | 0.000  | 0.000   | 0.000            | 16.486     |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -  | -       | -                |            |

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

This program element funds the Intelligence & Electronic Warfare Tactical Proficiency Trainer (IEWTPT), a Non-System Training Device (NSTD), supports training intelligence soldiers by simulating and stimulating Military Intelligence (MI) organic or surrogate equipment. It enables sustainment of critical individual and collective tasks/skills and is the core of the United States Army Intelligence Center of Excellence (USAICoEs) Military Intelligence (MI) holistic training strategy and includes both stand-alone and network enabled training capabilities. IEWTPT provides a realistic intelligence target environment for Multi-Intelligence disciplines such as Signals Intelligence (SIGINT), Imagery Intelligence (IMINT), Human Intelligence (HUMINT), Counterintelligence (CI), Geospatial Intelligence (GEOINT) and All Source intelligence. It stimulates multiple Intelligence, Surveillance, Reconnaissance (ISR) platform systems such as: Prophet, Distributed Common Ground Station-Army (DCGS-A); Tactical Ground Station (TGS); and Aerial Intelligence assets such as: Enhanced Medium Altitude Reconnaissance and Surveillance System (EMARSS); Airborne Reconnaissance Low-Enhanced (ARL-E); and Guardrail Common Sensor (GRCS). IEWTPT provides static and dynamic training capabilities (interactive environment for individual, crew, collective, Live, Virtual, and Constructive integrated mission rehearsals/exercises utilizing a constructive simulation feed) in an integrated, playback, or stand-alone mode. IEWTPT is composed of two major components: Technical Control Cell (TCC) and the HUMINT Control Cell (HCC). The IEWTPT TCC provides critical Intel enhancements to a constructive simulation to stimulate go-to-war or surrogate ISR systems where system operators/analysts are able to exploit exercise intelligence data during training, just as they would in a "real world" operation.

FY 2020 funding supports U.S. Army readiness by developing interface capabilities with Intelligence, Surveillance, Reconnaissance (ISR) platform programs/systems of records to train detailed military intelligence mission essential tasks in a simulation environment in support of Mission Command and Targeting. The funds provide the development of web-enabled capabilities and common operating environment/computing environment (COE/CE) migration for Command Post, Sensor, and Cloud requirements for both the Human Control Cell (HCC) and Technical Control Cell (TCC).

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

|   | FY 2018 | FY 2019 | FY 2020 |
|---|---------|---------|---------|
| <b>Title:</b> IEWTPT development, integration and support.  | 5.265   | 4.936   | 3.026   |
| <b>Description:</b> Continue IEWTPT development, integration and support to the user community.   |         |         |         |
| <b>FY 2019 Plans:</b><br>Will support V9.0 release and baseline improvements in development of detailed simulation interface capabilities for Intelligence, Surveillance, Reconnaissance (ISR) platform systems in the PEO Intelligence Electronic Warfare & Sensors (PEO IEW&S) portfolio to support home-station intelligence training. Prototype a cloud enabled training portal for the TCC and multi-intelligence training in a distributed/federated environment. Develop All Source, SIGINT, and Electronic Warfare prototypes and Open Source |         |         |         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |  |  | Date: March 2019 |                   |
|--|--|--|------------------|-------------------|
| Appropriation/Budget Activity<br>2040 / 5  | R-1 Program Element (Number/Name)<br>PE 0604742A / Constructive Simulation Systems Development | Project (Number/Name)<br>361 / Intelligence Simulation Systems |                  |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | FY 2018  | FY 2019          | FY 2020           |
| (OSINT) intelligence initial capabilities. Expand HUMINT, point of need, web-based, training capabilities, SIGINT scenario development tools, capabilities and evolve sensor emulation effects modeling as well as electronic intelligence replication for the simulation /user environment. Develop and integrate new Aerial ISR communications intelligence sensor emulation capabilities such as dismounted moving target indicator (DMTI) and improved synthetic aperture radar into program baseline representing Enhanced Medium Altitude Reconnaissance Surveillance System (EMARSS) and Guardrail Common Sensor (GRCS) capabilities. Will execute technology development and integration supporting product deliverables needed to meet Ft. Huachuca and Army G2 training strategy requirements. Develop linkages to migrate to designated Core Data Center/Common Operating Environment/ Computing Environments.  |  |  |                  |                   |
| <p><b>FY 2020 Plans:</b><br/>           Will support V10.0 release and baseline improvements/concurrency in development of detailed simulation interface capabilities for Intelligence, Surveillance, Reconnaissance (ISR) platform systems in the PEO Intelligence Electronic Warfare &amp; Sensors (PEO IEW&amp;S) portfolio to support home-station intelligence training. Finalize a prototype cloud enabled training portal for the TCC and multi-intelligence training in a distributed/federated environment. Expand All Source, SIGINT baselines and begin task analysis of Electronic Warfare Open Source (OSINT) intelligence initial capabilities. Expand HUMINT, point of need, web-based, training capabilities, SIGINT scenario development tools, capabilities and evolve sensor emulation effects modeling as well as electronic intelligence replication for the simulation /user environment. Will execute technology development and integration supporting product deliverables needed to meet Ft. Huachuca and Army G2 training strategy requirements. Develop linkages to migrate to designated Core Data Center/Common Operating Environment/Computing and Synthetic Training Environments.</p> |  |  |                  |                   |
| <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           Project 361 - Development requirements decrease as current Increment shifts to complete fielding.</p>   |  |  |                  |                   |
| <b>Title:</b> Program Management for the Intelligence Electronic Warfare Tactical Proficiency Trainer (IEWTPT).<br><b>Description:</b> Government Program Management for the IEWTPT program.   |  |  |                  | 0.829             |
| <b>Title:</b> FY19 SBIR/STTR Transfer<br><b>Description:</b> Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)   |  |  |                  | - 0.404 -         |
| <p><b>FY 2019 Plans:</b><br/>           Accounting for full funding amount.</p>  |  |  |                  |                   |
| <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           Accounting for full funding amount.</p>   |  |  |                  |                   |
| <b>Accomplishments/Planned Programs Subtotals</b>  |  |  |                  | 6.094 5.340 3.026 |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |         |         |                 |  |                  |         |         |  |         |                     | <b>Date:</b> March 2019 |
|---|---------|---------|-----------------|--|------------------|---------|---------|--|---------|---------------------|-------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |         |         |                 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604742A / <i>Constructive Simulation Systems Development</i> |                  |         |         | <b>Project (Number/Name)</b><br>361 / <i>Intelligence Simulation Systems</i> |         |                     |                         |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |         |                 |  |                  |         |         |  |         |                     |                         |
| Line Item   | FY 2018 | FY 2019 | FY 2020<br>Base | FY 2020<br>OCO   | FY 2020<br>Total | FY 2021 | FY 2022 | FY 2023  | FY 2024 | Cost To<br>Complete | Total Cost              |
| • NA0102: NSTD INTELLIGENCE   | 6.692   | 4.658   | 6.081           | -  | 6.081            | 1.609   | -       | -  | -       | 0.000               | 19.040                  |
| <b>Remarks</b>  |         |         |                 |  |                  |         |         |  |         |                     |                         |
| <b>D. Acquisition Strategy</b><br>A full and open competitive five (5) year, cost type procurement contract, was awarded to General Dynamics Mission Systems, Orlando, FL on 16 February 2017. The IEWTPT Increment I/Block II contract has a two (2) year base with three (3) one (1) year options. The contract continues the incremental development, integration, test and evaluation, production and fielding and exercise/technical/training support for the US Army Military Intelligence Corps. The FY 2020 funds will provide continued version 10.0 development, testing, production, and integration of the IEWTPT system and Software version releases. |         |         |                 |  |                  |         |         |  |         |                     |                         |
| <b>E. Performance Metrics</b><br>N/A  |         |         |                 |  |                  |         |         |  |         |                     |                         |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |   |             |         |            |         |            |              |            |             |            | Date: March 2019  |                  |            |                          |
|--|------------------------|---|-------------|---------|------------|---------|------------|--------------|------------|-------------|------------|---|------------------|------------|--------------------------|
| <b>Appropriation/Budget Activity</b>                   |                        |   |             |         |            |         |            |              |            |             |            | <b>R-1 Program Element (Number/Name)</b>                  |                  |            |                          |
| 2040 / 5   |                        |   |             |         |            |         |            |              |            |             |            | PE 0604742A / Constructive Simulation Systems Development |                  |            |                          |
| <b>Management Services (\$ in Millions)</b>            |                        |   |             | FY 2018 |            | FY 2019 |            | FY 2020 Base |            | FY 2020 OCO |            | FY 2020 Total   |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location                      | Prior Years | Cost    | Award Date | Cost    | Award Date | Cost         | Award Date | Cost        | Award Date | Cost  | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management                                     | Various                | PEO STRI : Orlando, FL                              | 10.189      | 0.829   | -          | -       | -          | -            | -          | -           | -          | -   | Continuing       | Continuing | Continuing               |
| SBIR/STTR Transfer                                     | TBD                    | PEO STRI : Orlando, FL                              | -           | -       | -          | 0.404   | Oct 2018   | -            | -          | -           | -          | -   | 0.000            | 0.404      | -                        |
| <b>Subtotal</b>  |                        | 10.189  | 0.829       | -       | 0.404      | -       | -          | -            | -          | -           | -          | -   | Continuing       | Continuing | N/A                      |
| <b>Product Development (\$ in Millions)</b>            |                        |   |             | 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 |
| TCC Technology   | C/CPFF                 | General Dynamics C4 Systems : Orlando, Florida      | 7.900       | -       | -          | -       | -          | -            | -          | -           | -          | -   | Continuing       | Continuing | Continuing               |
| TCC Technology   | C/CPFF                 | General Dynamics Mission Systems : Orlando, Florida | 4.809       | -       | -          | 4.936   | Feb 2019   | 1.997        | Feb 2020   | -           | -          | 1.997   | Continuing       | Continuing | Continuing               |
| Eng & Manufacturing Dev.                               | Option/ CPFF           | General Dynamics C4 Systems : Orlando, FL           | 58.560      | 5.265   | Feb 2018   | -       | -          | 1.029        | Feb 2020   | -           | -          | 1.029   | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        | 71.269  | 5.265       | -       | 4.936      | -       | -          | 3.026        | -          | -           | -          | 3.026   | Continuing       | Continuing | N/A                      |
| <b>Support (\$ in Millions)</b>                        |                        |   |             | 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 & Technical Support                        | Various                | Various : Various                                   | 2.743       | -       | -          | -       | -          | -            | -          | -           | -          | -   | 0.000            | 2.743      | 2.743                    |
| <b>Subtotal</b>  |                        | 2.743   | -           | -       | -          | -       | -          | -            | -          | -           | -          | -   | 0.000            | 2.743      | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |  |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|--|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604742A / Constructive Simulation Systems Development |            |         |            | Project (Number/Name)<br>361 / Intelligence Simulation Systems |            |             |            |                  |                  |            |                          |
| 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 |
| TEMP Support   | Various                | Multiple : Various             | 0.319       | -  | -          | -       | -          | -  | -          | -           | -          | -                | 0.000            | 0.319      | 0.319                    |
| Test Engineering Support                               | Various                | Multiple : Various             | 1.313       | -  | -          | -       | -          | -  | -          | -           | -          | -                | 0.000            | 1.313      | 1.313                    |
| <b>Subtotal</b>  |                        | <b>1.632</b>                   | -           | -  | -          | -       | -          | -  | -          | -           | -          | -                | 0.000            | 1.632      | 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 |
| <b>Project Cost Totals</b>                             |                        |                                | 85.833      | 6.094  |            | 5.340   |            | 3.026  |            | -           |            | 3.026            | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>   |                        |                                |             |  |            |         |            |  |            |             |            |                  |                  |            |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

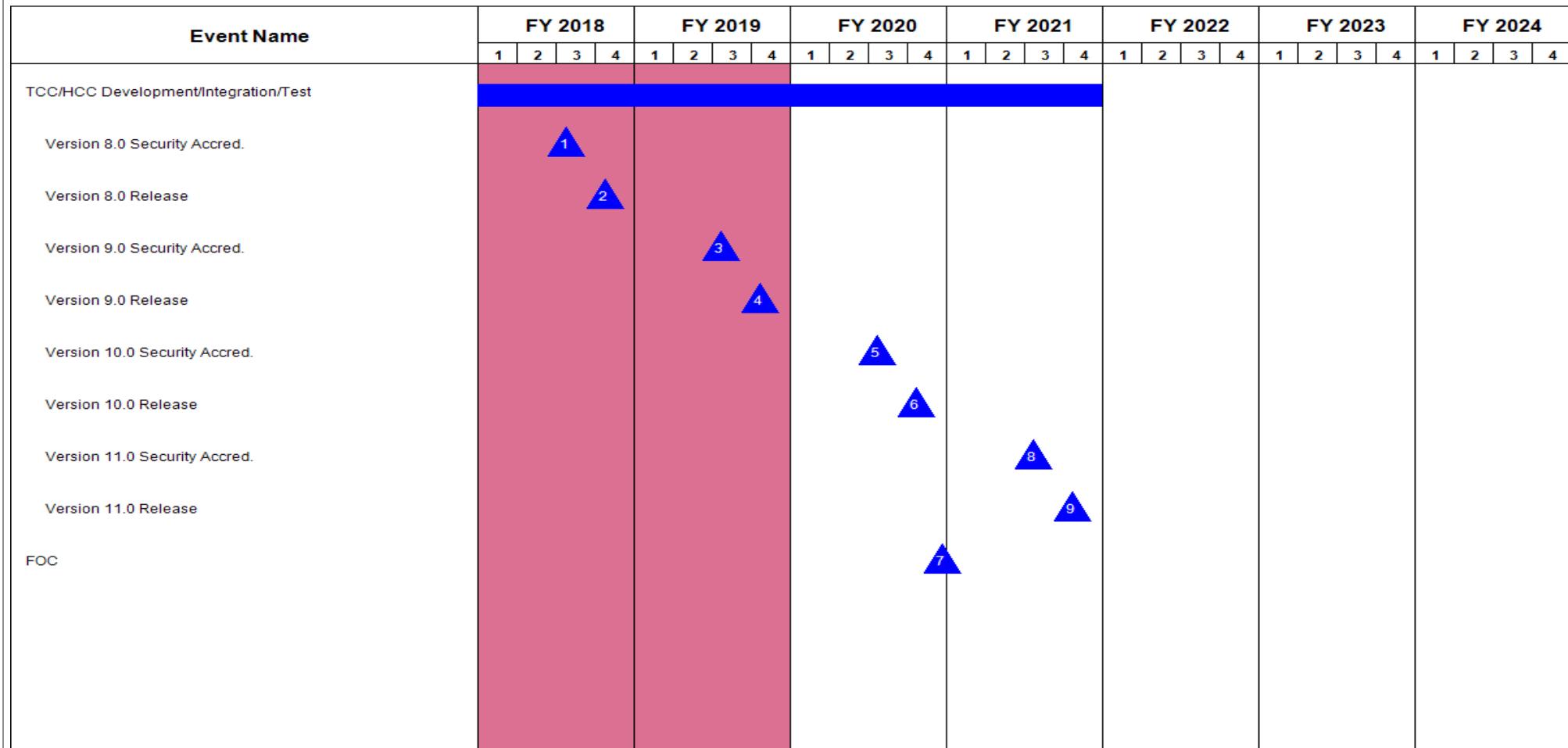
Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604742A / Constructive Simulation  
Systems Development**Project (Number/Name)**

361 / Intelligence Simulation Systems



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|   |  |  |
|---|--|--|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604742A / <i>Constructive Simulation Systems Development</i> | <b>Project (Number/Name)</b><br>361 / <i>Intelligence Simulation Systems</i> |

**Schedule Details**

| <b>Events</b>                        | <b>Start</b>   |             | <b>End</b>     |             |
|--------------------------------------|----------------|-------------|----------------|-------------|
|                                      | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| TCC/HCC Development/Integration/Test | 4              | 2007        | 4              | 2021        |
| Version 8.0 Security Accred.         | 3              | 2018        | 3              | 2018        |
| Version 8.0 Release                  | 4              | 2018        | 4              | 2018        |
| Version 9.0 Security Accred.         | 3              | 2019        | 3              | 2019        |
| Version 9.0 Release                  | 4              | 2019        | 4              | 2019        |
| Version 10.0 Security Accred.        | 3              | 2020        | 3              | 2020        |
| Version 10.0 Release                 | 4              | 2020        | 4              | 2020        |
| Version 11.0 Security Accred.        | 3              | 2021        | 3              | 2021        |
| Version 11.0 Release                 | 4              | 2021        | 4              | 2021        |
| FOC                                  | 4              | 2020        | 4              | 2020        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |  |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|--|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                         |               |         |         | Project (Number/Name)                      |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604742A / Constructive Simulation Systems Development |               |         |         | 362 / Jnt Land Component Constructive Trng |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                                    | FY 2024 | Cost To Complete | Total Cost |  |
| 362: Jnt Land Component Constructive Trng               | -           | 11.827  | 17.260  | 8.610        | -   | 8.610         | 6.070   | 5.504   | 5.511                                      | 7.184   | 0.000            | 61.966     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -  | -       | -                |            |  |

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

The Joint Land Component Constructive Training Capability (JLCCTC) supports Army Title X training worldwide for Army Commanders and their staff at Mission Training Complexes (MTCs), Training and Doctrine Command (TRADOC) facilities, and other customer locations. JLCCTC trains Commanders and their staff in Decisive Actions to include offensive, defensive, stability, and civil support operations. JLCCTC is a software modeling and simulation capability that contributes to Army Training Mission Area by providing appropriate levels of modeling and simulation resolution and fidelity to support unit collective and combined arms training. JLCCTC provides a composable federation configurable to any combination of models and simulations, as required by training exercise intent/design. JLCCTC provides accurate representations of tactically and operationally relevant land warfare operations executed in a contemporary Joint operating environment/context and in support of Army Training and Readiness.

FY 2020 funding in the amount of \$8.610 million will be used to continue development, integration and test, and verification and validation activities of JLCCTC Version 9.0/9x to train Commanders and their Staff. JLCCTC will continue to support emerging Common Operating Environment / Computing Environment (COE/CE), Mission Command (MC), Cyber Security/Risk Management Framework (RMF), and Concurrency warfighter requirements. In addition, JLCCTC will continue to support the integration activities with Live, Virtual, Constructive-Integrated Architecture (LVC-IA) and Combat Training Center Instrumentation System (CTC-IS).

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

| Title:  | FY 2018 | FY 2019 | FY 2020 |
|---|---------|---------|---------|
| <b>Description:</b> Improve JLCCTC software models to comply with emerging COE/CE requirements.   | 1.300   | 0.978   | 0.750   |
| <b>FY 2019 Plans:</b><br>Will continue improvements of JLCCTC software models to include common overlay development/modifications in support of COE compliance/standards. |         |         |         |
| <b>FY 2020 Plans:</b><br>Will continue improvements of JLCCTC software models to include common overlay development/modifications in support of COE compliance/standards. |         |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>  |         |         |         |

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|--|---|--|-------------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   |  | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604742A / Constructive Simulation Systems Development | <b>Project (Number/Name)</b><br>362 / Jnt Land Component Constructive Trng |                         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b><br><br>Funding decrease from FY 2019 to FY 2020 is in support of the Army's modernization priorities.  |   | <b>FY 2018</b>   | <b>FY 2019</b>          |
| <b>Title:</b> Improve JLCCTC software models to meet emerging Mission Command (MC) stimulation and Cyber Security requirements.<br><br><b>Description:</b> Improve JLCCTC software models to meet emerging Mission Command (MC) stimulation and Cyber Security requirements.   |   | 1.512  | 1.030                   |
| <b>FY 2019 Plans:</b><br>Continue to evolve JLCCTC to support emerging Mission Command requirements and fully comply with the Information Assurance Risk Management Framework (RMF) requirement.   |   | 0.850  |                         |
| <b>FY 2020 Plans:</b><br>Continue to evolve JLCCTC to support emerging Mission Command requirements and fully comply with the Cyber Security/Risk Management Framework (RMF) requirement.  |   |  |                         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Funding decrease from FY 2019 to FY 2020 is in support of the Army's modernization priorities.   |   |  |                         |
| <b>Title:</b> Improve JLCCTC software models to meet emerging warfighter requirements for Concurrency of Commander and staff training (Battalion thru Theater Level).<br><br><b>Description:</b> Improve JLCCTC software models to meet emerging warfighter requirements for Concurrency of Commander and staff training (Battalion thru Theater Level). |   | 1.840  | 1.064                   |
| <b>FY 2019 Plans:</b><br>Continue to evolve JLCCTC software models to support additional emerging requirements in support of Commander and staff warfighter training exercises through Theater level.  |   | 4.610  |                         |
| <b>FY 2020 Plans:</b><br>Continue to evolve JLCCTC software models to support additional emerging requirements in support of Commander and staff warfighter training exercises through Theater level.  |   |  |                         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase in funding is to support additional concurrency warfighter requirements from TRADOC Capability Manager-Constructive (TCM-C) and Mission Command Training Program (MCTP).  |   |  |                         |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for Constructive Strategy Implementation.<br><br><b>Description:</b> Constructive Strategy Implementation  |   | 2.164  | 2.164                   |
|  |   |  | -                       |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |                                   |                       | Date: March 2019 |         |         |
|--|-----------------------------------|-----------------------|------------------|---------|---------|
| Appropriation/Budget Activity  | R-1 Program Element (Number/Name) | Project (Number/Name) |                  |         |         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |                                   |                       | FY 2018          | FY 2019 | FY 2020 |
| <b>FY 2019 Plans:</b><br>Continue supporting the Live, Virtual, Constructive-Integrated Architecture (LVC-IA) integration and incorporating the Combat Training Center Instrumentation System (CTC-IS) capability in support of the Constructive Simulation Strategy. This will complete the development of v9.0 and the Constructive Simulation Strategy.   |                                   |                       |                  |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>This effort ended in FY 2019.  |                                   |                       |                  |         |         |
| <b>Title:</b> Government System Test and Evaluation for the Joint Land Component Constructive Training Capability (JLCCTC) Program.<br><br><b>Description:</b> Government System Test and Evaluation for the Joint Land Component Constructive Training Capability (JLCCTC).   |                                   |                       | 1.372            | 1.372   | 1.800   |
| <b>FY 2019 Plans:</b><br>Conduct system test events (Integration and Testing) in support of the JLCCTC v9.0 validation event.<br><br><b>FY 2020 Plans:</b><br>Continue conducting system test events (Integration and Testing) in support of the JLCCTC v9.0/9x validation event.  |                                   |                       |                  |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Slight increase of funds is to support JLCCTC testing and integration with the Live, Virtual, Constructive-Integrated Architecture (LVC-IA) and Combat Training Center Instrumentation System (CTC-IS).  |                                   |                       |                  |         |         |
| <b>Title:</b> Government Program Management for the Joint Land Component Constructive Training Capability (JLCCTC) Program.<br><br><b>Description:</b> Supports Government program management, engineering, logistics, contracting support and continues operational evaluation support for JLCCTC.  |                                   |                       | 3.639            | 1.575   | 0.600   |
| <b>FY 2019 Plans:</b><br>Includes costs for program management, which includes technical engineering and logistics to continue operational evaluation for JLCCTC. Government civilian labor moved to OMA SAG 435 MDEP level.<br><br><b>FY 2020 Plans:</b><br>Includes costs for program management, which includes technical engineering and logistics to continue operational evaluation for JLCCTC. No civilian labor is included. |                                   |                       |                  |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease in funding is due to requirement decrease.  |                                   |                       |                  |         |         |
| <b>Title:</b> JLCCTC mission command training program simulation upgrades.   |                                   |                       | -                | 8.234   | -       |

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|---|--------------------------|--------------------------|---|-----------------------------------|--|--------------------------|--------------------------|--|--------------------------|---------------------------------------|---------------------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                          |                          |   |                                   |  |                          |                          |  |                          | <b>Date:</b> March 2019               |                                 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                          |                          | <b>R-1 Program Element (Number/Name)</b><br>PE 0604742A / Constructive Simulation Systems Development |                                   |  |                          |                          | <b>Project (Number/Name)</b><br>362 / Jnt Land Component Constructive Trng |                          |                                       |                                 |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                          |                          |   |                                   | <b>FY 2018</b>                           | <b>FY 2019</b>           | <b>FY 2020</b>           |  |                          |                                       |                                 |
| <p><b>Description:</b> JLCCTC mission command training program simulation upgrades.</p> <p><b>FY 2019 Plans:</b><br/>Funding to support JLCCTC mission command training program simulation upgrades that are required to properly replicate the operational environment in the simulation. These efforts will also support Combat Training Center (CTC) Enhancements.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>Decrease in funds was because this effort was for FY 2019 only.</p>   |                          |                          |   |                                   |  |                          |                          |  |                          |                                       |                                 |
| <p><b>Title:</b> FY19 SBIR/STTR Transfer</p> <p><b>Description:</b> Small Business Innovation Research (SBIR)/Small Business Technology Transfer (STTR)</p> <p><b>FY 2019 Plans:</b><br/>Accounting for full funding amount.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>Accounting for full funding amount.</p>  |                          |                          |   |                                   | -  | 0.843                    | -                        |  |                          |                                       |                                 |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                          |                          |   |                                   |  |                          |                          | 11.827   | 17.260                   | 8.610                                 |                                 |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                          |                          |   |                                   |  |                          |                          |  |                          |                                       |                                 |
| <b>Line Item</b><br>• NA0103: NSTD<br><i>COMMAND &amp; CONTROL</i>  | <b>FY 2018</b><br>35.570 | <b>FY 2019</b><br>38.113 | <b>FY 2020</b><br><b>Base</b><br>35.313   | <b>FY 2020</b><br><b>OCO</b><br>- | <b>FY 2020</b><br><b>Total</b><br>35.313 | <b>FY 2021</b><br>35.075 | <b>FY 2022</b><br>36.199 | <b>FY 2023</b><br>33.733   | <b>FY 2024</b><br>31.660 | <b>Cost To Complete</b><br>Continuing | <b>Total Cost</b><br>Continuing |
| <b>Remarks</b>  |                          |                          |   |                                   |  |                          |                          |  |                          |                                       |                                 |
| <b>D. Acquisition Strategy</b>  |                          |                          |   |                                   |  |                          |                          |  |                          |                                       |                                 |
| <p>JLCCTC Indefinite Delivery/Indefinite Quantity (ID/IQ) contract was awarded to Lockheed Martin on 27 March 2013. This contract was extended through 30 Sep 2018. There are two delivery orders (DOs) still active under this contract: DO 0007 ending on 11 Jan 2019, and DO 0008 ending on 22 Mar 2019. A Bridge Contract was awarded to the current contractor (13 Dec 2018) in order to provide continuing support of the JLCCTC program until the new competitive JLCCTC contract award process is completed. The Bridge Contract consists of a Base contract for 12 months thru Dec 2019 with two options, six months each. Re-compete activities began during FY 2018 with a planned award of a new contract by 3rd Quarter FY 2020. The Draft RFP for the Re-compete was posted to Fed Biz Ops on 11 Dec 2018.</p> <p>Activities under this contract include System Engineering, Software Development, Integration &amp; Test, support to validation events and PDSS/P3I support.</p> |                          |                          |   |                                   |  |                          |                          |  |                          |                                       |                                 |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   | <b>Date:</b> March 2019  |   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604742A / <i>Constructive Simulation Systems Development</i> | <b>Project (Number/Name)</b><br>362 / <i>Jnt Land Component Constructive Trng</i> |
| JLCCTC produces a major software release/version every 18 to 24 months, which is then distributed/fielded to over 40 MTCs worldwide in support of Army Command and Staff Training. |  |   |
| <b>E. Performance Metrics</b><br>N/A   |  |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army       |                        |                                |             |  |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|--|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                    |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604742A / Constructive Simulation Systems Development |            |         |            | Project (Number/Name)<br>362 / Jnt Land Component Constructive Trng |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                         |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management   | Various                | Various : Various              | 63.123      | 3.639  | Oct 2017   | 1.575   | Oct 2018   | 0.600   | Oct 2019   | -           |            | 0.600            | Continuing       | Continuing | Continuing               |
| SBIR/STTR Transfer   | TBD                    | PEO STRI : Orlando, FL         | -           | -  |            | 0.843   | Oct 2018   | -   |            | -           |            | -                | 0.000            | 0.843      | -                        |
| <b>Subtotal</b>  |                        |                                | 63.123      | 3.639  |            | 2.418   |            | 0.600   |            | -           |            | 0.600            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                         |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Constructive Strategy Implementation                         | C/CPFF                 | Lockheed Martin : Orlando, FL  | 5.541       | 2.164  |            | 2.164   | Jan 2019   | -   |            | -           |            | -                | Continuing       | Continuing | Continuing               |
| Integration of JLCCCTC                                       | SS/FFF                 | Various : Various              | 56.851      | -  |            | -       |            | -   |            | -           |            | -                | Continuing       | Continuing | Continuing               |
| Improve JLCCCTC to meet emerging warfighter requirements.    | C/CPFF                 | Lockheed Martin : Orlando, FL  | 3.983       | 1.840  |            | 1.064   | Jan 2019   | 4.610   | Jan 2020   | -           |            | 4.610            | Continuing       | Continuing | Continuing               |
| MC Systems Stimulation and Cyber Security                    | C/CPFF                 | Lockheed Martin : Orlando, FL  | 4.990       | 1.512  |            | 1.030   | Jan 2019   | 0.850   | Jan 2020   | -           |            | 0.850            | Continuing       | Continuing | Continuing               |
| COE Compliance   | C/CPFF                 | Lockheed Martin : Orlando, FL  | 2.790       | 1.300  |            | 0.978   | Jan 2019   | 0.750   | Jan 2020   | -           |            | 0.750            | Continuing       | Continuing | Continuing               |
| JLCCCTC mission command training program simulation upgrades | C/CPFF                 | Lockheed Martin : Orlando, FL  | -           | -  |            | 8.234   | Jan 2019   | -   |            | -           |            | -                | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                | 74.155      | 6.816  |            | 13.470  |            | 6.210   |            | -           |            | 6.210            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                                     |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Engineering & Tech Spt (SE, CM, Lab, Documentation)          | Various                | Various : Various              | 11.312      | -  |            | -       |            | -   |            | -           |            | -                | Continuing       | Continuing | Continuing               |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |  |            |         |            |   |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|--|------------|---------|------------|---|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604742A / Constructive Simulation Systems Development |            |         |            | Project (Number/Name)<br>362 / Jnt Land Component Constructive Trng |              |             |             |                  |                  |                  |                          |                          |
| Support (\$ in Millions)                               |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base  |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost  | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
|  |                        | Subtotal                       | 11.312      | -  |            | -       |            | -   |              | -           |             | -                | Continuing       | Continuing       | N/A                      |                          |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020 Base  |              | FY 2020 OCO |             | FY 2020 Total    |                  |                  |                          |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost  | Award Date   | Cost        | Award Date  | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| System T&E (I&T, VE, ORE)                              | Various                | Various : Various              | 22.115      | 1.372  |            | 1.372   | Jan 2019   | 1.800   | Jan 2020     | -           |             | 1.800            | Continuing       | Continuing       | Continuing               |                          |
| Verification, Validation and Accreditation             | Various                | Various : Various              | 13.244      | -  |            | -       |            | -   |              | -           |             | -                | Continuing       | Continuing       | Continuing               |                          |
|  | Subtotal               | 35.359                         | 1.372       |  | 1.372      |         | 1.800      |   |              | -           |             | 1.800            | Continuing       | Continuing       | N/A                      |                          |
|  |                        |                                |             | Prior Years  | FY 2018    |         | FY 2019    |   | FY 2020 Base |             | FY 2020 OCO |                  | FY 2020 Total    | Cost To Complete | Total Cost               | Target Value of Contract |
| Project Cost Totals                                    |                        |                                |             | 183.949  | 11.827     |         | 17.260     |   | 8.610        |             | -           |                  | 8.610            | Continuing       | Continuing               | N/A                      |
| <b>Remarks</b>   |                        |                                |             |  |            |         |            |   |              |             |             |                  |                  |                  |                          |                          |

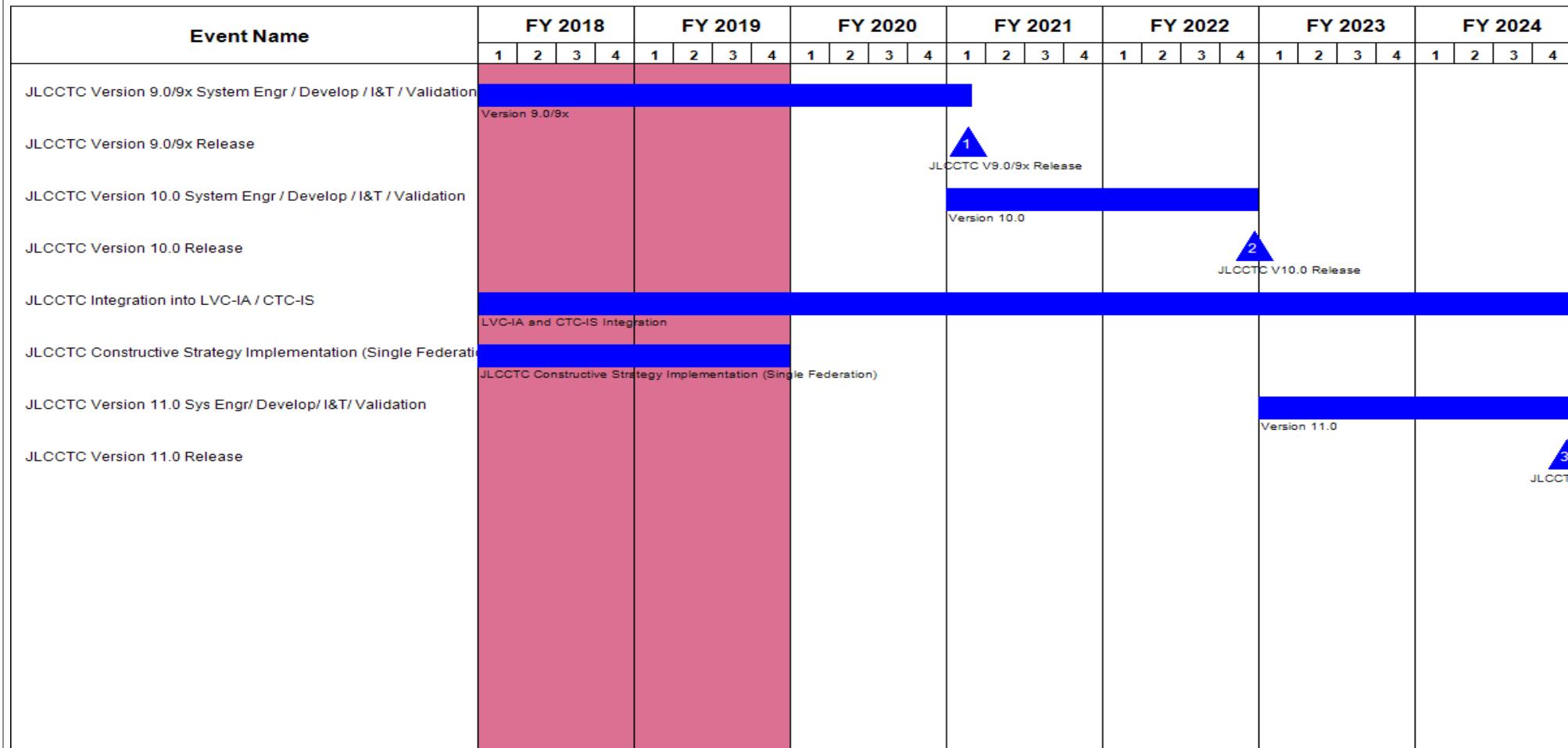
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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604742A / Constructive Simulation  
Systems Development**Project (Number/Name)**362 / Jnt Land Component Constructive  
Trng

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604742A / <i>Constructive Simulation Systems Development</i> | <b>Project (Number/Name)</b><br>362 / <i>Jnt Land Component Constructive Trng</i> |

**Schedule Details**

| <b>Events</b>   | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| JLCCTC Version 9.0/9x System Engr / Develop / I&T / Validation  | 1              | 2018        | 1              | 2021        |
| JLCCTC Version 9.0/9x Release                                   | 1              | 2021        | 1              | 2021        |
| JLCCTC Version 10.0 System Engr / Develop / I&T / Validation    | 1              | 2021        | 4              | 2022        |
| JLCCTC Version 10.0 Release                                     | 4              | 2022        | 4              | 2022        |
| JLCCTC Integration into LVC-IA / CTC-IS                         | 1              | 2014        | 4              | 2024        |
| JLCCTC Constructive Strategy Implementation (Single Federation) | 2              | 2016        | 4              | 2019        |
| JLCCTC Version 11.0 Sys Engr/ Develop/ I&T/ Validation          | 1              | 2023        | 4              | 2024        |
| JLCCTC Version 11.0 Release                                     | 4              | 2024        | 4              | 2024        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |                                   |               |         |         |         |         | Date: March 2019                                   |            |  |
|---|-------------|---------|---------|--------------|-----------------------------------|---------------|---------|---------|---------|---------|--|------------|--|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name) |               |         |         |         |         |  |            |  |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              |                                   |               |         |         |         |         | PE 0604746A / Automatic Test Equipment 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   | -           | 7.054   | 11.782  | 10.915       | -                                 | 10.915        | 9.880   | 4.055   | 4.135   | 3.619   | Continuing   | Continuing |  |
| L59: Diagnos/Expert Sys   | -           | 5.679   | 6.070   | 6.369        | -                                 | 6.369         | 5.946   | 0.000   | 0.000   | 0.000   | 0.000  | 24.064     |  |
| L65: Test Equipment Development   | -           | 1.375   | 5.712   | 4.546        | -                                 | 4.546         | 3.934   | 4.055   | 4.135   | 3.619   | Continuing   | Continuing |  |

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

This program element (PE) provides for development and testing of general-purpose test equipment, state-of-the-art diagnostics and prognostics technologies, and software and systems to support the increasingly complex electronic components of the Army's new and upgraded weapon systems. It focuses on implementation of commercial test and diagnostic technologies across multiple weapon platforms to minimize the cost of troubleshooting and maintenance of Army equipment in the field. Funding supports modernization of the test equipment fleets by investigating technology insertions including, but not limited to condition based maintenance, instrument reduction/miniatrization, electro-optics (EO), radio frequency (RF), and other emerging technologies. Funding also supports development of initial prototypes to enable refinement of Operational Requirements and early user feedback to support future sustainment and testing capabilities required for emerging weapons platforms.

Modular, reconfigurable automatic and semi-automatic systems are being developed under this program to satisfy weapon system test and diagnostics requirements. The Next Generation Automatic Test System (NGATS) provides state-of-the-art test and diagnostic capabilities to support current and future weapon systems. It is the platform for transitioning Agile Rapid Global Combat Support System (ARGCS) technologies into the Army weapon system support structure, and it will replace several aging automatic test systems (ATS) that are becoming prohibitively expensive to operate and maintain.

This PE also provides for continued development and improvement of general-purpose test equipment and calibration standards with emphasis on the incorporation of digital electronics and tailoring of configurations to improve deployability, mobility and survivability of the support equipment. It includes development, demonstration and testing of calibration standards and techniques to support new Army test equipment requirements. It provides for feasibility studies, market research, inventory analyses, bid sample testing and prototyping to support acquisition of calibration systems and general-purpose test and diagnostics equipment.

FY 2020 Base funding for this PE continues incremental development of the Army's standard NGATS which will improve deployability and mobility of test and diagnostic equipment. The NGATS provides state-of-the-art test and diagnostic capabilities and a means for reducing the Army's test equipment operating and support costs and the costs for supporting a number of the Army's vital warfighting systems. The FY 2020 funding will develop or significantly modify test equipment to satisfy modular force and homeland security support requirements that cannot be accommodated with test equipment currently available in the commercial marketplace such as RF and EO testing capability. It will also provide for technology insertions to modernize the Army's standard at-system tester to meet test and diagnostic requirements of the supported weapon systems, develop/redesign test program sets and hardware for support of legacy and emerging weapon systems, develop a network centric software framework for NGATS, and develop and test general-purpose test equipment and calibration standards to meet Army weapon system support requirements.

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b> |  |                |                     |                    | <b>Date:</b> March 2019 |
|---|--|----------------|---------------------|--------------------|-------------------------|
| <b>Appropriation/Budget Activity</b>                                  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development |                |                     |                    |                         |
| <b>B. Program Change Summary (\$ in Millions)</b>                     | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |
| Previous President's Budget   | 8.344  | 13.297         | 10.915              | -                  | 10.915                  |
| Current President's Budget  | 7.054  | 11.782         | 10.915              | -                  | 10.915                  |
| Total Adjustments   | -1.290   | -1.515         | 0.000               | -                  | 0.000                   |
| • Congressional General Reductions                                    | -0.005   | -0.015         |                     |                    |                         |
| • Congressional Directed Reductions                                   | -1.029   | -1.500         |                     |                    |                         |
| • Congressional Rescissions   | -  | -              |                     |                    |                         |
| • Congressional Adds  | -  | -              |                     |                    |                         |
| • Congressional Directed Transfers                                    | -  | -              |                     |                    |                         |
| • Reprogrammings  | -  | -              |                     |                    |                         |
| • SBIR/STTR Transfer  | -0.256   | -              |                     |                    |                         |

**Change Summary Explanation**

FY 2018 - \$1.029 million Congressional reduction due to historical underexecution; FY 2019 - \$1.500 million Congressional reduction due to prior year carryover.

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604746A / Automatic Test Equipment Development |               |         |         | Project (Number/Name)<br>L59 / Diagnos/Expert Sys |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| L59: Diagnos/Expert Sys                                 | -           | 5.679   | 6.070   | 6.369        | -   | 6.369         | 5.946   | 0.000   | 0.000   | 0.000   | 0.000            | 24.064     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                |            |  |

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

This Project funds development of and system enhancements for the Next Generation Automatic Test System (NGATS) and the Maintenance Support Device (MSD). The NGATS is a general-purpose automatic test system (ATS) that provides test and diagnostic capabilities required to support current and future weapons and combat support systems and will facilitate retirement of aging and obsolete test equipment that is imposing increasing logistics and operations and support cost burdens. It is the platform for transitioning Agile Rapid Global Combat Support System (ARGCS) Advanced Concept Technology Demonstration (ACTD) technologies into the Army weapon system support structure. The ARGCS ACTD initiative was sponsored by the Department of Defense, and all Services are expected to transition demonstrated technologies into their ATS programs. The MSD is the Army's standard at-system tester and requires continuing technology insertions to support modernization of the supported weapon systems. This Project funds development efforts to insert the most current relevant technology into the next generation MSD, supports capability enhancement of wireless at-platform test set (WATS) connectivity, develops capabilities to minimize or eliminate Army dependency on expensive proprietary software to support tactical vehicles, and maintains compatibility with emerging platform hardware bus technology and software interface requirements. This Project also provides for continuing efforts in the development and testing of common procedures utilizing existing test program sets and software applications, and market surveys of commercially available test equipment, methods and procedures to determine applicability to Army requirements. The test and diagnostic systems and procedures developed under this Project are essential for ensuring the operational readiness, accuracy and effectiveness of the Army's warfighting systems.

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

| FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---------|---------|--------------|-------------|---------------|
| 1.000   | 1.000   | 0.500        | -           | 0.500         |

**Title:** Next Generation Automatic Test System (NGATS) Radio Frequency (RF) Test Capability

**Description:** Develop and integrate NGATS RF test capability

**FY 2019 Plans:**

Continue prototyping and integration of RF subsystem into the NGATS, specifically the RF Interface Unit and the full-rate production NGATS configuration. Develop RF software libraries to support programs such as Counter Radio-Controlled Improvised Explosive Device (RCIED) Electronic Warfare (CREW)/Duke, TPQ-53 Radar and other emerging weapons systems.

**FY 2020 Base Plans:**

Continue to develop RF software libraries to support communication, mapping and radar applications in fielded ground systems. Redesign RF interface to include new requirements and expanded mission capabilities. Evaluate and incorporate new state-of-the-art sources for more accurate measurements.

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

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |  |  |                |                     | <b>Date:</b> March 2019 |                      |
|--|--|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development   | <b>Project (Number/Name)</b><br>L59 / Diagnos/Expert Sys |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| Decrease of \$.500 million from FY2019 to FY2020 because of higher priority software development required for weapon system support.   |  |  |                |                     |                         |                      |
| <b>Title:</b> NGATS Increment 2<br><br><b>Description:</b> Develop and test hardware and software for NGATS Increment 2 support capability   | <b>FY 2019 Plans:</b><br>Continue development and testing of hardware and software for support of emerging required capabilities such as high-speed digital, fiber channel, high-speed Ethernet and serial busses, and high power test (600V). Develop new software libraries to utilize instrument functions. | 0.382  | 0.500          | 0.500               | -                       | 0.500                |
| <b>FY 2020 Base Plans:</b><br>Continue development and testing of state-of-the-art hardware and software for support of emerging required capabilities to support the Armored Brigade Combat Teams (ABCT). New ABCT requirements include high-speed digital, fiber channel, high-speed Ethernet and serial busses, and high power test (600V). Develop new software libraries to utilize instrument functions. Develop and implement dynamic switching capability. |  |  |                |                     |                         |                      |
| <b>Title:</b> NGATS Electro-Optics (EO) Subsystem<br><br><b>Description:</b> Develop and test hardware and software for NGATS electro-optics (EO) subsystem (to include the capability to support new ground and aerial sensors for unmanned air and ground vehicles)  | <b>FY 2019 Plans:</b><br>Complete integration/testing of EO subsystem.   | 0.700  | 0.700          | -                   | -                       | -                    |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>No funding required for this effort in FY2020.   |  |  |                |                     |                         |                      |
| <b>Title:</b> Additional Software Capabilities for Use with NGATS<br><br><b>Description:</b> Develop software capabilities to incorporate common logistics operating environment/netcentric and embedded diagnostics data collection and analysis for closed loop diagnostic maintenance in support of condition-based maintenance   | <b>FY 2019 Plans:</b><br>Continue development of new and emerging netcentric architecture. Continue development of software architecture that will define the transport protocol to interface to DoD common logistics environments and   | 0.127  | 0.200          | 0.200               | -                       | 0.200                |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |  |  |                |                     | <b>Date:</b> March 2019 |                      |
|--|--|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development | <b>Project (Number/Name)</b><br>L59 / Diagnos/Expert Sys |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| Logistics Modernization Program (LMP). Continue development and improvement of data packages to include health management information.   |  |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Continue development of new and emerging netcentric architecture. Continue development of software architecture that will define the transport protocol to interface to DoD common logistics environments and LMP. Continue development and improvement of data packages to include health management information. Develop software to support condition-based maintenance (CBM)+.   |  |  |                |                     |                         |                      |
| <b>Title:</b> NGATS Performance Enhancement<br><br><b>Description:</b> NGATS core instrument/software modifications to increase NGATS performance  |  | 0.096  | 0.500          | 0.700               | -                       | 0.700                |
| <b>FY 2019 Plans:</b><br>Continue obsolescence identification and mitigation; continue analysis of system reliability and performance; identify bad actors and propose and integrate upgrades to increase readiness. Analyze new requirements from emerging weapons systems and implement system upgrades through hardware and software to meet platform testing requirements. Continue implementation and test of controller upgrade to increase processor speed to support Win10 implementation. Redesign cables for better logistic support and cost savings.   |  |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Continue obsolescence identification and mitigation; continue analysis of system reliability and performance; identify bad actors and propose and integrate upgrades to increase readiness. Analyze new requirements from emerging weapons systems and implement system upgrades through hardware and software to meet platform testing requirements. Evaluate Peripheral Component Interconnect (PCI) Extensions for Instrumentation (PXI) technology incorporation to increase performance and reduce station life cycle cost. Develop programmable ethernet technology. Develop high speed 1553 bus technology to support line replaceable units. |  |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase of \$0.200 million from FY2019 to FY2020 to enable timely implementation of modifications needed to meet weapon system support requirements.  |  |  |                |                     |                         |                      |
| <b>Title:</b> Abrams/Bradley Test Program Set (TPS) Design<br><br><b>Description:</b> Design, test and evaluate Abrams/Bradley TPSs to utilize modern core NGATS instrumentation vice continuing to execute on single-purpose instrumentation specifically developed to emulate Abrams/Bradley legacy test equipment (i.e., Direct Support Electrical System Test Set (DSESTS))  |  | 1.800  | 1.000          | 2.400               | -                       | 2.400                |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |  |  |                |                     | <b>Date:</b> March 2019 |                      |
|---|--|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development | <b>Project (Number/Name)</b><br>L59 / Diagnos/Expert Sys |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| <b>FY 2019 Plans:</b><br>Continue redesign of Abrams/Bradley TPSs to execute on core commercial NGATS instrumentation versus continuing to execute on single-purpose instrumentation specifically developed for testing Abrams/Bradley line replaceable units (LRU).  |  |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Continue redesign of Abrams/Bradley TPSs to execute on core commercial NGATS instrumentation versus continuing to execute on single-purpose instrumentation specifically developed for testing Abrams/Bradley LRUs. Redesign interconnect devices (ICD) to incorporate printed circuit boards and ribbon cables to reduce cost and maintenance. |  |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase of \$1.400 million from FY2019 to FY2020 to accommodate priority of elimination of single purpose hardware to achieve cost avoidances in production and sustainment.   |  |  |                |                     |                         |                      |
| <b>Title:</b> Electro-Optic (EO) TPS Development<br><br><b>Description:</b> Develop Increment 2 and 3 EO TPSs for use with NGATS EO asset to utilize (Army standard) core NGATS instrumentation vice legacy automatic test systems such as DSESTS and Base Shop Test Facility (BSTF)(V)5  |  | 0.250  | 0.250          | 0.300               | -                       | 0.300                |
| <b>FY 2019 Plans:</b><br>Continue development of re-hosted EO TPSs to include 2 each Common Remotely Operated Weapons Station (CROWS) and 2 each Stryker Remote Weapons Station.  |  |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Develop and rehost EO TPSs in support of the ABCT to include CROWS low profile in improved gunners primary site, laser range finding and forward looking infrared (FLIR)..  |  |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase of \$0.050 million from FY2019 to FY2020 to allow completion of this effort as scheduled.  |  |  |                |                     |                         |                      |
| <b>Title:</b> NGATS Logistics Support Products<br><br><b>Description:</b> Develop NGATS initial logistics support products (including provisioning, technical manuals and calibration)  |  | 0.200  | 0.250          | 0.200               | -                       | 0.200                |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |  |  |                |                     | <b>Date:</b> March 2019 |                      |
|--|--|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development | <b>Project (Number/Name)</b><br>L59 / Diagnos/Expert Sys |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| <b>FY 2019 Plans:</b><br>Continue development of NGATS EO and RF logistics products for use with the full-rate production NGATS.   |  |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Continue development of NGATS EO and RF logistics products for use with the full-rate production NGATS.  |  |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease of \$0.050 million from FY2019 to FY2020 to account for availability of funding.  |  |  |                |                     |                         |                      |
| <b>Title:</b> Maintenance Support Device (MSD) Technology Enhancements<br><br><b>Description:</b> Modernizes the current MSD fleet by investigating and Incorporating relevant technology into the next-generation MSD and supporting capability enhancement of the wireless at-platform test set (WATS). Develops capabilities to minimize or eliminate Army dependency on proprietary software to support tactical vehicles and maintain compatibility with emerging platform hardware bus technology and software interface requirements. |  | 0.633  | 0.633          | 0.633               | -                       | 0.633                |
| <b>FY 2019 Plans:</b><br>Investigate and validate the emerging hardware and software technology and suitability for use in the next generation of MSD and WATS. Test, develop technical data package, and insert innovative technology into the Army's at-platform test and diagnostic requirements to support new weapon systems and engineering changes to existing weapon system/platform interface.  |  |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Initiate next generation MSD market research. Incorporate greater range of supported weapons system diagnostic code fault detection into diagnostic software to support tactical vehicle sustainment concepts and ensure data bus compatibility and readability. Investigate emerging interactive electronic technical manual (IETM) viewer environments for use with future generation MSD.   |  |  |                |                     |                         |                      |
| <b>Title:</b> NGATS Simulation Environment<br><br><b>Description:</b> Develop a simulation environment that will allow development and testing of TPSs on a desktop environment  |  | -  | 0.200          | 0.500               | -                       | 0.500                |
| <b>FY 2019 Plans:</b>  |  |  |                |                     |                         |                      |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |  |  |                |                     | <b>Date:</b> March 2019 |                      |
|---|--|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development | <b>Project (Number/Name)</b><br>L59 / Diagnos/Expert Sys |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| Initiate development of an NGATS simulation environment to allow TPS developers and contractors to develop and test TPSs on a desktop environment. Environment will allow for a cost-effective way to develop, maintain and troubleshoot TPSs off station. Develop desktop training environment for TPS developers and maintainers.   |  |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Continue development of an NGATS simulation environment to allow TPS developers and contractors to develop and test TPSs on a desktop environment. Environment will allow for a cost-effective way to develop, maintain and troubleshoot TPSs off station. Develop desktop training environment for TPS developers and maintainers.   |  |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase of \$0.300 million from FY2019 to FY2020 to account for availability of funding and priority of this effort.   |  |  |                |                     |                         |                      |
| <b>Title:</b> TPS Development Environment<br><br><b>Description:</b> Develop a standardized TPS development environment for NGATS   |  | 0.300  | 0.484          | 0.336               | -                       | 0.336                |
| <b>FY 2019 Plans:</b><br>Continue development on the C-Oriented Test Executive (COTE) TPS development software for NGATS. Continue development of test executive that is standard and compliant with DoD initiatives, framework working group and the Automatic Test Equipment Management Board (AMB). Standardized test executive will promote long-term maintainability of TPSs.                            |  |  |                |                     |                         |                      |
| <b>FY 2020 Base Plans:</b><br>Continue development on the COTE TPS development software for NGATS. Continue development of test executive that is standard and compliant with DoD initiatives, framework working group and the AMB. Standardized test executive will promote long-term maintainability of TPSs. Develop graphical (visual) capability for TPS development which includes graphical libraries. |  |  |                |                     |                         |                      |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease of \$0.148 million from FY2019 to FY2020 because of higher priority funding requirements.  |  |  |                |                     |                         |                      |
| <b>Title:</b> Anti-Tamper/Cyber Security<br><br><b>Description:</b> Develop an Anti-Tamper/Cyber Security software capability for NGATS   |  | 0.191  | 0.078          | 0.100               | -                       | 0.100                |
| <b>FY 2019 Plans:</b>   |  |  |                |                     |                         |                      |

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|---|----------------|----------------|----------------|--|----------------|----------------|----------------|--|----------------|-------------------------|--------------------|--|--|--|--|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                |                |                |  |                |                |                | <b>Date:</b> March 2019                                  |                |                         |                    |  |  |  |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development |                |                |                | <b>Project (Number/Name)</b><br>L59 / Diagnos/Expert Sys |                |                         |                    |  |  |  |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |                |  |                |                |                | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b>     | <b>FY 2020 OCO</b> |  |  |  |  |
| Continue development of Anti-Tamper/Cyber Security (AT/CS) software capability for NGATS. Continue to upgrade existing hardware and software with constantly changing security and information assurance requirements. Upgrade to Win10 operating system to include Trusted Platform Module (TPM) 2.0.  |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| <b>FY 2020 Base Plans:</b><br>Continue development of AT/CS software capability for NGATS. Continue to upgrade existing hardware and software with constantly changing security and information assurance requirements. Upgrade to Win10 operating system to include TPM 2.0.   |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Increase of \$0.022 million from FY2019 to FY2020 to account for availability of funding.   |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| <b>Title:</b> FY 2019 SBIR/STTR Transfer  |                |                |                |  |                |                |                | -  | 0.275          | -                       | -                  |  |  |  |  |
| <b>Description:</b> FY 2019 SBIR/STTR Transfer  |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| <b>FY 2019 Plans:</b><br>SBIR/STTR  |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Adjusted for FY 2019 SBIR/STTR Transfer.  |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                |  |                |                |                | 5.679  | 6.070          | 6.369                   | - 6.369            |  |  |  |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2020</b>   | <b>FY 2020</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>   | <b>FY 2024</b> | <b>Cost To Complete</b> | <b>Total Cost</b>  |  |  |  |  |
| • MB4000: <i>Integrated Family Of Test Equipment (IFTE)</i>   | 36.644         | 82.037         | 76.980         | 1.395  | 78.375         | 78.661         | 78.227         | -  | -              | 0.000                   | 353.944            |  |  |  |  |
| <b>Remarks</b>  |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| <b>D. Acquisition Strategy</b>  |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |
| This developmental Project consists of organic and contractual actions. When the necessary expertise and capability are available within the Department of Defense, services required for the individual development projects are ordered from the government source; otherwise, commercial contracts are used. Equipment required for developmental projects is obtained by contract from the commercial supplier. Developmental efforts for the Next Generation Automatic Test System (NGATS) are being completed under a number of contracts awarded to the prime contractor for the Integrated Family of Test Equipment off-platform testers and other contractors with |                |                |                |  |                |                |                |  |                |                         |                    |  |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   | <b>Date:</b> March 2019  |
|--|---|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / <i>Automatic Test Equipment Development</i> | <b>Project (Number/Name)</b><br>L59 / <i>Diagnost/Expert Sys</i> |
| automatic test equipment (ATE) and test program set development capabilities. NGATS is following an evolutionary acquisition strategy using incremental development to satisfy Army depot and field testing requirements for new and existing systems. It will replace existing legacy Army ATE (i.e., Base Shop Test Facility (BSTF)(V)3, BSTF(V)5, and Direct Support Electrical System Test Set) as well as Army depot system-specific ATE. |   |  |
| <b>E. Performance Metrics</b><br>N/A   |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604746A / Automatic Test Equipment Development |            |         |            | Project (Number/Name)<br>L59 / Diagnos/Expert Sys |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                      |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Project Management                                     | Various                | Various : Various              | 0.350       | 0.246   |            | 0.253   | Jan 2019   | -   |            | -           |            | -                | 0.000            | 0.849      | -                        |
|  |                        | <b>Subtotal</b>                | 0.350       | 0.246   |            | 0.253   |            |   |            |             |            |                  | 0.000            | 0.849      | N/A                      |
| Product Development (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                      |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Software Development/Verification/Validation           | Various                | Various, : Various             | 38.288      | 2.110   |            | 2.015   | Feb 2019   | 3.420   | Feb 2020   | -           |            | 3.420            | Continuing       | Continuing | Continuing               |
| Hardware/Support Items Development                     | Various                | Various, : Various             | 69.115      | 2.343   |            | 2.777   | Jan 2019   | 2.319   | Jan 2020   | -           |            | 2.319            | Continuing       | Continuing | Continuing               |
| FY 2019 SBIR/STTR Transfer                             | TBD                    | Various : Various              | -           | -   |            | 0.275   |            | -   |            | -           |            | -                | 0.000            | 0.275      | -                        |
|  |                        | <b>Subtotal</b>                | 107.403     | 4.453   |            | 5.067   |            | 5.739   |            | -           |            | 5.739            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                      |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Technical Support                                      | Various                | Various, : Various             | 50.485      | 0.540   |            | 0.550   | Jan 2019   | 0.460   | Dec 2019   | -           |            | 0.460            | Continuing       | Continuing | Continuing               |
| Other Direct   | Various                | Various, : Various             | 4.390       | 0.240   |            | 0.200   | Jan 2019   | 0.170   | Dec 2019   | -           |            | 0.170            | Continuing       | Continuing | Continuing               |
|  |                        | <b>Subtotal</b>                | 54.875      | 0.780   |            | 0.750   |            | 0.630   |            | -           |            | 0.630            | Continuing       | Continuing | N/A                      |
| Test and Evaluation (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base                                      |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Developmental/Operational Testing                      | Various                | Various, : Various             | 2.896       | 0.200   |            | -       |            | -   |            | -           |            | -                | 0.000            | 3.096      | -                        |
|  |                        | <b>Subtotal</b>                | 2.896       | 0.200   |            | -       |            | -   |            | -           |            | -                | 0.000            | 3.096      | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army  |                        |                                |             |                     |                |                |                |                     |                     |                    |                    | <b>Date:</b> March 2019  |                      |                         |                          |                                 |
|---|------------------------|--------------------------------|-------------|---------------------|----------------|----------------|----------------|---------------------|---------------------|--------------------|--------------------|--|----------------------|-------------------------|--------------------------|---------------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                        |                                |             |                     |                |                |                |                     |                     |                    |                    | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development |                      |                         |                          |                                 |
| <b>Project (Number/Name)</b><br>L59 / Diagnost/Expert Sys   |                        |                                |             |                     |                |                |                |                     |                     |                    |                    |  |                      |                         |                          |                                 |
| <b>Test and Evaluation (\$ in Millions)</b>   |                        |                                |             | <b>FY 2018</b>      |                | <b>FY 2019</b> |                | <b>FY 2020 Base</b> |                     | <b>FY 2020 OCO</b> |                    | <b>FY 2020 Total</b>   |                      |                         |                          |                                 |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | Prior Years | Cost                | Award Date     | Cost           | Award Date     | Cost                | Award Date          | Cost               | Award Date         | Cost   | Cost To Complete     | Total Cost              | Target Value of Contract |                                 |
| <b>Remarks</b><br>Test program set (TPS) and contractor developmental test and evaluation are included in the product development cost. |                        |                                |             |                     |                |                |                |                     |                     |                    |                    |  |                      |                         |                          |                                 |
|   |                        |                                |             | Prior Years         | <b>FY 2018</b> |                | <b>FY 2019</b> |                     | <b>FY 2020 Base</b> |                    | <b>FY 2020 OCO</b> |  | <b>FY 2020 Total</b> | <b>Cost To Complete</b> | <b>Total Cost</b>        | <b>Target Value of Contract</b> |
|   |                        |                                |             | Project Cost Totals | 165.524        | 5.679          |                | 6.070               |                     | 6.369              |                    | -  | 6.369                | Continuing              | Continuing               | N/A                             |
| <b>Remarks</b>  |                        |                                |             |                     |                |                |                |                     |                     |                    |                    |  |                      |                         |                          |                                 |

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| Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army              |         |   |   |   |         |   |   |   |         |   |   | Date: March 2019 |         |   |   |   |         |   |   |   |         |   |   |   |  |
|--|---------|---|---|---|---------|---|---|---|---------|---|---|------------------|---------|---|---|---|---------|---|---|---|---------|---|---|---|--|
| Appropriation/Budget Activity<br>2040 / 5                      |         |   |   | R-1 Program Element (Number/Name)<br>PE 0604746A / Automatic Test Equipment Development |         |   |   | Project (Number/Name)<br>L59 / Diagnos/Expert Sys |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Event Name   | FY 2018 |   |   |   | FY 2019 |   |   |   | FY 2020 |   |   |                  | FY 2021 |   |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   |  |
|  | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4   | 1       | 2 | 3 | 4                | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 | 1       | 2 | 3 | 4 |  |
| Conditional Materiel Release                                   |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| First Unit Equipped  |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| Full Rate Production Decision Review                           |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| NGATS Full-Rate Production (Increment 1)                       |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| NGATS System Development and Demonstration (SDD) (Increment 1) |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| NGATS Testing (Increment 2)                                    |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| FOT&E Completed (DT)   |         |   |   |   | 1       |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| NGATS Development (RF Subsystem)                               |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| NGATS EO Integration   |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| NGATS RF Integration   |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| NGATS Testing (EO & RF Subsystems)                             |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| NGATS Product Improvements - Netcentric                        |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |
| New Systems Test Capability                                    |         |   |   |   |         |   |   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |  |

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| 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)    |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
| 2040 / 5  |  |  |  | PE 0604746A / Automatic Test Equipment Development |   |   |   |         | L59 / Diagnos/Expert Sys |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  | FY 2018  |   |   |   | FY 2019 |                          |   |   | FY 2020 |                  |   |   | FY 2021 |   | FY 2022 |   | FY 2023 |   | FY 2024 |   |   |   |   |   |
|   |  |  |  | 1  | 2 | 3 | 4 | 1       | 2                        | 3 | 4 | 1       | 2                | 3 | 4 | 1       | 2 | 3       | 4 | 1       | 2 | 3       | 4 | 1 | 2 | 3 | 4 |
| MSD Technology Enhancements                       |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |
|   |  |  |  |  |   |   |   |         |                          |   |   |         |                  |   |   |         |   |         |   |         |   |         |   |   |   |   |   |

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|---|--|--|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |  | <b>Date:</b> March 2019                                  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development | <b>Project (Number/Name)</b><br>L59 / Diagnos/Expert Sys |

**Schedule Details**

| Events   | Start   |      | End     |      |
|--|---------|------|---------|------|
|  | Quarter | Year | Quarter | Year |
| NGATS Testing (Increment 1)                                    | 1       | 2011 | 1       | 2012 |
| Production for First Article                                   | 1       | 2015 | 2       | 2017 |
| Conditional Materiel Release                                   | 2       | 2019 | 2       | 2019 |
| First Unit Equipped  | 3       | 2019 | 3       | 2019 |
| Full Rate Production Decision Review                           | 4       | 2019 | 4       | 2019 |
| NGATS Testing (Increment 1 Follow-On DT/OT)                    | 1       | 2016 | 3       | 2016 |
| NGATS Full-Rate Production (Increment 1)                       | 2       | 2019 | 4       | 2022 |
| NGATS System Development and Demonstration (SDD) (Increment 2) | 1       | 2016 | 4       | 2019 |
| NGATS Testing (Increment 2)                                    | 1       | 2016 | 4       | 2020 |
| FOT&E Completed (DT)   | 3       | 2018 | 3       | 2018 |
| NGATS Development (EO Subsystem)                               | 4       | 2010 | 4       | 2015 |
| NGATS Development (RF Subsystem)                               | 1       | 2016 | 4       | 2020 |
| NGATS EO Integration   | 3       | 2016 | 4       | 2019 |
| NGATS RF Integration   | 3       | 2017 | 2       | 2021 |
| NGATS Testing (EO & RF Subsystems)                             | 1       | 2016 | 3       | 2021 |
| NGATS Product Improvements - Netcentric                        | 1       | 2016 | 3       | 2022 |
| New Systems Test Capability                                    | 1       | 2016 | 3       | 2022 |
| MSD Technology Enhancements                                    | 1       | 2016 | 4       | 2022 |

**Note**

Test program set (TPS) compatibility testing runs continually throughout the product development process.

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604746A / Automatic Test Equipment Development |               |         |         | Project (Number/Name)<br>L65 / Test Equipment 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 |  |
| L65: Test Equipment Development                         | -           | 1.375   | 5.712   | 4.546        | -   | 4.546         | 3.934   | 4.055   | 4.135   | 3.619   | Continuing       | Continuing |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       |                  |            |  |

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

This Project supports modernization of calibration instruments, techniques, and existing Army calibration systems by investigating technology insertions including automated and 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 calibration systems and general-purpose test, measurement and diagnostic equipment (TMDE) acquisitions. This project develops calibration software and calibration capability for electro-optical, chemical, biological agent, radiation sourcing and detection systems, signal measurement from direct current to microwave ranges, physical and mechanical measurements such as torque, pressure, and temperature, and improvements in test and measurement performance envelopes. This Project provides for product improvements and development/evaluation of advanced technologies to increase reliability of calibration systems and general-purpose TMDE. The product improvements eliminate gaps in existing organic capabilities and ensure operational readiness and safety of Army weapons and combat support systems. These improvements employ reconfigurable open-electronics architecture and computer-based instrumentation where feasible and focus on reduced test equipment footprints to improve deployability and mobility in areas of operation.

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

|   | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
|---|---------|---------|--------------|-------------|---------------|
| <b>Title:</b> Calibration Sets (CALSETS) Software Environment and Calibration Procedures  | 0.200   | 0.351   | 0.306        | -           | 0.306         |
| <b>Description:</b> Develop and test an Army automated calibration environment and develop calibration procedures. Test and evaluate automated calibration equipment software efforts in support of the Army risk management framework (RMF). |         |         |              |             |               |
| <b>FY 2019 Plans:</b><br>Conclude development of calibration procedures and enhanced calibration environment. Continue test and evaluation of RMF compliance.   |         |         |              |             |               |
| <b>FY 2020 Base Plans:</b><br>Develop Army calibration enterprise data collection and analysis for obsolescence planning gaps and TMDE readiness.   |         |         |              |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>  |         |         |              |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |  |  |                |                     | <b>Date:</b> March 2019 |                      |
|--|--|--|----------------|---------------------|-------------------------|----------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / Automatic Test Equipment Development | <b>Project (Number/Name)</b><br>L65 / Test Equipment Development |                |                     |                         |                      |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      | <b>FY 2020 Total</b> |
| FY2020 decrease of \$0.045 million accounts for reduction in Army calibration environment code development and focuses on enterprise connectivity efforts.   |  |  |                |                     |                         |                      |
| <b>Title:</b> Physical Instruments<br><br><b>Description:</b> Research, develop, and test physical parameter calibration instrumentation to support areas such as force, torque, radiological, chemical/biological agent detection systems, night vision testers, small arms gages, pneumatic pressure systems, and temperature related to target detection in the infrared spectrum..<br><br><b>FY 2019 Plans:</b><br>Complete development and testing of prototype small arms gage calibration standards. Complete development and testing of calibration systems for biological agent detectors and protective equipment. Initiate tests of pneumatic standards to support avionics systems. Perform market research, evaluate commercial equipment, and complete specifications for acquisition.<br><br><b>FY 2020 Base Plans:</b><br>Perform air speed correlation study; develop infrared emissivity corrections for infrared systems calibration; develop radiation sources for NexGen radiation detector calibration; test and evaluate high torque multipliers for ground and aviation platforms.<br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY2020 increase of \$1.240 million required for development of calibration capability for emerging Army radiation detection systems. |  | 0.648  | 0.791          | 2.031               | -                       | 2.031                |
| <b>Title:</b> Electrical Instruments<br><br><b>Description:</b> Research, develop, and test electrical parameter calibration instrumentation to support areas such as intrinsic electrical standards, electrical transport standards and electro-optic standards.<br><br><b>FY 2019 Plans:</b><br>Complete development and test of electro-optic sources. Continue development and test of calibration standards and techniques for automated high accuracy calibration of attenuation, power, resistance, and phase noise.<br><br><b>FY 2020 Base Plans:</b>  |  | 0.348  | 1.943          | 1.824               | -                       | 1.824                |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |   |   |         | Date: March 2019 |             |               |
|---|---|---|---------|------------------|-------------|---------------|
| Appropriation/Budget Activity<br>2040 / 5   | R-1 Program Element (Number/Name)<br>PE 0604746A / Automatic Test Equipment Development | Project (Number/Name)<br>L65 / Test Equipment Development |         |                  |             |               |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | FY 2018   | FY 2019 | FY 2020 Base     | FY 2020 OCO | FY 2020 Total |
| Develop precision DC volt standards; develop test equipment for 5G communications networks; test and evaluate TMDE prototypes for ultraviolet irradiance, high energy laser and fiber-optic networks.   |   |   |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY2020 funding enables test and evaluation of systems developed in FY2019 and is decreased by \$0.119 million to provide funding for higher priority projects.  |   |   |         |                  |             |               |
| <b>Title:</b> Test Equipment Modernization (TEMOD)<br><br><b>Description:</b> Perform market research, bid sample testing and evaluation of commercial general-purpose electronic test equipment (GPETE), and develop performance specifications for TEMOD acquisitions.  |   | 0.179   | 2.423   | 0.385            | -           | 0.385         |
| <b>FY 2019 Plans:</b><br>Perform market research and evaluation of commercial GPETE and validate performance specifications for improved test equipment. The market research will be expanded to cover emerging synthetic instrumentation to potentially replace multiple pieces of GPETE within one platform. Conduct bid sample testing to support acquisition program. Funding of \$2.400 million is slated for six Other Transaction Authority (OTA) prototype TS-4549 Radio Test Sets that will be used for testing and down select to final vendor. |   |   |         |                  |             |               |
| <b>FY 2020 Base Plans:</b><br>Perform market research and evaluation of commercial GPETE and validate performance specifications for improved test equipment. The market research will be expanded to cover emerging synthetic instrumentation to potentially replace multiple pieces of GPETE within one platform. Conduct bid sample testing to support acquisition program.  |   |   |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease in FY2020 accounts for completion of RDTE funding requirement for the OTA prototype TS-4549 Radio Test Set.  |   |   |         |                  |             |               |
| <b>Title:</b> FY 2019 SBIR/STTR Transfer<br><br><b>Description:</b> FY 2019 SBIR/STTR Transfer  |   | -   | 0.204   | -                | -           | -             |
| <b>FY 2019 Plans:</b><br>SBIR/STTR  |   |   |         |                  |             |               |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>  |   |   |         |                  |             |               |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |                |                |                         |   |                          |                |                |   |                    |                         | <b>Date:</b> March 2019 |
|---|----------------|----------------|-------------------------|---|--------------------------|----------------|----------------|---|--------------------|-------------------------|-------------------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                |                         | <b>R-1 Program Element (Number/Name)</b><br>PE 0604746A / <i>Automatic Test Equipment Development</i> |                          |                |                | <b>Project (Number/Name)</b><br>L65 / <i>Test Equipment Development</i> |                    |                         |                         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |                         |   |                          | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020 Base</b>   | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |                         |
| Adjusted for FY 2019 SBIR/STTR Transfer.  |                |                |                         |   |                          |                |                |   |                    |                         |                         |
| <b>Accomplishments/Planned Programs Subtotals</b>   |                |                |                         |   |                          | 1.375          | 5.712          | 4.546   | -                  | 4.546                   |                         |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |                         |   |                          |                |                |   |                    |                         |                         |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020<br/>Base</b> | <b>FY 2020<br/>OCO</b>  | <b>FY 2020<br/>Total</b> | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>  | <b>FY 2024</b>     | <b>Cost To Complete</b> | <b>Total Cost</b>       |
| • N10000: <i>Calibration Sets Equipment</i>   | 5.564          | 4.270          | 3.030                   | -   | 3.030                    | 2.514          | 9.882          | 2.650   | 2.326              | Continuing              | Continuing              |
| • N11000: <i>Test Equipment Modernization (TEMOD)</i>   | 7.771          | 9.806          | 16.415                  | -   | 16.415                   | 7.868          | 10.100         | 7.164   | 6.403              | Continuing              | Continuing              |
| <b>Remarks</b>  |                |                |                         |   |                          |                |                |   |                    |                         |                         |
| <b>D. Acquisition Strategy</b><br>Projects focus on commercial and nondevelopmental item technologies. Department of Defense services provide programmatic, engineering expertise and capability for individual development projects; otherwise, commercial service contracts are used to obtain required capabilities. Equipment required for development projects is obtained from commercial suppliers. Candidate commercial equipment and nondevelopmental items are identified and evaluated through market research and government test and evaluation. |                |                |                         |   |                          |                |                |   |                    |                         |                         |
| <b>E. Performance Metrics</b><br>N/A  |                |                |                         |   |                          |                |                |   |                    |                         |                         |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604746A / Automatic Test Equipment Development |            |         |            | Project (Number/Name)<br>L65 / Test Equipment Development |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| In-house Engineering                                   | SS/ Various            | Various : Various              | 6.376       | 0.129   |            | 0.162   | Dec 2018   | -   |            | -           |            | -                | 0.000            | 6.667      | -                        |
|  |                        | <b>Subtotal</b>                | 6.376       | 0.129   |            | 0.162   |            | -   |            | -           |            | -                | 0.000            | 6.667      | 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 |
| CALSETS Software Environment and Calibration           | Various                | Various : Various              | 7.052       | 0.074   |            | 0.139   | Jan 2019   | 0.121   | Feb 2020   | -           |            | 0.121            | Continuing       | Continuing | -                        |
| Physical Instruments                                   | Various                | Various : Various              | 7.839       | 0.343   |            | 0.403   | Feb 2019   | 1.156   | Feb 2020   | -           |            | 1.156            | Continuing       | Continuing | -                        |
| Electrical Instruments                                 | Various                | Various : Various              | 10.361      | 0.163   |            | 1.094   | Feb 2019   | 1.032   | Mar 2020   | -           |            | 1.032            | Continuing       | Continuing | -                        |
| Test Equipment Modernization                           | Various                | Various : Various              | 0.995       | 0.107   |            | 1.454   | Jan 2019   | 0.231   | Feb 2020   | -           |            | 0.231            | Continuing       | Continuing | -                        |
| FY 2019 SBIR/STTR Transfer                             | TBD                    | Various : Various              | -           | -   |            | 0.204   |            | -   |            | -           |            | -                | 0.000            | 0.204      | -                        |
|  |                        | <b>Subtotal</b>                | 26.247      | 0.687   |            | 3.294   |            | 2.540   |            | -           |            | 2.540            | Continuing       | Continuing | N/A                      |
| Support (\$ in Millions)                               |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Contract Engineering                                   | C/FFP                  | Various : Various              | 2.538       | 0.100   |            | 0.195   | Feb 2019   | 0.311   | Feb 2020   | -           |            | 0.311            | Continuing       | Continuing | -                        |
|  |                        | <b>Subtotal</b>                | 2.538       | 0.100   |            | 0.195   |            | 0.311   |            | -           |            | 0.311            | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604746A / Automatic Test Equipment Development |            |         |            | Project (Number/Name)<br>L65 / Test Equipment Development |            |             |            |                  |                  |            |                          |
| 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 |
| CALSETS Software Environment and Calibration           | Various                | Various : Various              | 1.554       | 0.049   |            | 0.093   | Apr 2019   | 0.081   | Feb 2020   | -           |            | 0.081            | Continuing       | Continuing | -                        |
| Physical Instruments                                   | Various                | Various : Various              | 2.507       | 0.229   |            | 0.269   | Mar 2019   | 0.772   | Feb 2020   | -           |            | 0.772            | Continuing       | Continuing | -                        |
| Electrical Instruments                                 | Various                | Various : Various              | 2.376       | 0.109   |            | 0.730   | Mar 2019   | 0.688   | Mar 2020   | -           |            | 0.688            | Continuing       | Continuing | -                        |
| Test Equipment Modernization                           | Various                | Various : Various              | 0.895       | 0.072   |            | 0.969   | Feb 2019   | 0.154   | Feb 2020   | -           |            | 0.154            | Continuing       | Continuing | -                        |
| <b>Subtotal</b>  |                        |                                | 7.332       | 0.459   |            | 2.061   |            | 1.695   |            | -           |            | 1.695            | Continuing       | Continuing | N/A                      |
|  |                        |                                | Prior Years | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                             |                        |                                | 42.493      | 1.375   |            | 5.712   |            | 4.546   |            | -           |            | 4.546            | Continuing       | Continuing | N/A                      |

Remarks

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |   |   |         | Date: March 2019 |
|--|---|---|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604746A / Automatic Test Equipment Development | Project (Number/Name)<br>L65 / Test Equipment Development |         |                  |
| Schedule Details                                   |   |   |         |                  |
| Events   | Start   | End   | Quarter | Year             |
| AN/GSM-421(V2) User Testing                        | 2   | 2007  | 4       | 2012             |
| Physical Instruments                               | 1   | 2016  | 4       | 2024             |
| CALSETS Software Environment and Calibration       | 1   | 2016  | 4       | 2024             |
| Electrical Instruments                             | 1   | 2016  | 4       | 2024             |
| Test Equipment Modernization                       | 1   | 2016  | 4       | 2024             |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)                                  |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element   | -           | 10.890  | 9.134   | 7.801        | -  | 7.801         | 7.900   | 7.897   | 8.040   | 8.027   | 0.000            | 59.689     |
| C74: Devel Simulation Tech  | -           | 1.373   | 1.492   | 1.000        | -  | 1.000         | 1.000   | 1.000   | 1.000   | 1.000   | 0.000            | 7.865      |
| C77: Army Geospatial Data Master Plan   | -           | 0.573   | 0.785   | 0.767        | -  | 0.767         | 0.730   | 0.577   | 0.585   | 0.591   | 0.000            | 4.608      |
| C78: One Semi-Automated Forces  | -           | 8.944   | 6.857   | 6.034        | -  | 6.034         | 6.170   | 6.320   | 6.455   | 6.436   | 0.000            | 47.216     |

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

The program element "Distributive Interactive Simulations - Engineering Development" applies to the Army's Advanced Simulation Program, which enables operational readiness and the development of concepts and systems for the Future Force through the application of new simulation technology and techniques. The development and application of simulation technology will provide the means to link electronically a range of various simulation tools in a manner that is transparent to the user. The amalgam of simulations and tools is linked together to enable execution of an event; to verify the scenarios, tactics/techniques and procedures; to train testers on new hardware/software; and to conduct trial test runs before costly live field tests. The tools developed are available for reuse by developers and users of simulations throughout the Army.

Project C74 funds the HQDA-chartered mission of the Simulation-to-Mission Command Interoperability (SIMCI) Overarching Integrated Product Team (OIPT) in support of Army Training and Readiness. The SIMCI OIPT mission is to provide policy recommendations to Army senior leadership to improve organizations by allowing Soldiers to fight in the same manner in which they train. This is accomplished by interoperability between Mission Command (MC) systems and the Modeling and Simulation (M&S) systems the Army uses to stimulate MC systems for training Soldiers and their Leaders. SIMCI also invests in targeted solutions to critical problem areas that exist between MC and Simulations. The SIMCI OIPT, led by Program Executive Office (PEO) Simulation, Training, and Instrumentation (STRI) and PEO Command Control Communications-Tactical (C3T), uses focused collaborative processes among its 30+ Army organizations to identify key/critical interoperability shortfalls and the required materiel solutions.

Project C77, Army Geospatial Data Master Plan, focuses on activities that start with data acquisition from multiple sources and culminate in (1) accurate, robust and timely geospatial data and data management and (2) integration and conversion tools that support multiple battle command, training and mission-rehearsal applications. Project C77 continues development efforts associated with the Ground-Warfighter Geospatial Data Model (GGDM) and Geospatial Data Standards.

One Semi-Automated Forces (OneSAF) Project C78 develops and delivers a software application that represents activities of units and forces in simulation to support Army Training and Readiness. The application is used by Army agencies to support the concept evaluation, experimentation, materiel acquisition and training throughout the communities. The focus of this project is systems/software engineering and design for development and evolution of the architecture and software tools for a universal system of Army computer-generated forces -- OneSAF. OneSAF is a high fidelity brigade-and-below SAF that represents a full range of operations, systems and control processes in support of stand-alone and embedded training and Research, Development and Acquisition (RDA) simulation applications. OneSAF is fully

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>  |  |                |                     |                    | <b>Date:</b> March 2019 |  |  |  |  |  |
|--|--|----------------|---------------------|--------------------|-------------------------|--|--|--|--|--|
| <b>Appropriation/Budget Activity</b>   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |                |                     |                    |                         |  |  |  |  |  |
| 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>   |  |                |                     |                    |                         |  |  |  |  |  |
| interoperable with the Army's emerging virtual, live, and division-and-above constructive simulations and provides next-generation simulation products. OneSAF replaces a variety of legacy simulations used within the Army to support analytic and training simulation activities. |  |                |                     |                    |                         |  |  |  |  |  |
| <b>B. Program Change Summary (\$ in Millions)</b>  | <b>FY 2018</b>   | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |  |  |  |  |  |
| Previous President's Budget  | 11.270   | 9.145          | 13.869              | -                  | 13.869                  |  |  |  |  |  |
| Current President's Budget   | 10.890   | 9.134          | 7.801               | -                  | 7.801                   |  |  |  |  |  |
| Total Adjustments  | -0.380   | -0.011         | -6.068              | -                  | -6.068                  |  |  |  |  |  |
| • Congressional General Reductions   | -0.007   | -0.011         |                     |                    |                         |  |  |  |  |  |
| • Congressional Directed Reductions  | -  | -              |                     |                    |                         |  |  |  |  |  |
| • Congressional Rescissions  | -  | -              |                     |                    |                         |  |  |  |  |  |
| • Congressional Adds   | -  | -              |                     |                    |                         |  |  |  |  |  |
| • Congressional Directed Transfers   | -  | -              |                     |                    |                         |  |  |  |  |  |
| • Reprogrammings   | -  | -              |                     |                    |                         |  |  |  |  |  |
| • SBIR/STTR Transfer   | -0.373   | -              |                     |                    |                         |  |  |  |  |  |
| • Adjustments to Budget Years  | -  | -              | -6.068              | -                  | -6.068                  |  |  |  |  |  |
| <b>Change Summary Explanation</b>  | Program decreased to support Army Modernization Priorities   |                |                     |                    |                         |  |  |  |  |  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |                             |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|-----------------------------|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                                  |               |         |         | Project (Number/Name)       |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |               |         |         | C74 / Devel Simulation 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 |  |
| C74: Devel Simulation Tech                              | -           | 1.373   | 1.492   | 1.000        | -  | 1.000         | 1.000   | 1.000   | 1.000                       | 1.000   | 0.000            | 7.865      |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -                           | -       | -                | -          |  |

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

Project C74 funds the HQDA-chartered mission of the Simulation-to-Mission Command Interoperability (SIMCI) Overarching Integrated Product Team (OIPT) in support of Army Training and Readiness. The SIMCI OIPT mission is to provide policy recommendations to Army senior leadership to improve organizations by allowing Soldiers to fight in the same manner in which they train. This is accomplished by interoperability between Mission Command (MC) systems and the Modeling and Simulation (M&S) systems the Army uses to stimulate MC systems for training Soldiers and their Leaders. SIMCI also invests in targeted solutions to critical problem areas that exist between MC and Simulations. The SIMCI OIPT, led by Program Executive Office (PEO) Simulation, Training, and Instrumentation (STRI) and PEO Command Control Communications-Tactical (C3T), uses focused collaborative processes among its 30+ Army organizations to identify key/critical interoperability shortfalls and the required materiel solutions.

The SIMCI OIPT provides the following: (1) Advisor to Army Leadership--improve MC and M&S interoperability programs, policies, directives, resourcing, and procedures; (2) Technical Investment--sponsor/support initiatives that seek common solutions to critical interoperability issues surrounding MC and M&S systems; (3) Outreach--conduct & participate in interoperability outreach activities. SIMCI investments consist primarily of cost-sharing initiatives, leveraging initial system solutions of acquisition programs to enhance the interoperability of multiple systems in the Joint Operational Environment. SIMCI investments accelerate implementation within MC and M&S systems, of common data models and information exchanges that are used by other Services and coalition nations, thus enhancing the inherent ability of Army systems to interoperate seamlessly in a Joint, Interagency, Intergovernmental, and Multinational (JIIM) environment.

FY2020 funding continues progress with embedding simulation into Mission Command Systems via the Ozone Widget Framework, continues management of the SIMCI OIPT's Army-wide collaborative, interoperability enhancement activities, including architecture alignment, data model alignment, common standards, components, and products. It is focused first on reducing costs and improving capabilities in the areas of automating Operational Plans, Orders, and Reports in support of Army, Joint, and Coalition operations. Objectives are: identify and articulate to HQDA senior leadership specific standards that require Army-wide implementation; co-develop data standards, architecture standards, implementation specifications and Joint/Coalition products; continue transition of SIMCI knowledge and proof-of-principle products to Army and Joint acquisition programs.

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

**Title:** Program Management for the SIMCI Overarching Integrated Product Team (OIPT) Projects.

**Description:** Program Management of the SIMCI OIPT's Army-wide collaborative, interoperability enhancement activities, including architecture alignment, data model alignment, common standards, components, and products. The OIPT consists of a Product Director, engineers, and finance personnel.

|  | FY 2018 | FY 2019 | FY 2020 |
|--|---------|---------|---------|
|  | 1.373   | 1.252   | 1.000   |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |   |  | Date: March 2019 |                   |
|---|---|--|------------------|-------------------|
| Appropriation/Budget Activity<br>2040 / 5   | R-1 Program Element (Number/Name)<br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev | Project (Number/Name)<br>C74 / Devel Simulation Tech |                  |                   |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |   | FY 2018  | FY 2019          | FY 2020           |
| <p><b>FY 2019 Plans:</b><br/>           Will continue management and support of the SIMCI OIPT'S Army-wide collaborative, interoperability enhancement activities, including architecture alignment, data model alignment, common standards, components, and products. Will continue focus on gap-analysis of the current model and simulation programs and capabilities in the areas of Live, Virtual, and Constructive (LVC) simulations. This will support the Vice Chief of Staff of the Army's request to find redundancy within the Modeling and Simulation (M&amp;S) community and reduce it. Objectives are to compare the current M&amp;S capabilities with what will be required in the upcoming LVC-Information Assurance (LVC-IA) and Integrated Training Environment (ITE) environments, which will eventually become the Simulated Training Environment (STE) in 2021. This will be Army-wide, as well as, Joint combined interagency products. Focus on ITE with the creation of the blueprint for STE, which is slated to be implemented in 2021.</p> <p><b>FY 2020 Plans:</b><br/>           Will continue management and support of the SIMCI OIPT'S Army-wide collaborative, interoperability enhancement activities, including architecture alignment, data model alignment, common standards, components, and products. Will continue focus on gap-analysis of the current model and simulation programs and capabilities in the areas of Live, Virtual, and Constructive (LVC) simulations. This will support the Vice Chief of Staff of the Army's request to find redundancy within the Modeling and Simulation (M&amp;S) community and reduce it. Objectives are to compare the current M&amp;S capabilities with what will be required in the upcoming LVC-Information Assurance (LVC-IA) and Integrated Training Environment (ITE) environments, which will eventually become the Simulated Training Environment (STE) in 2021. This will be Army-wide, as well as, Joint combined interagency products. Focus on ITE with the creation of the blueprint for STE, which is slated to be implemented in 2021.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           Decreases were a result of repurposing of funds towards modernization efforts.</p> |   |  |                  |                   |
| <p><b>Title:</b> FY19 SBIR/STTR Transfer</p> <p><b>Description:</b> Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)</p> <p><b>FY 2019 Plans:</b><br/>           Accounting for full funding amount.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>           Accounting for full funding amount.</p>  |   |  |                  | - 0.240 -         |
| <b>Accomplishments/Planned Programs Subtotals</b>   |   |  |                  | 1.373 1.492 1.000 |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |   |  |                  |                   |
| N/A   |   |  |                  |                   |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |   | <b>Date:</b> March 2019  |
|--|---|--|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604760A / <i>Distributive Interactive Simulations (DIS) - Eng Dev</i> | <b>Project (Number/Name)</b><br>C74 / <i>Devel Simulation Tech</i> |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |   |  |
| <b>Remarks</b><br>SIMCI uses other contract vehicles (internal/external) and awards money to work on specific technical projects. This provides the opportunity to leverage technical expertise from different agencies. SIMCI chooses projects that enhance current capabilities, closes the gaps of existing capabilities, and makes the determination for future projects that affect both the Mission Command and Live, Virtual, Constructive simulations environment. SIMCI only chooses those projects that meet specific requirements and criteria as stated above. It is one of SIMCI's missions to locate, utilize, or upgrade those projects or specific products that do just that.   |   |  |
| <b>D. Acquisition Strategy</b><br>SIMCI Overarching Integrated Product Team (OIPT) resources are allocated to multiple organizations in both the Mission Command (MC) and Modeling and Simulation (M&S) Communities. The funds are contracted to execute approved functions and to projects that advance the efforts of SIMCI and components-based architecture alignment. Products developed transition to the lead or sponsor's program which then maintains the product for the cost savings of itself and other programs in both Communities. The primary focus for these projects are the following: Embedded simulations with current Command, Control, Communications, Computers, Intelligence, Surveillance, and Reconnaissance (C4ISR) systems, gap-analysis for current simulations, and the proper implementation of Next-Generation modeling and simulation capabilities in regards to the Synthetic Training Environment (STE). |   |  |
| <b>E. Performance Metrics</b><br>N/A   |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |              |   |            |              |            |  |            |             |            | Date: March 2019 |                  |            |                          |            |
|--|------------------------|--------------------------------|--------------|---|------------|--------------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |              | R-1 Program Element (Number/Name)<br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |            |              |            | Project (Number/Name)<br>C74 / Devel Simulation Tech |            |             |            |                  |                  |            |                          |            |
| Management Services (\$ in Millions)                   |                        |                                |              | FY 2018   |            | FY 2019      |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |            |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years  | Cost  | Award Date | Cost         | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |            |
| Program Management                                     | Various                | PEO STRI : Orlando, FL         | 10.123       | 0.150   | Jan 2018   | 0.150        | Jan 2019   | 0.150  | Jan 2020   | -           |            | 0.150            | Continuing       | Continuing | Continuing               |            |
| SBIR/STTR  | TBD                    | PEO STRI : Orlando, FL         | 0.086        | -   |            | 0.240        | Oct 2018   | -  |            | -           |            | -                | 0.000            | 0.326      | -                        |            |
| <b>Subtotal</b>  |                        | <b>10.209</b>                  | <b>0.150</b> |   |            | <b>0.390</b> |            | <b>0.150</b>   |            |             |            | <b>0.150</b>     | Continuing       | Continuing | N/A                      |            |
| Product Development (\$ in Millions)                   |                        |                                |              | FY 2018   |            | FY 2019      |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |            |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years  | Cost  | Award Date | Cost         | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |            |
| Transition of simulation initialization capability     | Various                | TBD : TBD                      | 3.134        | -   |            | -            |            | -  |            | -           |            | -                | -                | Continuing | Continuing               | Continuing |
| Geospatial Initiative                                  | Various                | TBD : TBD                      | 1.388        | -   |            | -            |            | -  |            | -           |            | -                | -                | Continuing | Continuing               | Continuing |
| Data Model applications and reference implementations  | Various                | TBD : TBD                      | 2.363        | -   |            | -            |            | -  |            | -           |            | -                | -                | Continuing | Continuing               | Continuing |
| Implementation of Initialization Products              | Various                | TBD : TBD                      | 2.255        | -   |            | -            |            | -  |            | -           |            | -                | -                | Continuing | Continuing               | Continuing |
| Initialization Study Implementation                    | Various                | TBD : TBD                      | 1.038        | -   |            | -            |            | -  |            | -           |            | -                | -                | Continuing | Continuing               | Continuing |
| Mission Comand systems data mediation/web services     | Various                | TBD : TBD                      | 2.910        | -   |            | -            |            | -  |            | -           |            | -                | -                | Continuing | Continuing               | Continuing |
| Expanding MTOE System Architecture (SA) Data           | Various                | TBD : TBD                      | 1.821        | -   |            | -            |            | -  |            | -           |            | -                | -                | Continuing | Continuing               | Continuing |
| C2 Adapter Web Services and Tools                      | Various                | TBD : TBD                      | 2.660        | -   |            | -            |            | -  |            | -           |            | -                | -                | Continuing | Continuing               | Continuing |
| <b>Subtotal</b>  |                        | <b>17.569</b>                  | <b>-</b>     |   |            | <b>-</b>     |            | <b>-</b>   |            |             |            | <b>-</b>         | Continuing       | Continuing | N/A                      |            |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army      |                        |                                |             |   |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|---|------------------------|--------------------------------|-------------|---|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                   |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |            |         |            | Project (Number/Name)<br>C74 / Devel Simulation Tech |            |             |            |                  |                  |            |                          |
| 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 |
| SIMCI Program/OIPT Support                                  | Various                | Various : Various              | 4.903       | 1.198   | Jan 2018   | 1.077   | Jan 2019   | 0.825  | Jan 2020   | -           |            | 0.825            | Continuing       | Continuing | Continuing               |
| Army Initialization Program and Technical Work Groups (TWG) | Various                | Various : Various              | 0.681       | 0.025   | Jan 2018   | 0.025   | Jan 2019   | 0.025  | Jan 2020   | -           |            | 0.025            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>   |                        | 5.584                          | 1.223       |   | 1.102      |         | 0.850      |  | -          |             | 0.850      | Continuing       | Continuing       | N/A        |                          |
|   |                        |                                | Prior Years | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    | Cost To Complete | Total Cost | Target Value of Contract |
| <b>Project Cost Totals</b>                                  |                        |                                | 33.362      | 1.373   |            | 1.492   |            | 1.000  |            | -           |            | 1.000            | Continuing       | Continuing | N/A                      |
| <b>Remarks</b>  |                        |                                |             |   |            |         |            |  |            |             |            |                  |                  |            |                          |

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| 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)       |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2040 / 5  |  |  |  |         |  |  | PE 0604760A / Distributive Interactive<br>Simulations (DIS) - Eng Dev |         |  |  |  |         |  | C74 / Devel Simulation Tech |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>Event Name</b>                                     |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| <b>FY 2018</b>  |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 1 2 3 4   |  |  |  | 1 2 3 4 |  |  |   | 1 2 3 4 |  |  |  | 1 2 3 4 |  |                             |  | 1 2 3 4 |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Implementation of Initialization Products             |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Transition of simulation initialization capability    |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Data Model applications and reference implementations |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| C2 Adapter Web Services and Tools                     |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Quarterly SIMCI OIPT Meeting                          |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Annual Project Call                                   |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
|   |  |  |  |         |  |  |   |         |  |  |  |         |  |                             |  |         |  |  |  |  |  |  |  |  |  |  |  |  |  |
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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |  | <b>Date:</b> March 2019                                     |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev | <b>Project (Number/Name)</b><br>C74 / Devel Simulation Tech |

**Schedule Details**

| <b>Events</b>   | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| Geospatial Initiative                                 | 1              | 2011        | 4              | 2014        |
| Implementation of Initialization Products             | 1              | 2010        | 4              | 2024        |
| Transition of simulation initialization capability    | 1              | 2010        | 4              | 2024        |
| Initialization Study Implementation                   | 1              | 2010        | 4              | 2017        |
| Data Model applications and reference implementations | 1              | 2010        | 4              | 2024        |
| C2 Adapter Web Services and Tools                     | 1              | 2010        | 4              | 2024        |
| Expanding MTOE System Architecture (SA) Data          | 1              | 2010        | 4              | 2012        |
| Quarterly SIMCI OIPT Meeting                          | 1              | 2010        | 4              | 2024        |
| Annual Project Call                                   | 1              | 2010        | 4              | 2024        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |  |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                                  |               |         |         | Project (Number/Name)                  |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |               |         |         | C77 / Army Geospatial Data Master Plan |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                                | FY 2024 | Cost To Complete | Total Cost |  |
| C77: Army Geospatial Data Master Plan                   | -           | 0.573   | 0.785   | 0.767        | -  | 0.767         | 0.730   | 0.577   | 0.585                                  | 0.591   | 0.000            | 4.608      |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -                                      | -       | -                |            |  |

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

Project C77 addresses the implementation and acceleration of objectives focused on geospatial standards that were identified in the Army Geospatial Data Integrated Master Plan (AGDIMP), approved by the Chief of Staff, Army in April 2005 and newer guidance and directives including the Army's Geospatial Information Office (GIO) GIO Charter, Army Regulation for Geospatial Information and Services updated in 2014 (AR 115-11), and Army COE (Common Operating Environment Implementation Plan's Geospatial Annex). The AGDIMP and the GIO charter, Geospatial Annex to COE IP, and AR 115-11 require the establishment of an enterprise architecture framed around geospatial standards that address geospatial/GEOINT data, services, and applications to enable the Army Geospatial Enterprise (AGE). This Army Geospatial Enterprise serves the Army's Programs/Systems, Organizations (most importantly our soldiers) to provide the geospatial foundation of accurate, robust, and timely geospatial data, robust tools and services that support mission command, intelligence, training, mission-rehearsal and other mission-applications. Project C77 addresses a geospatial/Geoint standard-base framework that supports the ground-warfighter. This geospatial standard framework must also fit within the broader National System for Geospatial-Intelligence (NSG) and Allies Systems for Geoint (ASG) architecture and standards. The establishment of a ground-warfighter, standards-based framework support the management, dissemination, and update of geospatial data and services from National systems and organization to tactical systems and ground-warfighter in an enterprise fashion that will minimal translation into unique and often proprietary data formats and internal application databases.

FY 2019 funding continues development efforts associated with the Ground-Warfighter Geospatial Data Model (GGDM) and integration of Geospatial Data Standards into the U.S. Army Geospatial Enterprise (AGE) and the Army M&S Enterprise.

| B. Accomplishments/Planned Programs (\$ in Millions)   |  |  | FY 2018 | FY 2019 | FY 2020 |
|--|--|--|---------|---------|---------|
| <b>Title:</b> Ground-Warfighter Geospatial Data Model (GGDM)   |  |  | 0.151   | 0.245   | 0.145   |
| <b>Description:</b> The GGDM incorporates common data elements that conform to standards mandated by the Department of Defense Information Technology Standards Registry (DISR) for the National System for Geospatial Intelligence (NSG). Incorporating common geospatial data standards into the GGDM makes the Programs of Record (POR) consistent with new DISR-mandated geospatial intelligence standards for the NSG. The implementation of GGDM across the army increases system-interoperability at the geospatial data level. |  |  |         |         |         |
| <b>FY 2019 Plans:</b><br>Initiate development of the next version of GGDM based upon new information and revisions to the National System for Geospatial-Intelligence (NSG) Application Schema (NAS) as well as new requires from the US Army, USMC, and ABCANZ Allies.  |  |  |         |         |         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |  |  | Date: March 2019 |         |
|--|--|--|------------------|---------|
| Appropriation/Budget Activity  | R-1 Program Element (Number/Name)                                  | Project (Number/Name)                  |                  |         |
| 2040 / 5   | PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev | C77 / Army Geospatial Data Master Plan |                  |         |
| B. Accomplishments/Planned Programs (\$ in Millions)   |  | FY 2018                                | FY 2019          | FY 2020 |
| Provide GGDM training classes to Army and USMC personnel. Ensure major Army PORs are implementing the GGDM (I.E. DCGS-A and SECORE).   |  |  |                  |         |
| <b>FY 2020 Plans:</b><br>Initiate development of the next version of GGDM based upon new information and revisions to the National System for Geospatial-Intelligence (NSG) Application Schema (NAS) as well as new requires from the US Army, USMC, and ABCANZ Allies. Provide GGDM training classes to Army and USMC personnel. Ensure major Army PORs are implementing the GGDM (I.E. DCGS-A and SECORE).   |  |  |                  |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Requirements change.   |  |  |                  |         |
| <b>Title:</b> Geospatial Data Standards<br><br><b>Description:</b> Army Geospatial Standards including data standards and standards for services to manage, process and disseminate and utilize geospatial data. Alignment of industry and Open geospatial standards from organizations such as the Open Geospatial Consortium (OGC) and others into the Army Geospatial Enterprise (AGE).   | 0.422  | 0.540                                  | 0.622            |         |
| <b>FY 2019 Plans:</b><br>Will initiate work in collaboration with industry and other agencies to develop new geospatial data and services standards, DOD Profiles of these standards, and technology implementations of these standards. Focus on standards to support 2D raster tiled maps, 3D globe standards, and initial assessment about vector tile maps. Additionally, cont. to develop modifications/updates elevation data formats and services. Maintain Geospatial Standards compliance matrix, Std-V1, in alignment with quarterly updated NSG standards and DoD Information Technology Standards and Profile Registry (DISR) cycle updates of GeolINT standards and coordinate results with Army CIO/G6 and ASA(ALT) Programs. Will continue to provide SME support on geospatial data and technology standards to Army PORs. |  |  |                  |         |
| <b>FY 2020 Plans:</b><br>Will initiate work in collaboration with industry and other agencies to develop new geospatial data and services standards, DOD Profiles of these standards, and technology implementations of these standards. Focus on standards to support 2D raster tiled maps, 3D globe standards, and initial assessment about vector tile maps. Additionally, cont. to develop modifications/updates elevation data formats and services. Maintain Geospatial Standards compliance matrix, Std-V1, in alignment with quarterly updated NSG standards and DoD Information Technology Standards and Profile Registry (DISR) cycle updates of GeolINT standards and coordinate results with Army CIO/G6 and ASA(ALT) Programs. Will continue to provide SME support on geospatial data and technology standards to Army PORs. |  |  |                  |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>   |  |  |                  |         |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |  |  | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev | <b>Project (Number/Name)</b><br>C77 / Army Geospatial Data Master Plan |                         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b><br><br>Increase due to economic adjustments  |  | <b>FY 2018</b>   | <b>FY 2019</b>          |
|  |  | Accomplishments/Planned Programs Subtotals                             | 0.573                   |
|  |  |  | 0.785                   |
|  |  |  | 0.767                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |  |  |                         |
| N/A  |  |  |                         |
| <b>Remarks</b>   |  |  |                         |
| <b>D. Acquisition Strategy</b><br>Resources are allocated to several critical geospatial projects in support of the Army Geospatial Data Integrated Master Plan (AGDIMP) and the Army Geospatial Enterprise (AGE). |  |  |                         |
| <b>E. Performance Metrics</b>  |  |  |                         |
| N/A  |  |  |                         |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |            |         |            | Project (Number/Name)<br>C77 / Army Geospatial Data Master Plan |            |             |            |                  |                  |            |                          |
| Product Development (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Army Geospatial Model and Data Standards               | Various                | TBD : TBD                      | 5.685       | 0.573   |            | 0.785   | Nov 2018   | 0.767   | Nov 2019   | -           |            | 0.767            | 0.000            | 7.810      | Continuing               |
| <b>Subtotal</b>  |                        |                                | 5.685       | 0.573   |            | 0.785   |            | 0.767   |            | -           |            | 0.767            | 0.000            | 7.810      | 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 |
| <b>Project Cost Totals</b>                             |                        |                                | 5.685       | 0.573   |            | 0.785   |            | 0.767   |            | -           |            | 0.767            | 0.000            | 7.810      | N/A                      |

**Remarks**

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |   |   | Date: March 2019 |      |
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| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev | Project (Number/Name)<br>C77 / Army Geospatial Data Master Plan |                  |      |
| Schedule Details                                   |   |   |                  |      |
| Events   | Start   |   | End              |      |
|  | Quarter   | Year  | Quarter          | Year |
| Ground Warfighter Geospatial Data Model            | 1   | 2010  | 4                | 2023 |
| Geospatial Data Standards                          | 1   | 2010  | 4                | 2023 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |                                 |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------------------------------|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                                  |               |         |         | Project (Number/Name)           |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |               |         |         | C78 / One Semi-Automated Forces |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023                         | FY 2024 | Cost To Complete | Total Cost |  |
| C78: One Semi-Automated Forces                          | -           | 8.944   | 6.857   | 6.034        | -  | 6.034         | 6.170   | 6.320   | 6.455                           | 6.436   | 0.000            | 47.216     |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -                               | -       | -                | -          |  |

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

One Semi-Automated Forces (OneSAF) develops and delivers a software application that represents activities of units and forces in simulation to support Army Training and Readiness. The application is used by Army agencies to support the concept evaluation, experimentation, materiel acquisition and training throughout the communities. The focus of this project is systems/software engineering and design for development and evolution of the architecture and software tools for a universal system of Army computer-generated forces -- OneSAF. OneSAF is a high fidelity brigade-and-below SAF that represents a full range of operations, systems and control processes in support of stand-alone and embedded training and Research, Development and Acquisition (RDA) simulation applications. OneSAF is fully interoperable with the Army's emerging virtual, live, and division-and-above constructive simulations and provides next-generation simulation products. OneSAF replaces a variety of legacy simulations used within the Army to support Acquisition, Analysis, Experimentation, Intelligence, Test & Evaluation, and Training simulation activities.

FY2020 funding allows for continued development of the software product line by addressing OneSAF Pre-Planned Product Improvements (P3Is) as prioritized and approved by the Training and Doctrine Command (TRADOC). This funding also provides for the management of the infrastructure, equipment, laboratories, and processes needed to develop, test, and release the required product baseline.

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

**Title:** Engineering and Manufacturing Development (EMD) phase contract activities for the One Semi-Automated Forces program.

|   | FY 2018 | FY 2019 | FY 2020 |
|---|---------|---------|---------|
| Description: Continue EMD phase contract activities for the OneSAF program. | 6.300   | 4.971   | 4.584   |

**Description:** Continue EMD phase contract activities for the OneSAF program.

**FY 2019 Plans:**

Will continue the development of software capabilities based on OneSAF P3Is as prioritized and approved by TRADOC. Will continue the software development of functionality that enhances architectural services, components, synthetic environment and infrastructure of the OneSAF Product Line and will provide for software integration, test and release of required software refreshes and Version 9.0

**FY 2020 Plans:**

Will continue the development of software capabilities based on OneSAF P3Is as prioritized and approved by TRADOC. Will continue the software development of functionality that enhances architectural services, components, synthetic environment and infrastructure of the OneSAF Product Line and will provide for software integration, test and release of required software refreshes and Version 10.0.

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

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |  |                                 | Date: March 2019 |         |
|---|--|---------------------------------|------------------|---------|
| Appropriation/Budget Activity   | R-1 Program Element (Number/Name)                                  | Project (Number/Name)           |                  |         |
| 2040 / 5  | PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev | C78 / One Semi-Automated Forces |                  |         |
| B. Accomplishments/Planned Programs (\$ in Millions)  |  | FY 2018                         | FY 2019          | FY 2020 |
| Decrease due to economic adjustments.   |  |                                 |                  |         |
| <b>Title:</b> Government System Test and Evaluation for the One Semi-Automated Forces (OneSAF) program.   |  | 1.100                           | 1.100            | 1.100   |
| <b>Description:</b> Government System Test and Evaluation for the OneSAF program.   |  |                                 |                  |         |
| <b>FY 2019 Plans:</b><br>Will provide for the conducting of software, test, integration and release for Version 9.0. Will provide support to the user community in conducting experiments, analyses, and validation events for integration into the Home Station Training Federation, Network Integration Events (NIE), Battle Lab Collaborative Simulation Environment (BLCSE), Multi Resolution Federation- Brigade (MRF-B) Enhanced, and other LVC applications.   |  |                                 |                  |         |
| <b>FY 2020 Plans:</b><br>Will provide for the conducting of software, test, integration and release for Version 10.0. Will provide support to the user community in conducting experiments, analyses, and validation events for integration into the Home Station Training Federation, Network Integration Events (NIE), Battle Lab Collaborative Simulation Environment (BLCSE), Entity Simulation Service (ESS) in support of Joint Land Component Constructive Training Capability (JLCC), and other LVC applications. |  |                                 |                  |         |
| <b>Title:</b> Government Program Management for the One Semi-Automated Forces (OneSAF) program.   |  | 1.544                           | 0.326            | 0.350   |
| <b>Description:</b> Government Program Management for the One Semi-Automated Forces (OneSAF) program.   |  |                                 |                  |         |
| <b>FY 2019 Plans:</b><br>Will provide a portion of program management, engineering and technical oversight, contract support, and travel for support of site surveys and Subject Matter Experts for the development of OneSAF.  |  |                                 |                  |         |
| <b>FY 2020 Plans:</b><br>Will provide a portion of program management, engineering and technical oversight, contract support, and travel for support of site surveys and Subject Matter Experts for the development of OneSAF.  |  |                                 |                  |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Minor change to annual program management costs.  |  |                                 |                  |         |
| <b>Title:</b> FY19 SBIR/STTR Transfer   |  | -                               | 0.460            | -       |
| <b>Description:</b> Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)   |  |                                 |                  |         |
| <b>FY 2019 Plans:</b>   |  |                                 |                  |         |

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|   |  |   |                         |
|---|--|---|-------------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |  |   | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev | <b>Project (Number/Name)</b><br>C78 / One Semi-Automated Forces |                         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b><br><br><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Accounting for full funding amount.  |  | <b>FY 2018</b>  | <b>FY 2019</b>          |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Accounting for full funding amount.   |  |   |                         |
| <b>Accomplishments/Planned Programs Subtotals</b>   |  | 8.944   | 6.857                   |
|   |  |   | 6.034                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b><br>N/A   |  |   |                         |
| <b>Remarks</b>  |  |   |                         |
| <b>D. Acquisition Strategy</b><br>OneSAF continues to manage two Delivery Orders for the Development, Integration, Interoperability, and Support (I2S) of capabilities products, data, and documentation that fully serves the current and evolving needs of the user community.<br><br>The enhancements will be executed within the development line as modifications to the released baseline via Engineering Change Proposals (ECPs); Change Requests (CRs); Pre-Planned Product Improvements (P3I); and correction of deficiencies identified as Problem Test Reports (PTRs) and Deficiency Reports (DRs) by the user community.<br><br>In FY2020, the program will continue with yearly releases of the OneSAF Software versions containing performance enhancements resulting from the development and integration of Pre-Planned Product Improvements (P3I), concurrency enhancements, user feedback, corrections of deficiencies identified as Problem Test Reports (PTR) and Deficiency Reports (DR) and Co-Developers handovers. The OneSAF program will continue to manage the single award contract for the continuing development and maintenance of the software baseline as well as continue to manage the Integrated Development Environment (IDE). |  |   |                         |
| <b>E. Performance Metrics</b><br>N/A  |  |   |                         |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                     |                        |   |              |   |            |              |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|---|--------------|---|------------|--------------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                                  |                        |   |              | R-1 Program Element (Number/Name)<br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |            |              |            | Project (Number/Name)<br>C78 / One Semi-Automated Forces |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                                       |                        |   |              | FY 2018   |            | FY 2019      |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                        | Prior Years  | Cost  | Award Date | Cost         | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Program Management   | Various                | PEO STRI, Orlando, FL : Various                       | 26.706       | 1.850   | Oct 2017   | 0.326        | Oct 2018   | 0.350  | Oct 2019   | -           |            | 0.350            | Continuing       | Continuing | Continuing               |
| SBIR/STTR  | TBD                    | PEO STRI : Orlando, FL                                | -            | -   |            | 0.460        | Oct 2018   | -  |            | -           |            | -                | 0.000            | 0.460      | -                        |
| <b>Subtotal</b>  |                        | <b>26.706</b>   | <b>1.850</b> |   |            | <b>0.786</b> |            | <b>0.350</b>   |            |             |            | <b>0.350</b>     | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                                       |                        |   |              | FY 2018   |            | FY 2019      |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location                        | Prior Years  | Cost  | Award Date | Cost         | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Architecture Dev & System Integration                                      | C/CPFF                 | Science Applications International Corp : Orlando, FL | 51.466       | -   |            | -            |            | -  |            | -           |            | -                | 0.000            | 51.466     | 51.466                   |
| Model and Tools Development  | C/CPFF                 | Science Applications International Corp : Orlando, FL | 27.625       | -   |            | -            |            | -  |            | -           |            | -                | 0.000            | 27.625     | 27.625                   |
| Environmental Runtime Component  | C/CPFF                 | Science Applications : Orlando, FL                    | 7.981        | -   |            | -            |            | -  |            | -           |            | -                | 0.000            | 7.981      | 7.981                    |
| OneSAF Component Development   | C/CPFF                 | Various : Various                                     | 9.648        | -   |            | -            |            | -  |            | -           |            | -                | 0.000            | 9.648      | 9.648                    |
| Integrated Environment Dev   | C/CPFF                 | Advanced Systems Technology, Inc : Orlando FL         | 11.702       | -   |            | -            |            | -  |            | -           |            | -                | 0.000            | 11.702     | 11.702                   |
| OneSAF Bridge Contract   | C/CPFF                 | Science Applications International Corp : Orlando, FL | 3.797        | -   |            | -            |            | -  |            | -           |            | -                | 0.000            | 3.797      | 3.797                    |
| Integration, Interoperability, and Support (I2S) & Logical Follow On (LFO) | C/CPFF                 | Cole Engineering Services, Inc. : Orlando, FL         | 6.290        | 1.000   | Dec 2017   | -            |            | -  |            | -           |            | -                | Continuing       | Continuing | Continuing               |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army    |                        |   |             |   |              |              |              |  |              |              |              | Date: March 2019 |                  |            |                          |     |
|---|------------------------|---|-------------|---|--------------|--------------|--------------|--|--------------|--------------|--------------|------------------|------------------|------------|--------------------------|-----|
| Appropriation/Budget Activity<br>2040 / 5                 |                        |   |             | R-1 Program Element (Number/Name)<br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |              |              |              | Project (Number/Name)<br>C78 / One Semi-Automated Forces |              |              |              |                  |                  |            |                          |     |
| Product Development (\$ in Millions)                      |                        |   |             | FY 2018   |              | FY 2019      |              | FY 2020 Base   |              | FY 2020 OCO  |              | FY 2020 Total    |                  |            |                          |     |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location            | Prior Years | Cost  | Award Date   | Cost         | Award Date   | Cost   | Award Date   | Cost         | Award Date   | Cost             | Cost To Complete | Total Cost | Target Value of Contract |     |
| Software Development & Production Logical Follow On (LFO) | C/CPFF                 | Leidos : Orlando, FL                      | 18.985      | 1.000   | Dec 2017     | -            | -            | -  | -            | -            | -            | -                | Continuing       | Continuing | Continuing               |     |
| Software Development                                      | C/CPFF                 | TBD : Orlando, FL                         | 3.601       | 3.534   | Dec 2017     | 4.521        | Dec 2018     | 4.124  | Dec 2019     | -            | -            | 4.124            | Continuing       | Continuing | Continuing               |     |
| <b>Subtotal</b>   |                        |   |             | <b>141.095</b>  | <b>5.534</b> | <b>4.521</b> |              | <b>4.124</b>   |              | <b>4.124</b> |              | <b>4.124</b>     | Continuing       | Continuing | N/A                      |     |
| Support (\$ in Millions)                                  |                        |   |             | FY 2018   |              | FY 2019      |              | FY 2020 Base   |              | FY 2020 OCO  |              | FY 2020 Total    |                  |            |                          |     |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location            | Prior Years | Cost  | Award Date   | Cost         | Award Date   | Cost   | Award Date   | Cost         | Award Date   | Cost             | Cost To Complete | Total Cost | Target Value of Contract |     |
| System Analysis   | Various                | Various : Various                         | 6.597       | -   | -            | -            | -            | -  | -            | -            | -            | -                | Continuing       | Continuing | Continuing               |     |
| Domain Analysis   | Various                | Various : Various                         | 6.135       | 0.150   | Dec 2017     | 0.150        | Dec 2018     | 0.150  | Dec 2019     | -            | -            | 0.150            | Continuing       | Continuing | Continuing               |     |
| Integrated Development Environment                        | Various                | Various : Various                         | 9.936       | -   | -            | -            | -            | -  | -            | -            | -            | -                | Continuing       | Continuing | Continuing               |     |
| Architecture Engr & Tech Spt                              | SS/FP                  | MITRE FFRDC : Aberdeen Proving Ground, MD | 5.449       | 0.310   | Dec 2017     | 0.300        | Dec 2018     | 0.310  | Dec 2019     | -            | -            | 0.310            | Continuing       | Continuing | Continuing               |     |
| <b>Subtotal</b>   |                        |   |             | <b>28.117</b>   | <b>0.460</b> |              | <b>0.450</b> |  | <b>0.460</b> |              | <b>0.460</b> |                  | <b>0.460</b>     | Continuing | Continuing               | N/A |
| Test and Evaluation (\$ in Millions)                      |                        |   |             | FY 2018   |              | FY 2019      |              | FY 2020 Base   |              | FY 2020 OCO  |              | FY 2020 Total    |                  |            |                          |     |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location            | Prior Years | Cost  | Award Date   | Cost         | Award Date   | Cost   | Award Date   | Cost         | Award Date   | Cost             | Cost To Complete | Total Cost | Target Value of Contract |     |
| OneSAF integration, evaluation and test                   | Various                | Various : Various                         | 12.829      | 0.900   | Dec 2017     | 0.900        | Dec 2018     | 0.900  | Dec 2019     | -            | -            | 0.900            | Continuing       | Continuing | Continuing               |     |
| OneSAF Verification, Validation & Accreditation           | Various                | Various : Various                         | 7.247       | 0.200   | Dec 2017     | 0.200        | Dec 2018     | 0.200  | Dec 2019     | -            | -            | 0.200            | Continuing       | Continuing | Continuing               |     |
| <b>Subtotal</b>   |                        |   |             | <b>20.076</b>   | <b>1.100</b> |              | <b>1.100</b> |  | <b>1.100</b> |              | <b>1.100</b> |                  | <b>1.100</b>     | Continuing | Continuing               | N/A |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |             |         |   |  |              |  |  |  |               | Date: March 2019 |            |                          |
|--|-------------|---------|---|--|--------------|--|--|--|---------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |             |         | R-1 Program Element (Number/Name)<br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev |  |              |  | Project (Number/Name)<br>C78 / One Semi-Automated Forces |  |               |                  |            |                          |
|  | 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                                    | 215.994     | 8.944   | 6.857   |  | 6.034        |  | -  |  | 6.034         | Continuing       | Continuing | N/A                      |
| <u>Remarks</u>   |             |         |   |  |              |  |  |  |               |                  |            |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

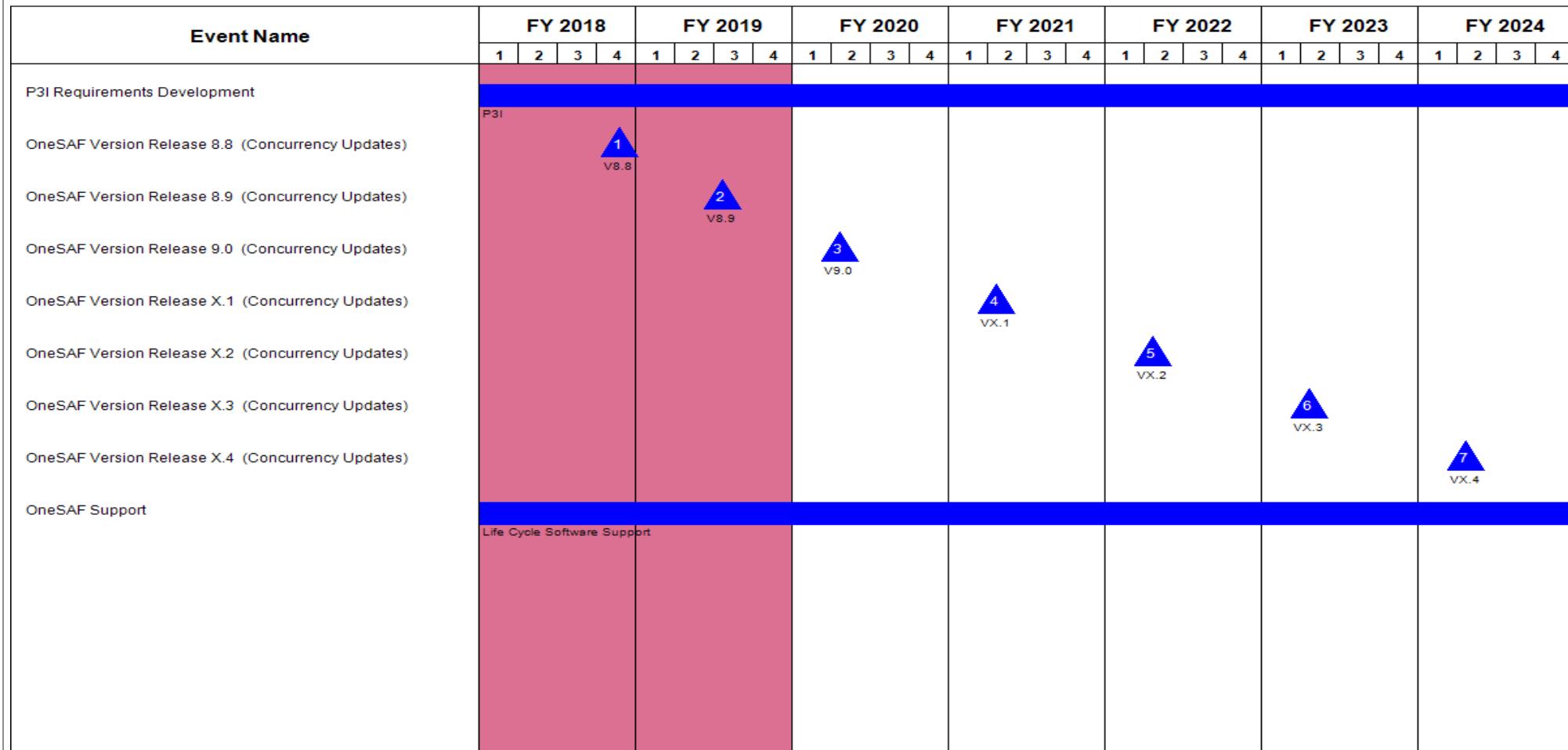
Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604760A / Distributive Interactive  
Simulations (DIS) - Eng Dev**Project (Number/Name)**

C78 / One Semi-Automated Forces



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|   |  |   |
|---|--|---|
| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |  | <b>Date:</b> March 2019   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604760A / Distributive Interactive Simulations (DIS) - Eng Dev | <b>Project (Number/Name)</b><br>C78 / One Semi-Automated Forces |

**Schedule Details**

| <b>Events</b>                                    | <b>Start</b>   |             | <b>End</b>     |             |
|--|----------------|-------------|----------------|-------------|
|  | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| P3I Requirements Development                     | 1              | 2006        | 4              | 2024        |
| OneSAF Version Release 8.8 (Concurrency Updates) | 4              | 2018        | 4              | 2018        |
| OneSAF Version Release 8.9 (Concurrency Updates) | 3              | 2019        | 3              | 2019        |
| OneSAF Version Release 9.0 (Concurrency Updates) | 2              | 2020        | 2              | 2020        |
| OneSAF Version Release X.1 (Concurrency Updates) | 2              | 2021        | 2              | 2021        |
| OneSAF Version Release X.2 (Concurrency Updates) | 2              | 2022        | 2              | 2022        |
| OneSAF Version Release X.3 (Concurrency Updates) | 2              | 2023        | 2              | 2023        |
| OneSAF Version Release X.4 (Concurrency Updates) | 2              | 2024        | 2              | 2024        |
| OneSAF Support                                   | 1              | 2006        | 4              | 2024        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)                    |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604768A / Brilliant Anti-Armor Submunition (BAT) |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | 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   | -           | 7.886   | 6.886   | 25.000       | -  | 25.000        | 36.000  | 41.000  | 39.000  | 10.000  | 0.000            | 165.772    |
| 688: ATACMS BLK II  | -           | 3.840   | 1.943   | 25.000       | -  | 25.000        | 36.000  | 41.000  | 39.000  | 10.000  | 0.000            | 156.783    |
| P01: MULTI - MODE SEEKER DEVELOPMENT AND TEST   | -           | 4.046   | 4.943   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 8.989      |

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

Army Tactical Missile System (ATACMS) is the United States (U.S.) Army's primary all-weather, surface-to-surface long-range artillery precision guided missile used by Combatant Commanders to shape the battlefield with long-range fires against hard & soft targets in open, complex, and urban environments.

Project P01. Multi-Mode Seeker will integrate Strategic Capabilities Office (SCO) STRIKE-X program demonstrated capabilities into ATACMS. This effort focuses on providing integration of a seeker to search, detect, acquire, and engage moving maritime/land-based targets. There is no funding in FY 2020

Project 688 is a developmental effort for the Palletized Field Artillery Launcher. Palletized Field Artillery Launcher (PFAL) is a palletized erector, MLRS-similar, launcher capable of firing the Multiple Launched Rocket System (MLRS) Family of Munitions (MFOM), to include the Extended Range (ER) Guided Multiple Launch Rocket System (GMLRS), the Army Tactical Missile System (ATACMS), and the Precision Strike Missile (PrSM). These munitions are capable of engaging targets with precision at ranges in excess of 400 kilometers. Palletized Field Artillery Launcher provides alternatives to deliver near-term innovative long-range strike capabilities to Combatant Commanders. This effort will design, develop, and deploy a safe and effective launcher system and integrate multiple sub-systems, including an erectorable palletized MLRS launcher, a Fire Control System (FCS), a communications system, and a Power Management System in a continuous user evaluation with Soldiers. In FY2020, PFAL transitions from Strategic Capability Office (SCO) to the Army. This effort was previously funded under program element 0604250D8Z as part of Project "Strike-X" (PB2019 Defense Wide RDTE BLIN 96). Project code 688 previously integrated Strategic Capabilities Office (SCO) Breaker program demonstrated capabilities into ATACMS.

**Justification:**

FY 2020 Base funding in the amount of \$25.000 million for Project 688 funds the development efforts to correct deficiencies found in the prototype design to obtain a safety certification which will allow for an Urgent Materiel Release. Base year funding allows for further design and development to ensure the safe and effective deployment of operational prototypes to Soldiers in a continuous user evaluation.

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>   |  |                |                     |                    | <b>Date:</b> March 2019 |
|---|--|----------------|---------------------|--------------------|-------------------------|
| <b>Appropriation/Budget Activity</b>  | <b>R-1 Program Element (Number/Name)</b>             |                |                     |                    |                         |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)   | PE 0604768A / Brilliant Anti-Armor Submunition (BAT) |                |                     |                    |                         |
| <b>B. Program Change Summary (\$ in Millions)</b>   | <b>FY 2018</b>                                       | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b> | <b>FY 2020 Total</b>    |
| Previous President's Budget   | 10.000   | 9.894          | 9.886               | -                  | 9.886                   |
| Current President's Budget  | 7.886  | 6.886          | 25.000              | -                  | 25.000                  |
| Total Adjustments   | -2.114   | -3.008         | 15.114              | -                  | 15.114                  |
| • Congressional General Reductions  | -0.008   | -0.008         |                     |                    |                         |
| • Congressional Directed Reductions   | -  | -3.000         |                     |                    |                         |
| • Congressional Rescissions   | -  | -              |                     |                    |                         |
| • Congressional Adds  | -  | -              |                     |                    |                         |
| • Congressional Directed Transfers  | -  | -              |                     |                    |                         |
| • Reprogrammings  | -1.714   | -              |                     |                    |                         |
| • SBIR/STTR Transfer  | -0.392   | -              |                     |                    |                         |
| • Adjustments to Budget Years   | -  | -              | 15.114              | -                  | 15.114                  |
| <b>Change Summary Explanation</b>   |  |                |                     |                    |                         |
| FY 2018: The \$2.114 million decrease in base funding is a result of a decrease of \$0.392 million for SBIR/STTR funding and decreased funding of \$1.714 million for Congressional Rescission. |  |                |                     |                    |                         |
| FY 2019: The \$3.326 decrease in base funding is a result of Army realignment of funds to higher priority programs.   |  |                |                     |                    |                         |
| FY 2020: The \$15.114 million increase in base funding is a result of Army realignment of funds to higher priority programs.  |  |                |                     |                    |                         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |         |  | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|--|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) |               |         |         |         | Project (Number/Name)<br>688 / ATACMS BLK II |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024                                      | Cost To Complete | Total Cost |  |
| 688: ATACMS BLK II                                      | -           | 3.840   | 1.943   | 25.000       | -  | 25.000        | 36.000  | 41.000  | 39.000  | 10.000                                       | 0.000            | 156.783    |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -       | -  | -                |            |  |

**Note**

FY 2021 delivers 2 prototype launchers; FY 2022 delivers 3 prototype launchers; FY 2023 delivers 3 prototype launchers; FY 2024 delivers 2 prototype launchers.

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

Project 688 is a developmental effort for the Palletized Field Artillery Launcher. Palletized Field Artillery Launcher (PFAL) is a palletized erectable, MLRS similar, launcher capable of firing the Multiple Launched Rocket System (MLRS) Family of Munitions (MFOM), to include the Extended Range (ER) Guided Multiple Launch Rocket System (GMLRS), the Army Tactical Missile System (ATACMS), and the Precision Strike Missile (PrSM). These munitions are capable of engaging targets with precision at ranges in excess of 400 kilometers. Palletized Field Artillery Launcher provides alternatives to deliver near-term innovative long-range strike capabilities to Combatant Commanders. This effort will design, develop, and deploy a safe and effective launcher system and integrate multiple sub-systems, including an erectable palletized MLRS launcher, a Fire Control System (FCS), a communications platform, and a Power Management System in a continuous user evaluation with Soldiers. In FY 2020, PFAL transitions from Strategic Capability Office (SCO) to the Army. This effort was previously funded under program element 0604250D8Z as part of Project "Strike-X" (PB2019 Defense Wide RDTE BLIN 96). Project code 688 previously integrated Strategic Capabilities Office (SCO) Breaker program demonstrated capabilities into ATACMS.

**Justification:**

FY 2020 Base funding in the amount of \$25.000 million for Project 688 funds the development efforts to correct deficiencies found in the prototype design to obtain a safety certification which will allow for an Urgent Materiel Release. Base year funding allows for further design and development to ensure the safe and effective deployment of operational prototypes to Soldiers in a continuous user evaluation.

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

| Title: Transition of SCO demonstrated capabilities to defeat armored targets  | FY 2018 | FY 2019 | FY 2020 |
|---|---------|---------|---------|
| <b>Description:</b> Conduct warhead component requirements development, system integration analysis, and transition planning targeted at rapid qualification and fielding of the armor engagement capability. | 3.840   | 1.784   | -       |
| <b>FY 2019 Plans:</b><br>Continue system analysis & evaluation, requirements & specification development, and program transition activities.  |         |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Transition of SCO demonstrated capabilities to defeat armored targets activities completing in FY 2019.   |         |         |         |
| <b>Title:</b> Palletized Field Artillery Launcher (PFAL)  | -       | -       | 25.000  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   |   |   | <b>Date:</b> March 2019                      |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) | <b>Project (Number/Name)</b><br>688 / ATACMS BLK II |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |   |   | <b>FY 2018</b> <b>FY 2019</b> <b>FY 2020</b> |
| <p><b>Description:</b> The Palletized Field Artillery Launcher (PFAL) Program provides a palletized erectable launcher capable of firing the Multiple Launched Rocket System (MLRS) Family of Munitions (MFOM). This effort will design, develop, and demonstrate this launcher system and integrate multiple sub-systems with intent to develop and deploy prototypes in a continuous user evaluation with Soldiers.</p> <p><b>FY 2020 Plans:</b><br/>FY 2020 is the first year of funding for Palletized Field Artillery Launcher under this Project code. Conduct analysis and redesign to demonstrate safe and effective design, development, and deployment of prototypes with Soldiers as part of a continuous user evaluation. This effort's funding will be executed by Program Executive Officer for Missiles and Space.</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>Increased funding of \$25.000 million funds transition of Palletized Field Artillery Launcher from Strategic Capabilities Office to the Army and continues the research and prototype development of Palletized Field Artillery Launcher. This effort was previously funded under program element 0604250D8Z as part of Project ?Strike-X? (PB2019 Defense Wide RDTE BLIN 96).</p> |   |   |  |
| <p><b>Title:</b> FY 2019 SBIR / STTR Transfer</p> <p><b>Description:</b> FY 2019 SBIR / STTR Transfer</p> <p><b>FY 2019 Plans:</b><br/>FY 2019 SBIR / STTR Transfer</p> <p><b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br/>Decrease due to FY 2019 SBIR / STTR Transfer.</p>  |   |   | -    0.159    -                              |
| <b>Accomplishments/Planned Programs Subtotals</b>  |   |   | 3.840    1.943    25.000                     |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |   |   |  |
| N/A  |   |   |  |
| <b>Remarks</b>   |   |   |  |
| There are no procurement lines for this program. This effort was previously funded under program element 0604250D8Z as part of project "Strike-X" (PB2019 Defense-Wide RDTE BLIN 96).  |   |   |  |
| <b>D. Acquisition Strategy</b>   |   |   |  |
| The Palletized Field Artillery Launcher (PFAL) Program transitions from a Strategic Capabilities Office managed effort to management by the Army's Field Artillery Launcher program office. The PFAL Program performs development efforts required to address emerging requirements. Emerging requirements include, but are not limited to, updates that address emerging threats of PFAL's organic version software, reacting to system changes driven by policy and emerging requirements, and   |   |   |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |   | <b>Date:</b> March 2019                             |
|---|---|---|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604768A / <i>Brilliant Anti-Armor Submunition (BAT)</i> | <b>Project (Number/Name)</b><br>688 / ATACMS BLK II |
| maintaining architectural compatibility. Conduct analysis and redesign to demonstrate safe and effective design, development, and deployment of prototypes in a continuous evaluation with Soldiers. Update software and hardware for communications and munitions to maintain compatibility and operational viability against a near-peer adversary. |   |   |
| <b>E. Performance Metrics</b><br>N/A  |   |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army   |                        |                                |             |  |            |         |            |  |                 |                |                | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|--|------------|---------|------------|--|-----------------|----------------|----------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5  |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) |            |         |            | Project (Number/Name)<br>688 / ATACMS BLK II |                 |                |                |                  |                  |                  |                          |                          |
| Management Services (\$ in Millions)   |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020<br>Base                              |                 | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | 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 : RSA                  | -           | 0.900  | Nov 2017   | 0.947   | Nov 2018   | -  | -               | -              | -              | -                | 0.000            | 1.847            | -                        |                          |
| <b>Subtotal</b>  |                        |                                |             | 0.900  |            | 0.947   |            | -  | -               | -              | -              | -                | 0.000            | 1.847            | N/A                      |                          |
| <b>Remarks</b><br>FY2020 and beyond program management costs are funded in the Operations and Maintenance, Army (OMA) appropriation.   |                        |                                |             |  |            |         |            |  |                 |                |                |                  |                  |                  |                          |                          |
| Product Development (\$ in Millions)   |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020<br>Base                              |                 | FY 2020<br>OCO |                | FY 2020<br>Total |                  |                  |                          |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date      | Cost           | Award Date     | Cost             | Cost To Complete | Total Cost       | Target Value of Contract |                          |
| Warhead Development  | C/CPFF                 | LMMFC : Dallas, TX             | -           | 2.100  | Jan 2018   | 0.200   | Jan 2019   | -  | -               | -              | -              | -                | 0.000            | 2.300            | -                        |                          |
| System Analysis, Requirement & Spec Dev  | MIPR                   | AMRDEC : RSA                   | -           | 0.840  | Nov 2017   | 0.637   | Nov 2018   | -  | -               | -              | -              | -                | 0.000            | 1.477            | -                        |                          |
| Palletized Field Artillery Launcher Development Engineering  | MIPR                   | AMRDEC : Redstone Arsenal      | -           | -  |            | -       |            | 25.000                                       | Jan 2020        | -              | 25.000         | 126.000          | 151.000          | -                | -                        |                          |
| FY 2019 SBIR / STTR Transfer   | TBD                    | TBD : TBD                      | -           | -  |            | 0.159   |            | -  | -               | -              | -              | -                | 0.000            | 0.159            | -                        |                          |
| <b>Subtotal</b>  |                        |                                |             | 2.940  |            | 0.996   |            | 25.000                                       |                 | -              | -              | 25.000           | 126.000          | 154.936          | N/A                      |                          |
|  |                        |                                |             | Prior Years  | FY 2018    |         | FY 2019    |  | FY 2020<br>Base |                | FY 2020<br>OCO |                  | FY 2020<br>Total | Cost To Complete | Total Cost               | Target Value of Contract |
| <b>Project Cost Totals</b>   |                        |                                |             | -  | 3.840      |         | 1.943      |  | 25.000          |                | -              | -                | 25.000           | 126.000          | 156.783                  | N/A                      |
| <b>Remarks</b><br>Acronyms:<br>RSA - Redstone Arsenal, Alabama;<br>AMRDEC - Aviation and Missile Research, Development and Engineering Command;<br>LMMFC - Lockheed Martin Missiles and Fire Control |                        |                                |             |  |            |         |            |  |                 |                |                |                  |                  |                  |                          |                          |

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| 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) |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| 2040 / 5  |            |         |   | PE 0604768A / Brilliant Anti-Armor Submunition (BAT) |   |         |   | 688 / ATACMS BLK II   |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| <table><thead><tr><th rowspan="2">Event Name</th><th colspan="4">FY 2018</th><th colspan="4">FY 2019</th><th colspan="4">FY 2020</th><th colspan="4">FY 2021</th><th colspan="4">FY 2022</th><th colspan="4">FY 2023</th><th colspan="4">FY 2024</th></tr><tr><th>1</th><th>2</th><th>3</th><th>4</th><th>1</th><th>2</th><th>3</th><th>4</th><th>1</th><th>2</th><th>3</th><th>4</th><th>1</th><th>2</th><th>3</th><th>4</th><th>1</th><th>2</th><th>3</th><th>4</th><th>1</th><th>2</th><th>3</th><th>4</th><th>1</th><th>2</th><th>3</th><th>4</th></tr></thead><tbody><tr><td>System Analysis, Requirement &amp; Spec Development</td><td colspan="4" style="background-color: #e67e22;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4"></td><td colspan="4"></td><td colspan="4"></td><td colspan="4"></td></tr><tr><td>Warhead Development</td><td colspan="4" style="background-color: #e67e22;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4"></td><td colspan="4"></td><td colspan="4"></td><td colspan="4"></td></tr><tr><td>Contract Requirements Package Development</td><td colspan="4" style="background-color: #e67e22;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4"></td><td colspan="4"></td><td colspan="4"></td><td colspan="4"></td></tr><tr><td>Palletized Field Artillery Launcher Development Engineering</td><td colspan="4" style="background-color: #e67e22;"></td><td colspan="4" style="background-color: #e67e22;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4"></td><td colspan="4"></td></tr><tr><td>Flight Tests</td><td colspan="4"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4"></td><td colspan="4"></td><td colspan="4"></td></tr><tr><td>Prototype Production</td><td colspan="4"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4"></td><td colspan="4"></td></tr><tr><td>Prototype Fielding</td><td colspan="4"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4" style="background-color: #0000ff;"></td><td colspan="4"></td></tr><tr><td><p>The Gantt chart illustrates the timeline for various RDT&amp;E activities. The activities are listed on the left, and the timeline is divided into fiscal years (FY) 2018 through 2024. Each activity is represented by a horizontal bar indicating its duration and timing. The bars are color-coded: pink for initial phases and blue for later phases.</p><ul style="list-style-type: none"><li><b>System Analysis, Requirement &amp; Spec Development:</b> FY 2018 (Q1-Q4), FY 2019 (Q1-Q4).</li><li><b>Warhead Development:</b> FY 2018 (Q1-Q4), FY 2019 (Q1-Q4).</li><li><b>Contract Requirements Package Development:</b> FY 2018 (Q1-Q4), FY 2019 (Q1-Q4).</li><li><b>Palletized Field Artillery Launcher Development Engineering:</b> FY 2018 (Q1-Q4), FY 2019 (Q1-Q4), FY 2020 (Q1-Q4), FY 2021 (Q1-Q4), FY 2022 (Q1-Q4), FY 2023 (Q1-Q4), FY 2024 (Q1-Q4).</li><li><b>Flight Tests:</b> FY 2020 (Q1-Q4), FY 2021 (Q1-Q4).</li><li><b>Prototype Production:</b> FY 2021 (Q1-Q4), FY 2022 (Q1-Q4), FY 2023 (Q1-Q4), FY 2024 (Q1-Q4).</li><li><b>Prototype Fielding:</b> FY 2022 (Q1-Q4), FY 2023 (Q1-Q4), FY 2024 (Q1-Q4).</li></ul></td></tr></tbody></table> | Event Name | FY 2018 |   |  |   | FY 2019 |   |                       |   | FY 2020 |   |   |                  | FY 2021 |   |   |   | FY 2022 |   |   |   | FY 2023 |   |   |   | FY 2024 |   |   |  | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | 1 | 2 | 3 | 4 | System Analysis, Requirement & Spec Development |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Warhead Development |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Contract Requirements Package Development |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Palletized Field Artillery Launcher Development Engineering |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Flight Tests |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Prototype Production |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | Prototype Fielding |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  | <p>The Gantt chart illustrates the timeline for various RDT&amp;E activities. 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|   | 1          | 2       | 3 | 4  | 1 | 2       | 3 | 4                     | 1 | 2       | 3 | 4 | 1                | 2       | 3 | 4 | 1 | 2       | 3 | 4 | 1 | 2       | 3 | 4 | 1 | 2       | 3 | 4 |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| System Analysis, Requirement & Spec Development   |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Warhead Development   |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Contract Requirements Package Development   |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Palletized Field Artillery Launcher Development Engineering   |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Flight Tests  |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Prototype Production  |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| Prototype Fielding  |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| <p>The Gantt chart illustrates the timeline for various RDT&amp;E activities. The activities are listed on the left, and the timeline is divided into fiscal years (FY) 2018 through 2024. Each activity is represented by a horizontal bar indicating its duration and timing. The bars are color-coded: pink for initial phases and blue for later phases.</p> <ul style="list-style-type: none"><li><b>System Analysis, Requirement &amp; Spec Development:</b> FY 2018 (Q1-Q4), FY 2019 (Q1-Q4).</li><li><b>Warhead Development:</b> FY 2018 (Q1-Q4), FY 2019 (Q1-Q4).</li><li><b>Contract Requirements Package Development:</b> FY 2018 (Q1-Q4), FY 2019 (Q1-Q4).</li><li><b>Palletized Field Artillery Launcher Development Engineering:</b> FY 2018 (Q1-Q4), FY 2019 (Q1-Q4), FY 2020 (Q1-Q4), FY 2021 (Q1-Q4), FY 2022 (Q1-Q4), FY 2023 (Q1-Q4), FY 2024 (Q1-Q4).</li><li><b>Flight Tests:</b> FY 2020 (Q1-Q4), FY 2021 (Q1-Q4).</li><li><b>Prototype Production:</b> FY 2021 (Q1-Q4), FY 2022 (Q1-Q4), FY 2023 (Q1-Q4), FY 2024 (Q1-Q4).</li><li><b>Prototype Fielding:</b> FY 2022 (Q1-Q4), FY 2023 (Q1-Q4), FY 2024 (Q1-Q4).</li></ul>   |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |
| <p>A large rectangular redacted area covering the bottom portion of the chart.</p>  |            |         |   |  |   |         |   |                       |   |         |   |   |                  |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                     |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |              |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                      |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |                    |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |   |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army          |  |  |         | Date: March 2019 |
|---|--|--|---------|------------------|
| Appropriation/Budget Activity<br>2040 / 5                   | R-1 Program Element (Number/Name)<br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) | Project (Number/Name)<br>688 / ATACMS BLK II |         |                  |
| Schedule Details  |  |  |         |                  |
| Events  | Start  | End  | Quarter | Year             |
| System Analysis, Requirement & Spec Development             | 1  | 2018   | 4       | 2019             |
| Warhead Development   | 1  | 2019   | 4       | 2019             |
| Contract Requirements Package Development                   | 1  | 2018   | 4       | 2019             |
| Palletized Field Artillery Launcher Development Engineering | 1  | 2020   | 4       | 2024             |
| Flight Tests  | 3  | 2020   | 3       | 2021             |
| Prototype Production  | 1  | 2021   | 4       | 2023             |
| Prototype Fielding  | 1  | 2022   | 4       | 2024             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |  |                | Date: March 2019 |                |  |
|--|-------------|---------|---------|--------------|--|---------------|---------|---------|--|----------------|------------------|----------------|--|
| Appropriation/Budget Activity<br>2040 / 5  |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) |               |         |         | Project (Number/Name)<br>P01 / MULTI - MODE SEEKER<br>DEVELOPMENT AND TEST |                |                  |                |  |
| COST (\$ in Millions)  | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023  | FY 2024        | Cost To Complete | Total Cost     |  |
| P01: <i>MULTI - MODE SEEKER<br/>DEVELOPMENT AND TEST</i>   | -           | 4.046   | 4.943   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000  | 0.000          | 0.000            | 8.989          |  |
| Quantity of RDT&E Articles   | -           | -       | -       | -            | -  | -             | -       | -       | -  | -              | -                |                |  |
| <b>A. Mission Description and Budget Item Justification</b>  |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| Multi-Mode Seeker will integrate Strategic Capabilities Office (SCO) STRIKE-X program demonstrated capabilities into ATACMS. This effort focuses on providing integration of a seeker to search, detect, acquire, and engage moving maritime/land-based targets. |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| There is no funding in FY 2020.  |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| <b>Title:</b> Transition of SCO demonstrated capabilities to defeat maritime targets   |             |         |         |              |  |               |         |         |  | <b>FY 2018</b> | <b>FY 2019</b>   | <b>FY 2020</b> |  |
| <b>Description:</b> Conduct seeker component requirements development, system integration analysis, and transition planning targeted at rapid qualification and fielding of the maritime engagement capability.  |             |         |         |              |  |               |         |         |  | 4.046          | 4.784            | -              |  |
| <b>FY 2019 Plans:</b><br>Continue system analysis & evaluation, requirements & specification development, Sensor Development, System Integration, and program transition activities.   |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 is the last year of funding.   |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| <b>Title:</b> FY 2019 SBIR / STTR Transfer   |             |         |         |              |  |               |         |         |  | -              | 0.159            | -              |  |
| <b>Description:</b> FY 2019 SBIR / STTR Transfer   |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| <b>FY 2019 Plans:</b><br>FY 2019 SBIR / STTR Transfer  |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>FY 2019 is the last year of funding.   |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |             |         |         |              |  |               |         |         |  | 4.046          | 4.943            | -              |  |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |             |         |         |              |  |               |         |         |  |                |                  |                |  |
| N/A  |             |         |         |              |  |               |         |         |  |                |                  |                |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   | <b>Date:</b> March 2019   |   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) | <b>Project (Number/Name)</b><br>P01 / MULTI - MODE SEEKER<br>DEVELOPMENT AND TEST |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |   |   |
| <b>Remarks</b>   |   |   |
| <b>D. Acquisition Strategy</b><br>Accelerate the transition of Strategic Capabilities Office (SCO) STRIKE-X program demonstrated capabilities into ATACMS. |   |   |
| <b>E. Performance Metrics</b><br>N/A   |   |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army  |                        |                                |             |  |            |         |            |  |            |                |            | Date: March 2019 |                  |            |                          |
|---|------------------------|--------------------------------|-------------|--|------------|---------|------------|--|------------|----------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5   |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) |            |         |            | Project (Number/Name)<br>P01 / MULTI - MODE SEEKER<br>DEVELOPMENT AND TEST |            |                |            |                  |                  |            |                          |
| Management Services (\$ in Millions)  |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | 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 : RSA                  | -           | 0.900  | Nov 2017   | 0.947   | Nov 2018   | -  | -          | -              | -          | -                | 0.000            | 1.847      | -                        |
| <b>Subtotal</b>   |                        |                                |             | 0.900  |            | 0.947   |            | -  | -          | -              | -          | -                | 0.000            | 1.847      | N/A                      |
| <b>Remarks</b><br>RSA-Redstone Arsenal, Alabama   |                        |                                |             |  |            |         |            |  |            |                |            |                  |                  |            |                          |
| Product Development (\$ in Millions)  |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | Prior Years | Cost   | Award Date | Cost    | Award Date | Cost   | Award Date | Cost           | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Seeker Development  | C/CPFF                 | Various : Various              | -           | 0.900  | Jan 2018   | 1.500   | Jan 2019   | -  | -          | -              | -          | -                | 0.000            | 2.400      | -                        |
| System Analysis, Requirement & Spec Dev   | MIPR                   | AMRDEC : RSA                   | -           | 1.123  | Jan 2018   | 1.337   | Jan 2019   | -  | -          | -              | -          | -                | 0.000            | 2.460      | -                        |
| FY 2019 SBIR / STTR Transfer  | TBD                    | TBD : TBD                      | -           | -  |            | 0.159   |            | -  | -          | -              | -          | -                | 0.000            | 0.159      | -                        |
| <b>Subtotal</b>   |                        |                                |             | 2.023  |            | 2.996   |            | -  | -          | -              | -          | -                | 0.000            | 5.019      | N/A                      |
| <b>Remarks</b><br>AMRDEC-U.S. Army Research, Development and Engineering Command; RSA-Redstone Arsenal, Alabama |                        |                                |             |  |            |         |            |  |            |                |            |                  |                  |            |                          |
| Test and Evaluation (\$ in Millions)  |                        |                                |             | FY 2018  |            | FY 2019 |            | FY 2020<br>Base  |            | FY 2020<br>OCO |            | FY 2020<br>Total |                  |            |                          |
| Cost Category Item  | Contract Method & Type | Performing Activity & Location | 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 Hardware   | MIPR                   | Redstone Test Center : RSA     | -           | 1.123  | Nov 2017   | 1.000   | Nov 2018   | -  | -          | -              | -          | -                | 0.000            | 2.123      | -                        |
| <b>Subtotal</b>   |                        |                                |             | 1.123  |            | 1.000   |            | -  | -          | -              | -          | -                | 0.000            | 2.123      | N/A                      |
| <b>Remarks</b><br>RSA-Redstone Arsenal, Alabama   |                        |                                |             |  |            |         |            |  |            |                |            |                  |                  |            |                          |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                |         |  |  |                 |  |  |  |                  | Date: March 2019    |               |                                |
|--|----------------|---------|--|--|-----------------|--|--|--|------------------|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                |         | R-1 Program Element (Number/Name)<br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) |  |                 |  | Project (Number/Name)<br>P01 / MULTI - MODE SEEKER<br>DEVELOPMENT AND TEST |  |                  |                     |               |                                |
|  | Prior<br>Years | FY 2018 | FY 2019  |  | FY 2020<br>Base |  | FY 2020<br>OCO   |  | FY 2020<br>Total | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
| Project Cost Totals                                    | -              | 4.046   | 4.943  |  | -               |  | -  |  | -                | 0.000               | 8.989         | N/A                            |
| <u>Remarks</u>   |                |         |  |  |                 |  |  |  |                  |                     |               |                                |

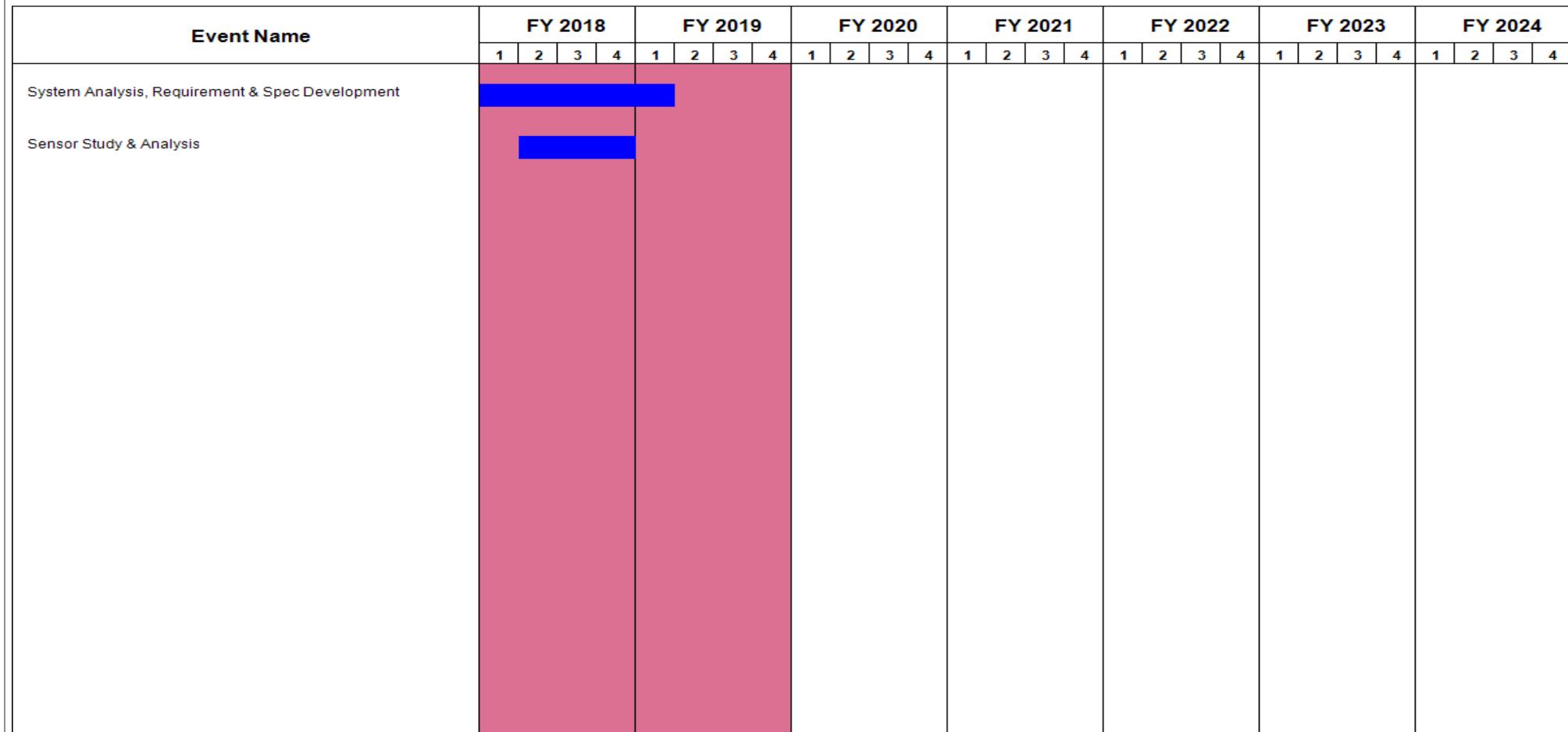
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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

2040 / 5

**R-1 Program Element (Number/Name)**PE 0604768A / Brilliant Anti-Armor  
Submunition (BAT)**Project (Number/Name)**P01 / MULTI - MODE SEEKER  
DEVELOPMENT AND TEST

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |  |  | Date: March 2019 |
|--|--|--|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604768A / Brilliant Anti-Armor<br>Submunition (BAT) | Project (Number/Name)<br>P01 / MULTI - MODE SEEKER<br>DEVELOPMENT AND TEST |                  |
| Schedule Details                                   |  |  |                  |
| Events   | Start<br>Quarter   | End<br>Quarter   | Year             |
| System Analysis, Requirement & Spec Development    | 1  | 2018   | 1<br>2019        |
| Sensor Study & Analysis                            | 2  | 2018   | 4<br>2018        |

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army  |             |         |         |              |  |               |         |         |         |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name)                        |               |         |         |         |         |                  |            |
| 2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) |             |         |         |              | PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |               |         |         |         |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | 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   | -           | 17.855  | 21.936  | 9.241        | -  | 9.241         | 8.837   | 9.521   | 9.904   | 9.848   | Continuing       | Continuing |
| 571: Close Cbt Tact Trainer   | -           | 0.899   | 0.664   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 1.563      |
| 577: Gaming Technology In Support Of Army Training  | -           | 0.515   | 2.265   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 2.780      |
| 582: Synthetic Envir Core   | -           | 11.084  | 9.717   | 9.241        | -  | 9.241         | 8.837   | 9.521   | 9.904   | 9.848   | Continuing       | Continuing |
| 585: Aviation Combined Arms Tactical Trainer  | -           | 5.357   | 9.290   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 14.647     |

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

The Combined Arms Tactical Trainers (CATT) represent a family of combined arms simulation systems designed to support the Army's simulation-based, Combined Arms Training Strategy. The CATT program portfolio directly supports the Army's Training Strategy and progressive training model by providing realistic training events and comprehensive After Action Reviews (AAR). CATT enables units, from crew to the battalion task force level, to conduct a wide variety of combat tasks on a realistic, interactive, synthetic battlefield. CATT's combination of manned simulators and staff officer workstations enables units to train as a combined arms team in a cost effective manner. The primary CATT system is the Close Combat Tactical Trainer (CCTT) which provides the underlying baseline architecture and AAR for CATT expansions, Pre-Planned Product Improvements (P3I) and system enhancements. The Reconfigurable Vehicle Simulator (RVS) supports combat convoy operations and Improvised Explosive Devices (IED) tasks. Synthetic Environment (SE) Core provides for the expansion of the synthetic environment baseline to include enhanced interoperability and the products and infrastructure to support current and future combat operations and mission rehearsals required for Unified Land Operations. The first synthetic environments expanded were in the Aviation Combined Arms Tactical Trainer (AVCATT) and the CCTT for both the Active and Reserve components. Gaming Technology provides an application to train and rehearse convoy-operations, platoon level, mounted infantry tactics, dismounted operations, rules-of-engagement training, cross-cultural communications training, IED defeat training, route clearance, ground-air coordination, Unmanned Aerial Vehicle (UAV) integration, and other small unit and individual training and mission rehearsal requirements. Soldiers can train in a common environment on geotypical or geospecific virtual terrain. It is also possible to link Gaming technology to actual communication, command, control, computer, and intelligence (C4I) systems and other CATT simulation systems to increase the utility and realism of the training. By practicing skills in CATT, units are able to effectively prepare for costly live fire and maneuver exercises, as well as training tasks deemed too hazardous to conduct in a live training environment. Fielded in both fixed site and mobile versions, CATT enables both Active and Reserve component units to prepare for real world contingency missions. By being able to use a wide array of training terrain databases and modify the behavior of the computer generated opposing forces, CATT offers an unlimited array of training options to support the Army's many regional combat missions. The combination of tough field and live fire training, and realistic simulation training in CATT, is the formula to prepare Soldiers and their Leaders for the uncertainties they face in combat operations.

FY 2020 base funding of \$9.241 million for SE Core will continue the development of the Standard Terrain Database Generation Capability (STDGC) to ensure the process remains Army Geospatial Center (AGC) certified and that the terrain data maintains the "Gold Standard" quality and remain concurrent with supported training systems. FY 2020 funds will also continue the development and integration of new tools and processes to improve the STDGC to accommodate generation of increasing larger constructive terrain databases.

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: PB 2020 Army</b>   |  |   |                |                     | <b>Date:</b> March 2019 |
|---|--|---|----------------|---------------------|-------------------------|
| <b>Appropriation/Budget Activity</b>  |  | <b>R-1 Program Element (Number/Name)</b>                        |                |                     |                         |
| 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 5: System Development &amp; Demonstration (SDD)</i>  |  | PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i> |                |                     |                         |
| <b>B. Program Change Summary (\$ in Millions)</b>   |  | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020 Base</b> | <b>FY 2020 OCO</b>      |
| Previous President's Budget   |  | 18.566  | 21.964         | 15.554              | -                       |
| Current President's Budget  |  | 17.855  | 21.936         | 9.241               | -                       |
| Total Adjustments   |  | -0.711  | -0.028         | -6.313              | -                       |
| • Congressional General Reductions  |  | -0.015  | -0.028         |                     |                         |
| • Congressional Directed Reductions   |  | -   | -              |                     |                         |
| • Congressional Rescissions   |  | -   | -              |                     |                         |
| • Congressional Adds  |  | -   | -              |                     |                         |
| • Congressional Directed Transfers  |  | -   | -              |                     |                         |
| • Reprogrammings  |  | -0.006  | -              |                     |                         |
| • SBIR/STTR Transfer  |  | -0.690  | -              |                     |                         |
| • Adjustments to Budget Years   |  | -   | -              | -6.313              | -                       |
| <b>Change Summary Explanation</b>   |  |   |                |                     |                         |
| Decrease in FY 2020 budget is due to modernization efforts from Games for Training (GFT), SE Core, CCTT, and AVCATT RDTE funds in order to increase funding for Synthetic Training Environment (STE) in PE 0604121A, Project FD6. |  |   |                |                     |                         |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|--|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5  |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |               |         |         | Project (Number/Name)<br>571 / Close Cbt Tact 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 |  |
| 571: Close Cbt Tact Trainer  | -           | 0.899   | 0.664   | 0.000        | -   | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 1.563      |  |
| Quantity of RDT&E Articles   | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                |            |  |
| <b>A. Mission Description and Budget Item Justification</b>  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| The Close Combat Tactical Trainer (CCTT) immersively and comprehensively trains Armor, Cavalry, Infantry, Mechanized Infantry, and Armored Reconnaissance units from squad through Battalion/Squadron level, to include their staffs. The primary training audience operates from full-crew simulators, reconfigurable command posts, and live battalion command posts to accomplish their combined arms training tasks. CCTT is a ground based, collective training device comprised of the CCTT and the Reconfigurable Vehicle Tactical Trainer (RVTT). CCTT is comprised of full fidelity, manned simulators for the M1 Abrams main battle tank, M2 Bradley Fighting Vehicles (BFV) variants, and Cavalry Fighting Vehicles (CFV). RVTT is a CCTT Reconfigurable Vehicle Simulator (RVS) comprised of full fidelity, manned simulators for the High Mobility Multipurpose Wheeled Vehicle (HMMWV) and Heavy Expanded Mobility Tactical Truck (HEMTT). |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Title:</b> Government Program Management for the Close Combat Tactical Trainer (CCTT) program.  |             |         |         |              |   |               |         |         |   | 0.166   | 0.169            | -          |  |
| <b>Description:</b> Government Program Management for the CCTT program.  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 Plans:</b><br>Will support engineering, technical, contracting support, and will continue operational evaluation support.   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>RDTE funding removed in FY 2020 due to transition to sustainment.  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for CCTT, and Interoperability between CCTT.   |             |         |         |              |   |               |         |         |   | 0.733   | 0.495            | -          |  |
| <b>Description:</b> Continue EMD phase contract activities for CCTT.   |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 Plans:</b><br>Will enable the continued development and integration of gaming technology; and development of virtualization technology into CCTT in support of maneuver training for Armor Brigade Combat Teams.  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>RDTE funding removed in FY 2020 due to transition to sustainment.  |             |         |         |              |   |               |         |         |   |         |                  |            |  |
| <b>Accomplishments/Planned Programs Subtotals</b>  |             |         |         |              |   |               |         |         |   | 0.899   | 0.664            | -          |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>  |         |         |                 |   |                  |         |         |   |         | <b>Date:</b> March 2019 |            |
|---|---------|---------|-----------------|---|------------------|---------|---------|---|---------|-------------------------|------------|
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |         |         |                 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i> |                  |         |         | <b>Project (Number/Name)</b><br>571 / <i>Close Cbt Tact Trainer</i> |         |                         |            |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |         |         |                 |   |                  |         |         |   |         |                         |            |
| Line Item   | FY 2018 | FY 2019 | FY 2020<br>Base | FY 2020<br>OCO  | FY 2020<br>Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To<br>Complete     | Total Cost |
| • NA0170: Close Combat Tactical Trainer   | 34.008  | 33.080  | 0.000           | -   | 0.000            | -       | -       | -   | -       | 0.000                   | 67.088     |
| <b>Remarks</b><br>The RDT&E efforts are essential to provide enhancements for the hardware and software of the program to meet warfighter mission priorities and validated requirements. These enhancements, after proper testing, will be procured and fielded with the program's procurement funds. |         |         |                 |   |                  |         |         |   |         |                         |            |
| <b>D. Acquisition Strategy</b><br>All CCTT development will utilize small business competitively awarded contract vehicles and other Army programs for support of research and development.   |         |         |                 |   |                  |         |         |   |         |                         |            |
| <b>E. Performance Metrics</b><br>N/A  |         |         |                 |   |                  |         |         |   |         |                         |            |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                     |                        |                                |                            |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|----------------------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                                  |                        |                                |                            | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |            |         |            | Project (Number/Name)<br>571 / Close Cbt Tact Trainer |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                                       |                        |                                |                            | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years                | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Government Program Management, Engineering, Technical, Contracting Support | Various                | PEO STRI : Orlando, FL         | 17.870                     | 0.167   | Oct 2018   | 0.169   | Mar 2019   | -   | -          | -           | -          | -                | 0.000            | 18.206     | 17.583                   |
|  |                        |                                | <b>Subtotal</b>            | 17.870  | 0.167      |         | 0.169      |   |            |             |            |                  | 0.000            | 18.206     | 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 |
| EMD Phase - Virtualization   | C/T&M                  | AVT Simulation : Orlando, FL   | 2.681                      | 0.732   | Aug 2018   | 0.495   | Jun 2019   | -   | -          | -           | -          | -                | 0.000            | 3.908      | -                        |
|  |                        |                                | <b>Subtotal</b>            | 2.681   | 0.732      |         | 0.495      |   |            |             |            |                  | 0.000            | 3.908      | 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 |
|  |                        |                                | <b>Project Cost Totals</b> | 20.551  | 0.899      |         | 0.664      |   | -          | -           | -          | -                | 0.000            | 22.114     | N/A                      |

**Remarks**

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| 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)        |   |   |         |   |                  |         |   |   |         |   |   |         |   |  |
| 2040 / 5   |  |         |   | PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |         |   |   | 571 / Close Cbt Tact Trainer |   |   |         |   |                  |         |   |   |         |   |   |         |   |  |
| Event Name   |  | FY 2018 |   |  | FY 2019 |   |   | FY 2020                      |   |   | FY 2021 |   |                  | FY 2022 |   |   | FY 2023 |   |   | FY 2024 |   |  |
|  |  | 1       | 2 | 3  | 4       | 1 | 2 | 3                            | 4 | 1 | 2       | 3 | 4                | 1       | 2 | 3 | 4       | 1 | 2 | 3       | 4 |  |
| P3I in Support of Gaming Technology and Virtualization for Man |  |         |   |  |         |   |   |                              |   |   |         |   |                  |         |   |   |         |   |   |         |   |  |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army                           |   |   | Date: March 2019 |
|--|---|---|------------------|
| Appropriation/Budget Activity<br>2040 / 5                                    | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core | Project (Number/Name)<br>571 / Close Cbt Tact Trainer |                  |
| Schedule Details   |   |   |                  |
| Events   | Start<br>Quarter  | End<br>Year   |                  |
| P3I in Support of Gaming Technology and Virtualization for Maneuver Training | 2   | 2015  | 4                |
|  |   |   | 2019             |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |  |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity                           |             |         |         |              | R-1 Program Element (Number/Name)                        |               |         |         | Project (Number/Name)                               |         |                  |            |  |
| 2040 / 5  |             |         |         |              | PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |               |         |         | 577 / Gaming Technology In Support Of Army Training |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO  | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| 577: Gaming Technology In Support Of Army Training      | -           | 0.515   | 2.265   | 0.000        | -  | 0.000         | 0.000   | 0.000   | 0.000   | 0.000   | 0.000            | 2.780      |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -  | -             | -       | -       | -   | -       | -                |            |  |

**Note**  
The research and development effort for Project 577 - Gaming Technology In Support Of Army Training, has completed and the program will not request funding in FY 2020.

**A. Mission Description and Budget Item Justification**  
The Games for Training (GFT) Program prepares Soldiers and Leaders for executing Unified Land Operations by delivering robust training and mission rehearsal capabilities. The GFT program satisfies the Active, National Guard, and Army Reserves' educational requirements in the Operational, Institutional, and Self-Development Training Domains with a low-overhead, flexible, persistent training capability on geo-specific and geo-typical terrain that is relevant with all military platforms and weapon systems. This gaming capability allows units and commanders to train individual and collective tasks at the company and below level with minimal amount of resourcing required (land, ammunition, transportation, etc.). Through the use of GFT systems, commanders are able to refine and rehearse unit Tactics, Techniques, and Procedures (TTPs) and Standard Operating Procedures (SOPs) prior to executing live, large-scale training events. GFT trains higher echelon units and staffs by facilitating Tactical Exercises Without Troops (TEWT).

The research and development efforts supporting the GFT program has completed, and the program will not request funding in FY 2020.

| B. Accomplishments/Planned Programs (\$ in Millions)   | FY 2018 | FY 2019 | FY 2020 |
|--|---------|---------|---------|
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Games for Training (GFT) program.  | -       | 2.000   | -       |
| <b>Description:</b> Continue EMD phase contract activities for the GFT program.  |         |         |         |
| <b>FY 2019 Plans:</b><br>Funding will be used to conduct integration activities of the GFT system to ensure interoperability with Live, Virtual and Constructive training simulations and Mission Command Systems, and compliance with Risk Management Framework (RMF) requirements. Additionally, funds will be used to develop/integrate models in the Virtual Battle Space 3 (VBS3) software. Lastly, funding will be used to support investigation of the transition of gaming capabilities into data centers. |         |         |         |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease is a result of program completing RDTE efforts, and therefore the program does not require funding in FY 2020   |         |         |         |
| <b>Title:</b> Government Program Management for the GFT program.   | 0.515   | -       | -       |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |         |   |                 |                |  |         |         |         |         | Date: March 2019 |            |         |  |  |  |
|---|---------|---|-----------------|----------------|--|---------|---------|---------|---------|------------------|------------|---------|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5   |         | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |                 |                | Project (Number/Name)<br>577 / Gaming Technology In Support Of Army Training |         |         |         |         |                  |            |         |  |  |  |
| B. Accomplishments/Planned Programs (\$ in Millions)  |         |   |                 |                |  |         |         |         |         | FY 2018          | FY 2019    | FY 2020 |  |  |  |
| <b>Description:</b> Government Program Management for the GFT program.  |         |   |                 |                |  |         |         |         |         | -                | 0.265      | -       |  |  |  |
| <b>Title:</b> FY19 SBIR/STTR Transfer   |         |   |                 |                |  |         |         |         |         | -                | 0.265      | -       |  |  |  |
| <b>Description:</b> Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)   |         |   |                 |                |  |         |         |         |         | -                | 0.265      | -       |  |  |  |
| <b>FY 2019 Plans:</b><br>Accounting for full funding amount.  |         |   |                 |                |  |         |         |         |         | -                | 0.265      | -       |  |  |  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Accounting for full funding amount.   |         |   |                 |                |  |         |         |         |         | -                | 0.265      | -       |  |  |  |
| Accomplishments/Planned Programs Subtotals  |         |   |                 |                |  |         |         |         |         | 0.515            | 2.265      | -       |  |  |  |
| C. Other Program Funding Summary (\$ in Millions)   |         |   |                 |                |  |         |         |         |         |                  |            |         |  |  |  |
| Line Item   | FY 2018 | FY 2019   | FY 2020<br>Base | FY 2020<br>OCO | FY 2020<br>Total   | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |         |  |  |  |
| • NA0176: Gaming Technology In Support of Army Training   | 6.487   | 25.161  | 15.463          | -              | 15.463   | 12.894  | 6.905   | 1.350   | -       | Continuing       | Continuing |         |  |  |  |
| <b>Remarks</b>  |         |   |                 |                |  |         |         |         |         |                  |            |         |  |  |  |
| OPA funding provides concurrency of the Virtual Battlespace 3 (VBS3) software that provides the Army enterprise use rights. Additionally, OPA funding conducts the procurement and fielding of the Stryker Virtual Collective Trainers (SVCT), new gaming hardware suites, and gaming system refreshes to meet Army Risk Management Framework (RMF) requirements. The GFT program will also provide other commercial off the-shelf (COTS) and Government off the-shelf (GOTS) software applications used to train Active, Reserve, and Army National Guard soldiers in a PC based, shared environment   |         |   |                 |                |  |         |         |         |         |                  |            |         |  |  |  |
| <b>D. Acquisition Strategy</b>  |         |   |                 |                |  |         |         |         |         |                  |            |         |  |  |  |
| The acquisition strategy supports Army-wide gaming software for a commercial game based training system with government data rights, Virtual Battlespace 3 (VBS3), and associated Games for Training system cyber compliant hardware. The GFT RMF compliant hardware system consists of a common desktop or laptop computer, headset, and peripherals; this hardware is configured as gaming suites and is fielded to 88 various Army locations. In support of its fielding efforts, the GFT program will acquire fielding support to provide logistical provisioning for the de-confliction and coordination with receiving locations as well as oversight for meeting network and cyber requirements. Additionally, program plans to acquire technical support to provide system monitoring of the GFT hardware and software configuration to ensure compliance with Army's RMF requirements. |         |   |                 |                |  |         |         |         |         |                  |            |         |  |  |  |
| In FY 2018, the GFT Program was directed to end the Program by FY 2024, due to the gaming requirement for training being provided by the Synthetic Training Environment (STE) starting in FY 2021. The GFT Program will meet Full Operational Capability (FOC) in FY 2019 (all 115 BOIP Cyber Compliant Classroom Suites will   |         |   |                 |                |  |         |         |         |         |                  |            |         |  |  |  |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army   | <b>Date:</b> March 2019   |  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i> | <b>Project (Number/Name)</b><br>577 / <i>Gaming Technology In Support Of Army Training</i> |
| be installed). After FOC, there will be a Tech Refresh of previously fielded GFT Classroom Suites to bring them up to RMF compliance through FY 2021, followed by Sustainment beginning in FY 2022 and a Divestment Period beginning in FY 2023 and ending by FY 2024. |   |  |
| <b>E. Performance Metrics</b><br>N/A   |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |                                |             |   |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |            |         |            | Project (Number/Name)<br>577 / Gaming Technology In Support Of Army Training |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base   |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item                                     | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost   | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Government Program Management                          | Various                | PEO STRI : Orlando, FL         | 2.139       | 0.515   | Nov 2017   | -       | -          | -  | -          | -           | -          | -                | 0.000            | 2.654      | 2.654                    |
| SBIR/STTR  | TBD                    | PEO STRI : Orlando, FL         | -           | -   |            | 0.265   | Oct 2018   | -  | -          | -           | -          | -                | 0.000            | 0.265      | -                        |
| <b>Subtotal</b>  |                        |                                | 2.139       | 0.515   |            | 0.265   |            | -  | -          | -           | -          | -                | 0.000            | 2.919      | 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 |
| Games for Training                                     | Various                | PEO STRI : Orlando, FL         | 10.903      | -   |            | 2.000   | Mar 2019   | -  | -          | -           | -          | -                | 0.000            | 12.903     | 13.171                   |
| <b>Subtotal</b>  |                        |                                | 10.903      | -   |            | 2.000   |            | -  | -          | -           | -          | -                | 0.000            | 12.903     | 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 |
| <b>Project Cost Totals</b>                             |                        |                                | 13.042      | 0.515   |            | 2.265   |            | -  |            | -           |            | -                | 0.000            | 15.822     | N/A                      |

Remarks

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| 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)                               |   |   |   |                  |   |   |   |
| 2040 / 5  |         |   |   | PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |         |   |   |   | 577 / Gaming Technology In Support Of Army Training |   |   |   |                  |   |   |   |
| Event Name  | FY 2018 |   |   |  | FY 2019 |   |   |   | FY 2020   |   |   |   | FY 2021          |   |   |   |
|   | 1       | 2 | 3 | 4  | 1       | 2 | 3 | 4 | 1   | 2 | 3 | 4 | 1                | 2 | 3 | 4 |
| GFT Program Management                            |         |   |   |  |         |   |   |   |   |   |   |   |                  |   |   |   |
| GFT Integration with LVC                          |         |   |   |  |         |   |   |   |   |   |   |   |                  |   |   |   |
| GFT Market Research                               |         |   |   |  |         |   |   |   |   |   |   |   |                  |   |   |   |
| GFT Data Center Migration Investigation           |         |   |   |  |         |   |   |   |   |   |   |   |                  |   |   |   |
| GFT Models Development & Integration              |         |   |   |  |         |   |   |   |   |   |   |   |                  |   |   |   |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details: PB 2020 Army</b> |   | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i> | <b>Project (Number/Name)</b><br>577 / <i>Gaming Technology In Support Of Army Training</i> |

**Schedule Details**

| <b>Events</b>                           | <b>Start</b>   |             | <b>End</b>     |             |
|---|----------------|-------------|----------------|-------------|
|   | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| GFT Program Management                  | 1              | 2010        | 4              | 2018        |
| GFT Integration with LVC                | 1              | 2010        | 4              | 2019        |
| GFT Market Research                     | 1              | 2017        | 4              | 2018        |
| GFT Data Center Migration Investigation | 3              | 2019        | 4              | 2019        |
| GFT Models Development & Integration    | 3              | 2019        | 4              | 2019        |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army |             |         |         |              |   |               |         |         |   |         | Date: March 2019 |            |  |
|---|-------------|---------|---------|--------------|---|---------------|---------|---------|---|---------|------------------|------------|--|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |               |         |         | Project (Number/Name)<br>582 / Synthetic Envir Core |         |                  |            |  |
| COST (\$ in Millions)                                   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO   | FY 2020 Total | FY 2021 | FY 2022 | FY 2023   | FY 2024 | Cost To Complete | Total Cost |  |
| 582: Synthetic Envir Core                               | -           | 11.084  | 9.717   | 9.241        | -   | 9.241         | 8.837   | 9.521   | 9.904   | 9.848   | Continuing       | Continuing |  |
| Quantity of RDT&E Articles                              | -           | -       | -       | -            | -   | -             | -       | -       | -   | -       | -                | -          |  |

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

This project supports the Synthetic Environment Core (SE Core) Program. The SE Core Program is a foundational element and the only provider of correlated terrain for the Army's Live, Virtual, Constructive Integrated Training Environment (LVC ITE) that links Army training systems and simulators into an integrated and interoperable environment. SE Core's mission is to ensure that Army systems and simulators support U.S. Army Readiness by providing visual models (buildings and vehicles), terrain (over which the simulator moves), and entity behaviors (models performing realistic and appropriate actions such as movement and weapon effects) that are relevant and realistic to Force 2025 and beyond. As the exclusive provider of correlated terrain, SE Core ensures that all Army simulators/operators receive terrain that allows for a "Fair Fight" capability; that is, no one will have an inherent advantage over another because training did not occur on a "level playing field". Fair Fight allows air and ground forces to hold coordinated and integrated training events that accurately replicate combat operations for a train-as-we-fight capability.

A major component of the program is the SE Core-developed Standard Terrain Database Generation Capability (STDGC), the process used to build the terrain and models that the simulators and simulations employ. The Army Geospatial Center (AGC) gave SE Core its highest rating, the "Gold Standard", based on the quality of the STDGC process and the geospatial data generated by it. The program has been a certified, AGC co-producer of geospatial data since 2014. In addition to the correlated terrain databases and common visual models, SE Core components include Virtual One Semi-Automated Forces (Virtual OneSAF) (the computer generated force behaviors for virtual systems); the virtual systems architecture; and mission command development.

FY 2020 base funding of \$9.241 million for SE Core will continue the development of the STDGC to ensure the process remains AGC certified and that the terrain data maintains the "Gold Standard" quality and remain concurrent with supported training systems. FY 2020 funds will also continue the development and integration of new tools and processes to improve the STDGC to accommodate generation of increasing larger constructive terrain databases.

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

**Title:** Engineering and Manufacturing Development (EMD) phase contract activity for the Synthetic Environment Core (SE Core) program.

**Description:** Continue EMD phase contract activities for the SE Core program.

**FY 2019 Plans:**

Continuing to fulfill requirements of Increment 3. Efforts to automate the terrain generation capability to meet the demand for synthetic terrain for constructive and gaming training will continue. Continue to increase interoperability across simulators and

|  | FY 2018 | FY 2019 | FY 2020 |
|--|---------|---------|---------|
|  | 10.482  | 8.580   | 8.827   |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army  |  |                            | Date: March 2019 |
|--|--|----------------------------|------------------|
| Appropriation/Budget Activity  | R-1 Program Element (Number/Name)                        | Project (Number/Name)      |                  |
| 2040 / 5   | PE 0604780A / Combined Arms Tactical Trainer (CATT) Core | 582 / Synthetic Envir Core |                  |
| B. Accomplishments/Planned Programs (\$ in Millions)   | FY 2018  | FY 2019                    | FY 2020          |
| simulations by improving subterranean capabilities and building interiors. Completing systems engineering required to add additional Integrated Training Environment (ITE) formats into the terrain generation process.  |  |                            |                  |
| <b>FY 2020 Plans:</b><br>Continue to fulfill requirements of Increment 3. Will continue efforts to automate the terrain generation capability to meet the demand for synthetic terrain for constructive simulations. In addition funds are required to ensure the SE Core development environment remains compliant with Risk Management Framework mandates. |  |                            |                  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Minor increase from FY 2019 to FY 2020 is due to cost associated with the automation of the terrain generation capability supporting increasing larger constructive terrain databases.   |  |                            |                  |
| <b>Title:</b> Government Program Management for the Synthetic Environment Core (SE Core) program.<br><b>Description:</b> Government Program Management for the SE Core program.  | 0.602  | 0.572                      | 0.414            |
| <b>FY 2019 Plans:</b><br>Will provide funding for program management travel supporting site surveys, in addition to, funding the Subject Matter Experts providing technical oversight in the development of SE Core terrain generation capability.   |  |                            |                  |
| <b>FY 2020 Plans:</b><br>Will provide funding for program management travel supporting site surveys, in addition to funding the Subject Matter Experts providing technical input into the development of the SE Core terrain generation capability.  |  |                            |                  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Decrease from FY 2019 to FY 2020 is due to decreased cost associated with Subject Matter Experts providing technical input into the development of the SE Core terrain generation capability.  |  |                            |                  |
| <b>Title:</b> FY19 SBIR/STTR Transfer<br><b>Description:</b> Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)   | -  | 0.565                      | -                |
| <b>FY 2019 Plans:</b><br>Accounting for full funding amount.   |  |                            |                  |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>Accounting for full funding amount.  |  |                            |                  |
| <b>Accomplishments/Planned Programs Subtotals</b>  | 11.084   | 9.717                      | 9.241            |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification: PB 2020 Army</b>   |   | <b>Date:</b> March 2019   |
|--|---|---|
| <b>Appropriation/Budget Activity</b><br>2040 / 5   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i> | <b>Project (Number/Name)</b><br>582 / <i>Synthetic Envir Core</i> |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |   |   |
| N/A  |   |   |
| <b>Remarks</b>   |   |   |
| <b>D. Acquisition Strategy</b><br><p>The SE Core program is post Milestone B and will remain in the Engineering and Manufacturing Development phase for the remainder of its lifecycle. SE Core is a "software only" program that continuously develops terrain, virtual models and other software products for integration into existing training systems. It does not field products to the end user, therefore the program will not require a Milestone C decision or go into the Production phase. The SE Core program is developing the software tools and processes to develop the Army's common virtual environment to link simulation devices [to include: Close Combat Tactical Trainer (CCTT), Aviation Close Combat Tactical Trainer (AVCATT) , Games for Training (GFT), Live, Virtual, Constructive Integrating Architecture (LVC-IA), Homestation Instrumentation Training System (HITS), Joint Land Component Constructive Training Capability (JLCCTC), Fires Simulation (FIRESIM), One Semi-Automated Forces (OneSAF)] into an interoperable environment and maintaining the synthetic terrain, models, and virtual OneSAF for the Army's Integrated Training Environment (ITE) concept.</p> <p>The government awarded Increment 2 as a single award, cost plus fixed fee (CPFF), indefinite delivery indefinite quantity (IDIQ) contract to Leidos in August 2011 with a period of performance start date of December 2011. Leidos was formerly known as Science Applications International Corporation (SAIC). This contract has a one-year base with four one-year options. The government exercised the first option in December 2012, the second option in December 2013, the third option in December 2014 and the fourth option in December 2015. The government awarded a final delivery order in December 2016 that extended the period of performance of the Increment 2 contract into December 2017. The contract was extended an additional six months to June 2018 while the Increment 3 contract was competed.</p> <p>In April 2018, in keeping with the original SE Core acquisition strategy of continuous development, the government awarded the Increment 3 contract as a single award, CPFF, IDIQ with a one year base and four one-year options and a target end date of 2023.</p> |   |   |
| <b>E. Performance Metrics</b><br>N/A   |   |   |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army                 |                        |                                |             |   |            |         |            |   |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                              |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |            |         |            | Project (Number/Name)<br>582 / Synthetic Envir Core |            |             |            |                  |                  |            |                          |
| Management Services (\$ in Millions)                                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Management Services  | Various                | Various : Various              | 3.622       | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 3.622      | 3.622                    |
| Government Program Management Support                                  | Various                | PEO STRI : Orlando, FL         | 25.391      | 0.602   | Oct 2017   | 0.572   | Oct 2018   | 0.414   | Oct 2019   | -           |            | 0.414            | Continuing       | Continuing | Continuing               |
| SBIR/STTR  | TBD                    | PEO STRI : Orlando, FL         | -           | -   |            | 0.565   | Oct 2018   | -   |            | -           |            | -                | 0.000            | 0.565      | -                        |
| <b>Subtotal</b>  |                        |                                | 29.013      | 0.602   |            | 1.137   |            | 0.414   |            | -           |            | 0.414            | Continuing       | Continuing | N/A                      |
| Product Development (\$ in Millions)                                   |                        |                                |             | FY 2018   |            | FY 2019 |            | FY 2020 Base  |            | FY 2020 OCO |            | FY 2020 Total    |                  |            |                          |
| Cost Category Item   | Contract Method & Type | Performing Activity & Location | Prior Years | Cost  | Award Date | Cost    | Award Date | Cost  | Award Date | Cost        | Award Date | Cost             | Cost To Complete | Total Cost | Target Value of Contract |
| Technology Development - Architecture and Integration                  | C/CPFF                 | SAIC : Orlando, FL             | 6.946       | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 6.946      | 6.946                    |
| Technology Development -Architecture and Integration                   | C/CPFF                 | SAIC : Orlando, FL             | 50.785      | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 50.785     | 50.785                   |
| Technology Development -Database Virtual Environment Development       | C/CPFF                 | CAE, USA : Orlando, FL         | 56.179      | -   |            | -       |            | -   |            | -           |            | -                | 0.000            | 56.179     | 56.179                   |
| Technology Development-Common Virtual Environment & Management         | C/Various              | Leidos : Orlando, FL           | 76.687      | 3.597   | Dec 2018   | -       |            | -   |            | -           |            | -                | 0.000            | 80.284     | 80.284                   |
| Technology Development-Common Virtual Environment & Management INC III | C/Various              | Leidos, Inc. : Orlando, FL     | -           | 6.885   | Apr 2018   | 3.640   | Oct 2018   | -   |            | -           |            | -                | 0.000            | 10.525     | Continuing               |
| Technology Development-Common Virtual Environment & Management INC III | Option/ Various        | Leidos : Orlando, FL           | -           | -   |            | 4.940   | Mar 2019   | 8.827   | Nov 2019   | -           |            | 8.827            | Continuing       | Continuing | Continuing               |
| <b>Subtotal</b>  |                        |                                | 190.597     | 10.482  |            | 8.580   |            | 8.827   |            | -           |            | 8.827            | Continuing       | Continuing | N/A                      |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army   |                        |                                |             |   |            |         |            |   |              |             |             | Date: March 2019 |                  |                  |                          |                          |
|--|------------------------|--------------------------------|-------------|---|------------|---------|------------|---|--------------|-------------|-------------|------------------|------------------|------------------|--------------------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5  |                        |                                |             | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |            |         |            | Project (Number/Name)<br>582 / Synthetic Envir Core |              |             |             |                  |                  |                  |                          |                          |
| 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 |                          |
| <b>Remarks</b><br>FY2019 award of \$3.640M in Nov 2018 fully funds base year period; Mar 2019 planned award of \$4.940M incrementally funds option year 1 period. FY2020 award in Nov 2019 of \$8.827M funds remaining option year 1 period and awards option year 2 period. |                        |                                |             |   |            |         |            |   |              |             |             |                  |                  |                  |                          |                          |
| 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 |                          |
| Technology Development - Test Support  | Various                | Test Community : Various       | 0.125       | -   |            | -       |            | -   |              | -           |             | -                | 0.000            | 0.125            | 0.125                    |                          |
| <b>Subtotal</b>  |                        |                                | 0.125       | -   |            | -       |            | -   |              | -           |             | -                | 0.000            | 0.125            | 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 |
| <b>Project Cost Totals</b>   |                        |                                |             | 219.735   | 11.084     |         | 9.717      |   | 9.241        |             | -           | 9.241            | Continuing       | Continuing       | N/A                      |                          |
| <b>Remarks</b>   |                        |                                |             |   |            |         |            |   |              |             |             |                  |                  |                  |                          |                          |

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Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army

Date: March 2019

**Appropriation/Budget Activity**

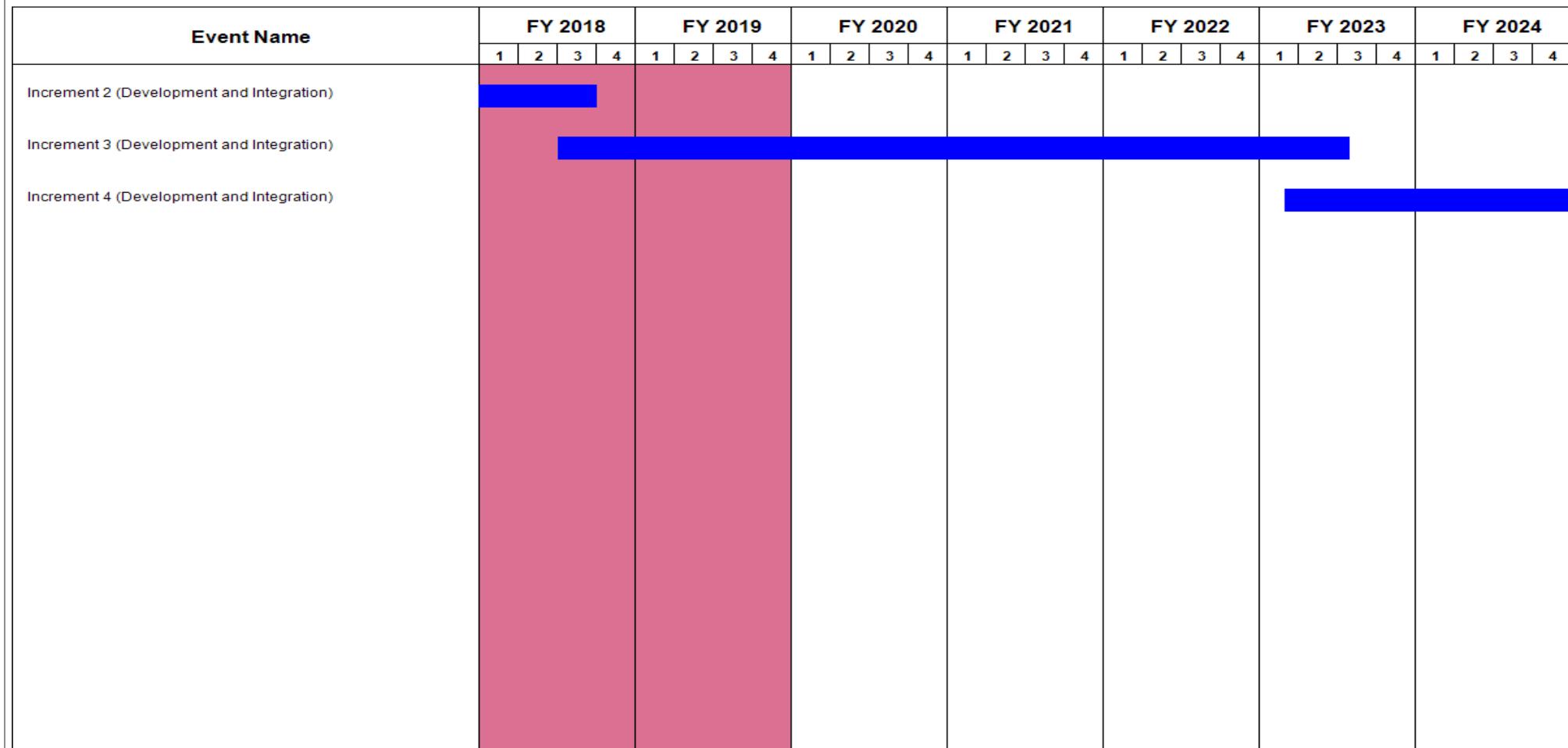
2040 / 5

**R-1 Program Element (Number/Name)**

PE 0604780A / Combined Arms Tactical Trainer (CATT) Core

**Project (Number/Name)**

582 / Synthetic Envir Core



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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army |   |   | Date: March 2019 |
|--|---|---|------------------|
| Appropriation/Budget Activity<br>2040 / 5          | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core | Project (Number/Name)<br>582 / Synthetic Envir Core |                  |
| Schedule Details                                   |   |   |                  |
| Events   | Start   | End   |                  |
| Quarter  | Year  | Quarter   | Year             |
| Increment 2 (Development and Integration)          | 4   | 2013  | 3                |
| Increment 3 (Development and Integration)          | 3   | 2018  | 3                |
| Increment 4 (Development and Integration)          | 1   | 2023  | 4                |
|  |   |   |                  |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Army   |             |         |         |              |                                   |               |         |         |                       |         | Date: March 2019 |            |
|---|-------------|---------|---------|--------------|-----------------------------------|---------------|---------|---------|-----------------------|---------|------------------|------------|
| Appropriation/Budget Activity   |             |         |         |              | R-1 Program Element (Number/Name) |               |         |         | Project (Number/Name) |         |                  |            |
| COST (\$ in Millions)   | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO                       | FY 2020 Total | FY 2021 | FY 2022 | FY 2023               | FY 2024 | Cost To Complete | Total Cost |
| 585: Aviation Combined Arms Tactical Trainer  | -           | 5.357   | 9.290   | 0.000        | -                                 | 0.000         | 0.000   | 0.000   | 0.000                 | 0.000   | 0.000            | 14.647     |
| Quantity of RDT&E Articles  | -           | -       | -       | -            | -                                 | -             | -       | -       | -                     | -       | -                |            |
| <b>A. Mission Description and Budget Item Justification</b>   |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| The Aviation Combined Arms Tactical Trainer (AVCATT) is Army Aviation's only Collective Training Program of Record for Active, Reserve, and Army National Guard Aviation Units. AVCATT enables unit collective and combined arms air-ground training for AH-64, UH-60, CH-47, and UH-72 aircrews within the Live, Virtual and Constructive (LVC) Integrated Training Environment (ITE). The AVCATT also supports the training of Non-Rated crew members in crew coordination, flight, aerial gunnery, hoist, and slingload related tasks via the Non-Rated Crew Member Manned Module (NCM3); which can be linked to AVCATT's UH-60, CH-47, and UH-72 cockpit configurations to support a unit's specific Mission Training Requirements. |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| <b>Title:</b> Government Program Management for the Aviation Combined Arms Tactical Trainer (AVCATT) program.   |             |         |         |              |                                   |               |         |         |                       | 0.104   | 0.106            | -          |
| <b>Description:</b> Government Program Management for the AVCATT program.   |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| <b>FY 2019 Plans:</b><br>Program Management costs were increased to reflect inflation.  |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>RDTE funding removed in FY 2020 due to transition to sustainment.   |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| <b>Title:</b> Engineering and Manufacturing Development (EMD) phase contract activity for the Aviation Combined Arms Tactical Trainer (AVCATT) program.   |             |         |         |              |                                   |               |         |         |                       | 5.253   | 8.636            | -          |
| <b>Description:</b> Continue EMD phase contract activities for the AVCATT program.  |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| <b>FY 2019 Plans:</b><br>Continue EMD phase contract activities for the AVCATT program. Replacement of both the AVCATT and NCM3 Image Generators with next generation, game based, cloud delivered rendering technology and the modification of existing AVCATT and NCM3 software baselines and data products (17 terrain databases and hundreds of 3D visual models) to accommodate the new image generator technology are planned.  |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b><br>RDTE funding removed in FY 2020 due to transition to sustainment.   |             |         |         |              |                                   |               |         |         |                       |         |                  |            |
| <b>Title:</b> FY19 SBIR/STTR Transfer   |             |         |         |              |                                   |               |         |         |                       | -       | 0.548            | -          |

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|---|----------------|----------------|--|----------------|---|----------------|----------------|---|----------------|-------------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army  |                |                |  |                |   |                |                |   |                | <b>Date:</b> March 2019 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5  |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |                |   |                |                | <b>Project (Number/Name)</b><br>585 / Aviation Combined Arms Tactical Trainer |                |                         |
| <b>B. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |                |  |                |   |                |                | <b>FY 2018</b>  | <b>FY 2019</b> | <b>FY 2020</b>          |
| <i>Description:</i> Small Business Innovation Research (SBIR) / Small Business Technology Transfer (STTR)<br><br><i>FY 2019 Plans:</i><br>Accounting for full funding amount.<br><br><i>FY 2019 to FY 2020 Increase/Decrease Statement:</i><br>Accounting for full funding amount.  |                |                |  |                |   |                |                |   |                |                         |
|   |                |                |  |                | <b>Accomplishments/Planned Programs Subtotals</b> |                |                | 5.357   | 9.290          | -                       |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>  |                |                |  |                |   |                |                |   |                |                         |
| <b>Line Item</b>  | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b>   | <b>FY 2020</b> | <b>FY 2020</b>                                    | <b>FY 2021</b> | <b>FY 2022</b> | <b>FY 2023</b>  | <b>FY 2024</b> | <b>Cost To Complete</b> |
| • NA0173: Aviation Combined Arms Tactical Trainer   | 30.568         | 32.700         | 4.840  | -              | 4.840   | 4.947          | -              | -   | -              | Continuing              |
| <b>Remarks</b>  |                |                |  |                |   |                |                |   |                |                         |
| <b>D. Acquisition Strategy</b>  |                |                |  |                |   |                |                |   |                |                         |
| The government awarded a single award, cost plus fixed fee (CPFF), indefinite delivery indefinite quantity (IDIQ) contract to Applied Visual Technologies, a minority owned, small disadvantaged business, in December 2012. The period of performance of the base contract is through December 2017. Additional tasks are exercised through delivery orders which each have multiple options for development. The most recently awarded RDTE effort was on the fourth delivery order, awarded in September 2014, which included options for gunnery enhancements, integrated data modem development, training environment virtualization, aviation mission planning software development, maintenance tool kit development, manned unmanned teaming, and AH-64E concurrency development. |                |                |  |                |   |                |                |   |                |                         |
| The government awarded a single award, CPFF, IDIQ services contract to Cole Engineering Services, Inc, a small business, in September 2015. The period of performance of the base contract is through September 2020. The third task order, awarded in June 2016, included hardware modernization development and Windows 10 research and testing.  |                |                |  |                |   |                |                |   |                |                         |
| AVCATT utilizes small business competitively awarded contract vehicles when able. Currently small businesses are conducting development for dynamic terrain enhancements, NCM3 development, and training effectiveness analysis.  |                |                |  |                |   |                |                |   |                |                         |
| The AVCATT program is post Milestone C. Although the system is in the production phase, continuous research, development, testing, and engineering is required in order to maintain concurrency with the real world aircraft and systems that the AVCATT simulates in the virtual training environment. The AVCATT program has fielded the full base order of issue of 23 suites but continues to release incremental hardware and software upgrades at approximate semiannual intervals. RDTE efforts will not continue in FY 2020, as system begins its transition into sustainment.  |                |                |  |                |   |                |                |   |                |                         |

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| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2020 Army |   | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5                   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i> | <b>Project (Number/Name)</b><br>585 / <i>Aviation Combined Arms Tactical Trainer</i> |
| <b>E. Performance Metrics</b>                                      |   |  |
| N/A  |   |  |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army |                        |  |             |   |            |         |            |  |            |             |            | Date: March 2019 |                  |            |                          |
|--|------------------------|--|-------------|---|------------|---------|------------|--|------------|-------------|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                        |  |             | R-1 Program Element (Number/Name)<br>PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |            |         |            | Project (Number/Name)<br>585 / Aviation Combined Arms Tactical Trainer |            |             |            |                  |                  |            |                          |
| 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 |
| AVCATT Program Management Support                      | Various                | PEO STRI : Orlando, FL                       | 3.544       | 0.104   | Oct 2017   | 0.106   | Oct 2018   | -  | -          | -           | -          | -                | 0.000            | 3.754      | -                        |
| SBIR/STTR  | TBD                    | PEO STRI : Orlando, FL                       | -           | -   |            | 0.548   | Oct 2018   | -  | -          | -           | -          | -                | 0.000            | 0.548      | -                        |
| <b>Subtotal</b>  |                        | 3.544  | 0.104       |   | 0.654      |         |            |  |            |             |            |                  | 0.000            | 4.302      | 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 |
| AVCATT Interoperability                                | C/CPFF                 | Cole Engineering Services, INC : Orlando, FL | -           | 2.826   |            | 1.042   | Jul 2019   | -  | -          | -           | -          | -                | 0.000            | 3.868      | -                        |
| AVCATT Image Generators                                | C/CPFF                 | Cole Engineering Services, INC : Orlando, FL | -           | 2.427   |            | 7.594   | May 2019   | -  | -          | -           | -          | -                | 0.000            | 10.021     | -                        |
| AVCATT Virtualization - Manned Module                  | C/CPFF                 | Cole Engineering Services, INC : Orlando, FL | 2.228       | -   |            | -       |            | -  | -          | -           | -          | -                | 0.000            | 2.228      | -                        |
| <b>Subtotal</b>  |                        | 2.228  | 5.253       |   | 8.636      |         |            |  |            |             |            |                  | 0.000            | 16.117     | 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 |
| <b>Project Cost Totals</b>                             |                        |  | 5.772       | 5.357   |            | 9.290   |            | -  |            | -           |            | -                | 0.000            | 20.419     | N/A                      |
| <b>Remarks</b>   |                        |  |             |   |            |         |            |  |            |             |            |                  |                  |            |                          |

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| 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)                         |         |   |         |                  |         |   |         |   |  |  |  |
| 2040 / 5  |  |  |  | PE 0604780A / Combined Arms Tactical Trainer (CATT) Core |   |         |   |         | 585 / Aviation Combined Arms Tactical Trainer |         |   |         |                  |         |   |         |   |  |  |  |
| Event Name  |  |  |  | FY 2018  |   | FY 2019 |   | FY 2020 |   | FY 2021 |   | FY 2022 |                  | FY 2023 |   | FY 2024 |   |  |  |  |
|   |  |  |  | 1  | 2 | 3       | 4 | 1       | 2   | 3       | 4 | 1       | 2                | 3       | 4 | 1       | 2 |  |  |  |
| AVCATT/NCM3 EMD                                   |  |  |  |  |   |         |   |         |   |         |   |         |                  |         |   |         |   |  |  |  |
| AVCATT Interoperability                           |  |  |  |  |   |         |   |         |   |         |   |         |                  |         |   |         |   |  |  |  |
| AVCATT Image Generator                            |  |  |  |  |   |         |   |         |   |         |   |         |                  |         |   |         |   |  |  |  |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army |   | <b>Date:</b> March 2019  |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604780A / <i>Combined Arms Tactical Trainer (CATT) Core</i> | <b>Project (Number/Name)</b><br>585 / <i>Aviation Combined Arms Tactical Trainer</i> |

**Schedule Details**

| <b>Events</b>           | <b>Start</b>   |             | <b>End</b>     |             |
|-------------------------|----------------|-------------|----------------|-------------|
|                         | <b>Quarter</b> | <b>Year</b> | <b>Quarter</b> | <b>Year</b> |
| AVCATT/NCM3 EMD         | 2              | 2017        | 2              | 2020        |
| AVCATT Interoperability | 2              | 2018        | 4              | 2019        |
| AVCATT Image Generator  | 2              | 2018        | 2              | 2020        |