Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army											Date: February 2018	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.000	70.760	86.167	-	86.167	92.181	68.398	40.277	20.782	0.000	378.565
FB2: *Man Transportable Robotic System (MTRS) Inc II*	-	0.000	6.780	4.304	-	4.304	4.646	0.000	0.000	0.000	0.000	15.730
FB3: *Robotics Architecture*	-	0.000	2.003	1.853	-	1.853	2.879	3.905	4.953	1.991	0.000	17.584
FB4: *Common Robotic Systems*	-	0.000	31.252	29.337	-	29.337	28.438	12.087	0.000	0.000	0.000	101.114
FB6: *Squad Multipurpose Equipment Transport (SMET)*	-	0.000	16.802	19.139	-	19.139	24.077	23.827	14.255	0.000	0.000	98.100
FB7: *Robotics Enhanced Program (REP)*	-	0.000	7.989	9.399	-	9.399	9.506	9.554	9.717	9.694	0.000	55.859
FB8: *Soldier Borne Sensor (SBS)*	-	0.000	2.289	3.469	-	3.469	1.512	1.213	2.239	3.548	0.000	14.270
FB9: *MTRS Standardization*	-	0.000	3.645	15.698	-	15.698	19.937	16.626	7.927	4.363	0.000	68.196
FG8: *Common Robotic Controller*	-	0.000	0.000	2.968	-	2.968	1.186	1.186	1.186	1.186	0.000	7.712

Note

Project FG8 Common Robotic Controller is not a new start effort in FY 2019. In FY 2018, the Common Robotic System, Universal Controller was a subset of the Common Robotic System (Individual) program funded on PE 0605053A Ground Robotics Project FB4. The effort will transition from PE 0605053A Ground Robotics, Project FB4 Common Robotic Systems in FY 2018 to PE 0605053A Ground Robotics, Project FG8 Common Robotic Controller in FY 2019.

A. Mission Description and Budget Item Justification

FB2: The Man-Transportable Robotic System (MTRS) Inc. II is a modular medium-sized system providing a multitude of standoff capabilities through different payloads for the Army. These capabilities include detect and confirm presence, identify, disposition, and counter hazards by providing a platform for payloads in support of current and future mission requirements. MTRS Inc. II will support current and future payload missions for the Engineer's route clearance platoons, Special Operational Forces (SOF) detachments, Chemical Biological Radiological and Nuclear (CBRN), and Explosive Ordnance Disposal (EOD) Units. FY 2019 RDTE funds will enable the MTRS Inc. II program to progress through the EMD phase and into LRIP by funding the following: Production Qualification Test asset procurement, test support, design efforts, contract data procurement, program support, travel, Virtual Clearance Training Suite development, and other expenses related to the MTRS Inc. II RDTE program.

FB3: Robotic Architecture (RA) provides the engineering and development resources to manage the overarching architecture for robotic systems that are both modular and interoperable across the Joint Force in order to facilitate future modernization efforts. It will manage the interoperability standards, modular payload interface, common software and common architecture for universal controllers. RA includes the construction of program specific Interoperability Profiles (IOP) (i.e. Squad Multi-

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0605053A *I Ground Robotics*

Equipment Transport (SMET), Tactical Wheeled Vehicle-Leader Follower (TWV-LF), Route Clearance Interrogation System Type II (RCIS Type II), Common Robotics System (Vehicle) (CRS(V)), Common Robotics System (Individual) (CRS(I)) Inc. II, Common Robotics System (Heavy) (CRS(H)), Enhanced Robotic Payload (ERP), Common Robotic System (Light Reconnaissance) (CRS(LR))/Light Reconnaissance Robot (LRR), Robotic Combat Vehicle-Robotic Wingman (RCV-RW), etc.) and new standards addressing emerging requirements (i.e. Cyber Security, new autonomous behaviors, new payloads, lethality, etc.). FY 2019 RDTE funds support the continued development, finalization, and publishing of the Robotics and Autonomous Systems, Ground (RAS-G) Interoperability Profile (IOP) Version 4.0. IOP V4.0 will provide the required modular open interfaces and compliance test tools for new programs including Robotic Combat Vehicle (RCV) and Enhanced Robotics Payloads (ERP). Additionally, FY 2019 RDTE supports the robotics portfolio wide analysis of software interfaces between active programs including Universal Controller, MTRS Inc. II, CRS(I), RCIS, SMET and Leader Follower.

FB4: The Common Robotic System - (Individual) (CRS(I)) is the Army's small sized (<25 lbs.) Soldier back-packable, remotely operated, common robotic system. The system provides dismounted Soldiers with increased standoff capability from hazardous threats. The system consists of a Universal Controller (UC), a suite of payloads, and open architecture common mobility platform allowing for future capability growth. The CRS(I) will be designed so the operator can quickly re-configure for other various missions by adding or removing modules and/or payloads. The CRS(I) will provide interrogation, detection, confirmation, and neutralization capabilities employed to support a wide spectrum of mobility missions for current and future forces. This capability provides commanders the ability to persistently monitor the Operating Environment (OE) while protecting and sustaining the force. The CRS(I) complements the Joint Integrated Warfighting Force by providing standoff to the Warfighter during major combat, stability, and homeland security operations. FY 2019 RDTE funding support up to two vendors to develop prototypes for submission to government down-select. An option will be issued for Low Rate Initial Production (LRIP) to provide 15 RDTE Production Qualification Test (PQT) articles. This funding also supports a government IPT to provide program management, test and evaluation, and programmatic risk mitigation to address Cyber Security Controls, interoperability (IOP), and analysis of collaborative operations with various Unmanned Systems (i.e. MTRS Inc. II, Light Reconnaissance, Short Range Reconnaissance UAS, etc.) assigned at Battalion and below.

FB6: Squad Multipurpose Equipment Transport (SMET) will help to reduce Soldier loads by transporting mission specific equipment, resupply equipment, and supplies required for extended operations. The SMET will be capable of carrying the equipment currently required to support Infantry and Engineer Platoons in the Infantry Brigade Combat Team (IBCT) for a 72 hour mission without resupply. The SMET will reduce Soldier load, increase squad mobility during combat operations and dismounted maneuvers. SMET will have open architectures, a remote control, support casualty evacuation, power generation/offload and chemical/biological payloads. FY 2019 RDTE funding supports the development and purchase of Technical Insertions, Logistics Support Data, and SMET Program of Record (POR) production contract to include the Statement of Work (SOW) and Request for Project Proposal (RPP). FY 2019 RDTE funding also supports Developmental testing at Aberdeen and the completion of the Technology Demonstration. Program support to include salaries, travel and miscellaneous expense for the SMET program will also be funded.

FB7: The Robotics Enhanced Program (REP) uses a "buy/lease, try, and inform" methodology to evaluate Commercial Off the Shelf (COTS), Government Off the Shelf (GOTS) and Non-Developmental Item (NDI) robotics products that have the potential to enhance Soldier combat effectiveness. Actual operational user feedback and evaluation results obtained inform emerging capabilities and requirements documents as well as support of a return on investment to support future Army decision making. FY 2019 RDTE funds for the REP will be utilized to fund Iteration 19.1 and 19.2 and out-of-cycle iterations which will fund salaries, travel, ERDC and ATEC support, RDECOM support, CoE support, Battle Lab support, and associated experiments. REP will also prepare for and complete Knowledge Point 3 (KP3) in 4QFY19, which will provide a status of the REP to the Program Executive Officer.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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FB8: The Soldier Borne Sensor (SBS) provides a near term solution to three Army Warfighting Challenges at the Infantry Squad level: develop situational understanding, conduct air-ground reconnaissance, and conduct joint combined arms maneuver. The SBS provides the small unit "quick look" capability when higher echelon assets are unavailable and time is of the essence. The system is simple to use, expendable, and deployable in a matter of seconds to support the squad leader's decision-making process. The system allows Soldiers to obtain local situational awareness and understanding of their immediate surroundings while remaining in covered or concealed positions.

FB9: The MTRS Standardization project provides the platforms to support integration and testing of payloads and technology for non-standard unmanned ground robotics systems used by Army Engineers, Explosive Ordnance Disposal (EOD), Chemical, Biological, Radiological, and Nuclear (CBRN) and Special Operational Forces (SOF) units. Current system characteristics include the following: a remote controlled articulated arm with a gripper, operating range up to 800 meters, multiple illuminated cameras, a pan/tilt surveillance camera, two-way radio, and a ruggedized operator control unit. The platforms provided will support development and testing of the following capabilities: High Dexterous Manipulation System (HDMS), Multi-Spectral Image Fusion System (MIFS), and Precision Aimed Multi-shot Disruptor (PAMD). The use of robotics allows the first approach, to potentially explosive hazards, to be made by a robot rather than a Soldier. FY 2019 RDTE funding supports the development of a library of robot parts that can be 3D printed via additive manufacturing. The funding will also test the operational compatibility of the 3D printed parts with robot platforms.

The Common Robotic System, Heavy (CRS(H)) is a modular large-sized system that provides enhanced protection to the EOD Soldier in order to support the Joint Force Commander with the ability to identify, render safe and dispose of explosive ordnance (EO) and improvised explosive devices (IEDs) in support of the Range of Military Operations (ROMO) and Home Land Defense (HLD) operations. CRS(H) will also enable EOD Soldiers to execute Defense Support of the Civil Authorities (DSCA) operations in response to requests from federal, state, local, and tribal authorities for domestic incidents, emergencies, disasters, designated law enforcement support and other activities. CRS(H) will support current and future missions for Explosive Ordnance Disposal (EOD) and Chemical Biological Radiological and Nuclear (CBRN) units. FY 2019 RDTE funds will enable the CRS(H) program to progress into the EMD/LRIP phases by funding the following: Production Qualification Test asset procurement, test support, design efforts, contract data procurement, program support and engineering, travel, and other expenses related to the CRS(H) RDTE program. The Army Acquisition Objective (AAO) for CRS(H) robots is 225. FY 2019 funding will also be utilized to support Enhanced Robotic Payload (ERP) program initiation.

FG8: The Common Robotic Controller/Common Robotic System (Universal Controller) (CRS(UC)) provides the capability to individually and/or concurrently control multiple Unmanned Systems (UxS) platforms and control/monitor a mesh network without having to obtain and/or carry separate Operator Control Unit (OCU)s for each system. A controlled UxS may be mobile or stationary, can be smart learning, and self-adaptive. Two CRS(UC)s will be used to hand-off control of a system to a receiver, reducing hand-off time and the need for the UxSs to have multiple OCUs. The CRS(UC) will also be capable of "hot swapping" batteries where one of its two batteries can be replaced without the system being shut down, halting mission progress, and use current or new Soldier power sources that will maximize its operational time and minimize the number of replacement batteries needed for most missions. The controller will also use haptic indicators inside the hand grips to give the user active feedback of the controlled system's movements if the UxS software is programmed to use them. If and when the use of lethal systems on the CRS(UC) is approved, the weaponized payloads will be controlled via several fail-safe mechanisms to prevent accidental discharge. The intent of this requirement is allow the Soldier at battalion and below to use the Common Robotic System (Universal Controller) to operate unmanned aerial systems (e.g. Raven, PUMA, Short Range Micro

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
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(SRM), Lethal Miniature Aerial Munition System (LMAMS), Autonomous Aerial Resupply, etc.) and unmanned ground vehicles (e.g. CRS(I), CRS(V), CRS(H), SMET, MTRS INC II, Light Reconnaissance (LR), Wingman, etc.). In addition, the project will investigate backwards compatibility for the non-standard equipment robots (e.g. FirstLook, SUGV, Soldier Borne Sensor (SBS), MTRS MK II, etc.). FY 2019 RDTE funds will be utilized to conduct user testing and select a Universal Controller.

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	70.760	88.117	-	88.117
Current President's Budget	0.000	70.760	86.167	-	86.167
Total Adjustments	0.000	0.000	-1.950	-	-1.950
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-1.950	-	-1.950

Change Summary Explanation

The increase in funding from FY 2018 to FY 2019 is mainly attributable to the increased requirements on Project FB9 associated with the Common Robotic System (Heavy) program, a new start effort in FY 2019. It is also attributable to increased testing and technical insertion and payload efforts in FY 2019 associated with Project FB6 Squad Multipurpose Equipment Transport.

In FY2018 funding for the Man Transportable Robotic System (MTRS) Inc. II transitioned from PE 0604808A Landmine Warfare/Barrier - Eng Dev, Project 415 Mine Neutral/Detection to PE 0605053A Ground Robotics, Project FB2 Man Transportable Robotic System (MTRS) Inc. II; Robotics Architecture transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0605053A Ground Robotics, Project FB3 Robotics Architecture; Common Robotics Systems (CRS) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0605053A Ground Robotics, Project FB4 Common Robotic Systems; Robotic Enhanced Program (REP) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0605053A Ground Robotics, Project FB7 Robotic Enhanced Program.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB2 / *Man Transportable Robotic System (MTRS) Inc II*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FB2: *Man Transportable Robotic System (MTRS) Inc II*	-	0.000	6.780	4.304	-	4.304	4.646	0.000	0.000	0.000	0.000	15.730
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for the Man Transportable Robotic System (MTRS) Inc II will transition from PE 0604808A Landmine Warfare/Barrier - Eng Dev, Project 415 Mine Neutral/Detection to PE 0605053A Ground Robotics, Project FB2 Man Transportable Robotic System (MTRS) Inc II

A. Mission Description and Budget Item Justification

The Man-Transportable Robotic System (MTRS) Inc. II is a modular medium-sized system providing a multitude of standoff capabilities through different payloads for the Army. These capabilities include detect and confirm presence, identify, disposition, and counter hazards by providing a platform for payloads in support of current and future mission requirements. MTRS Inc. II will support current and future payload missions for the Engineer's route clearance platoons, Special Operational Forces (SOF) detachments, Chemical Biological Radiological and Nuclear (CBRN), and Explosive Ordnance Disposal (EOD) Units. FY 2019 RDTE funds will enable the MTRS Inc. II program to progress through the EMD phase and into LRIP by funding the following: Production Qualification Test asset procurement, test support, design efforts, contract data procurement, SEPM, travel, Virtual Clearance Training Suite development, and other expenses related to the MTRS Inc. II RDTE program.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: MTRS Inc II RDTE	-	6.780	4.304
Description: MTRS Inc II RDTE funding to support engineering and logistics data, and various test efforts to include test articles, test execution, and test support staff salaries, and System Engineering Program Management (SEPM) costs. ***FY 2018 Plans:*** Funding will be used to acquire First Article Test hardware for test, test site, and test site support, fund design efforts to include Critical Design Review (CDR) and contract data, along with program management costs to include salaries, travel and miscellaneous expenses associated with the MTRS Inc II RDTE program. ***FY 2019 Plans:*** Funding will be used to acquire the remaining Production Qualification Test hardware and test support, fund design efforts and contract data, program management costs to include salaries, travel and miscellaneous expenses associated with the MTRS Inc II RDTE efforts. Funding will also be used for Initial development of the MTRS Inc II integration into the Virtual Clearance Training Suite (VCTS). ***FY 2018 to FY 2019 Increase/Decrease Statement:***			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB2 / *Man Transportable Robotic System (MTRS) Inc II*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Additional funding was required in FY 2018 as the program acquired a significant number of test articles and data deliverables. Less funding is required in FY 2019 as efforts will focus on test and test support costs.			
Accomplishments/Planned Programs Subtotals	-	6.780	4.304

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• R67050: *Man-Transportable Robotic Sys Inc II (MTRS Inc II)*	5.515	-	6.615	-	6.615	19.015	38.967	37.789	29.896	0.000	137.797

Remarks

D. Acquisition Strategy

The MTRS Inc II acquisition strategy will execute an abbreviated Engineering Manufacturing Development (EMD) phase followed by a Production Deployment phase to integrate available payloads into the MTRS Inc II materiel solution. This EMD/Production Deployment award was based on a selection from a full and open competition. The is contract Firm Fixed Price and includes a Critical Design Review (CDR) in FY18, design integration, Production Qualification Test (FY19), Low Rate Initial Production (LRIP) (FY19) and Full Rate Production (FRP) (FY20). The program will obtain First Unit Equipped (FUE) under a Conditional Materiel Release (CMR) in FY19 while working toward obtaining Full Materiel Release (FMR) in FY21.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army		Date: February 2018
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Managment Costs	MIPR	VARIOUS : MULTIPLE	-	-		3.000	Jul 2017	0.253	Oct 2018	-		0.253	0.000	3.253	-
		Subtotal	-	-		3.000		0.253		-		0.253	0.000	3.253	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Hardware	SS/FFP	Endeavor : Chelmsford, MA	-	-		3.000	Sep 2017	0.300	Jan 2019	-		0.300	0.000	3.300	-
Virtual Clearance Training Suite (VCTS)	Various	Various : Multiple	-	-		-		0.300	Oct 2018	-		0.300	0.000	0.300	-
		Subtotal	-	-		3.000		0.600		-		0.600	0.000	3.600	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MTRS Inc II MOCU development	Various	Various : Multiple	-	-		-		1.000	Oct 2018	-		1.000	0.000	1.000	-
MTRS Inc II contract data	SS/FFP	Endeavor : Chelmsford, MA	-	-		-		0.551	Oct 2018	-		0.551	0.000	0.551	-
		Subtotal	-	-		-		1.551		-		1.551	0.000	1.551	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test site and test site support for FAT	MIPR	VARIOUS : MULTIPLE	-	-		0.780		1.900	Oct 2018	-		1.900	0.000	2.680	-
		Subtotal	-	-		0.780		1.900		-		1.900	0.000	2.680	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
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	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		6.780		4.304		-		4.304	0.000	11.084	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB2 / *Man Transportable Robotic System (MTRS) Inc II*

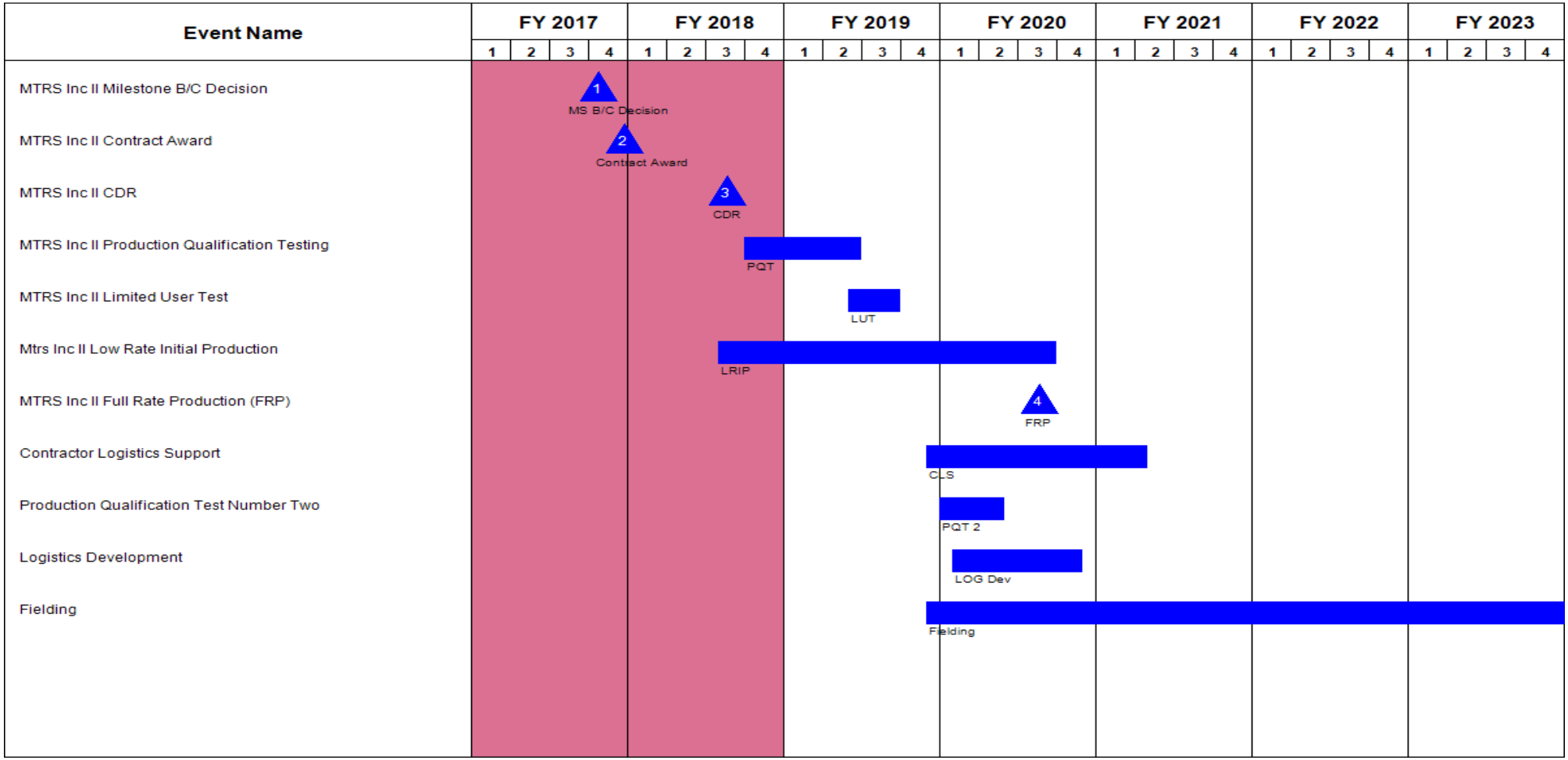

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB2 / *Man Transportable Robotic System (MTRS) Inc II*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
MTRS Inc II Milestone B/C Decision	4	2017	4	2017
MTRS Inc II Contract Award	4	2017	4	2017
MTRS Inc II CDR	3	2018	3	2018
MTRS Inc II Production Qualification Testing	4	2018	2	2019
MTRS Inc II Limited User Test	2	2019	3	2019
Mtrs Inc II Low Rate Initial Production	3	2018	3	2020
MTRS Inc II Full Rate Production (FRP)	3	2020	3	2020
Contractor Logistics Support	4	2019	2	2021
Production Qualification Test Number Two	1	2020	2	2020
Logistics Development	1	2020	4	2020
Fielding	4	2019	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB3 / *Robotics Architecture*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FB3: *Robotics Architecture*	-	0.000	2.003	1.853	-	1.853	2.879	3.905	4.953	1.991	0.000	17.584
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for Robotics Architecture transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0605053A Ground Robotics, Project FB3 Robotics Architecture.

A. Mission Description and Budget Item Justification

Robotic Architecture (RA) provides the engineering and development resources to manage the overarching architecture for robotic systems that are both modular and interoperable across the Joint Force in order to facilitate future modernization efforts. It will manage the interoperability standards, modular payload interface, common software and common architecture for universal controllers. RA includes the construction of program specific Interoperability Profiles (IOP) (i.e. Squad Multi-Equipment Transport (SMET), Tactical Wheeled Vehicle-Leader Follower (TWV-LF), Route Clearance Interrogation System Type II (RCIS Type II), Common Robotics System (Vehicle) (CRS(V)), Common Robotics System (Individual) (CRS(I)) Inc. II, Common Robotics System (Heavy) (CRS(H)), Enhanced Robotic Payload (ERP), Common Robotic System (Light Reconnaissance) (CRS(LR)/Light Reconnaissance Robot (LRR), Robotic Combat Vehicle-Robotic Wingman (RCV-RW), etc.) and new standards addressing emerging requirements (i.e. Cyber Security, new autonomous behaviors, new payloads, lethality, etc.).

Fiscal Year 2019 RDTE supports the continued development, finalization, and publishing of the Robotics and Autonomous Systems, Ground (RAS-G) Interoperability Profile (IOP) Version 4.0. IOP V4.0 will provide the required modular open interfaces and compliance test tools for new programs including Robotic Combat Vehicle (RCV) and Enhanced Robotics Payloads (ERP). Additionally, FY19 RDTE supports the robotics portfolio wide analysis of software interfaces between active programs including Universal Controller, MTRS Inc. II, CRS(I), RCIS, SMET and Leader Follower.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Robotics Architecture	-	2.003	1.853
Description: Provide architecture tools and support for current Program of Record (PoR) to allow for interoperability within the Joint community for Robotics Autonomous Systems.			
FY 2018 Plans: FY 2018 funding for Robotics Architecture will complete and update Interoperability Profile (IOP) and tools to evaluate and assess Route Clearance Interrogation System (RCIS), Man-Transportable Robotic System (MTRS) Inc II, Common Robotic System (Individual) (CRS(I)), and initial tools for emerging PoR Tactical Wheeled Vehicle-Leader Follower (TWV-LF), and Squad Multipurpose Equipment Transport (SMET) requirements. It will initiate the development of IOP V4 which will provide interfaces			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
for near term emerging programs such as LF, CRS(H), EOD Robotic Payload (ERP), Robotic Combat Vehicle-Robotic Wingman (RCV-RW), and RCIS. ***FY 2019 Plans:*** FY 2019 funding for Robotics Architecture will apply IOP Conformance Validation Tools on programs of record including the Route Clearance and Interrogation System (RCIS), Man-Transportable Robotic System (MTRS) Inc II, Common Robotic System (Individual) (CRS(I)) Inc II, CRS(LR) and Universal Controller. It will complete and update IOP and tools to evaluate and assess the Common Robotic System, Heavy (CRS(H)) and Enhanced Robotics Payloads (ERP) and refine tools for Leader Follower (LF) and Squad Multi Equipment Transport (SMET). It will continue development and finalization of IOP V4 which will provide interfaces for near term emerging programs such as Lightweight Recon Robot (LRR), Robotic Combat Vehicle, and Autonomous Convoy Operations. The CRS(H) program is a new start effort in FY 2019. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding delta between FY 2018 and FY 2019 is insignificant.			
Accomplishments/Planned Programs Subtotals	-	2.003	1.853

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

In FY 2019 the Robotics Architecture line funds PM personnel to develop IOP tools and supporting infrastructure. It leverages intellectual capital and products which allow for Joint interoperability and helps meet Army Program of Record (PoR) cost and schedule while delivering high quality products for fielding. The architecture and tools developed under this line are central to the Army acquisition philosophy of a modular open systems approach between the major subsystems of robotics and autonomous systems.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB3 / *Robotics Architecture*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	Various : Multiple	-	-		0.303		0.030	Nov 2018	-		0.030	0.000	0.333	-
		Subtotal	-	-		0.303		0.030		-		0.030	0.000	0.333	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IOP V4	Various	Various : Multiple	-	-		0.800	Jun 2018	0.780	Jun 2019	-		0.780	0.000	1.580	-
AEODRS & Joint Product Development	Various	Various : Multiple	-	-		0.200	Jun 2018	0.100	Jun 2019	-		0.100	0.000	0.300	-
Instantiation Tool Development	SS/CPFF	DCS : Warren, MI	-	-		0.100	Jun 2018	0.100	Jun 2019	-		0.100	0.000	0.200	-
Universal Controller Interoperability	MIPR	TARDEC : Warren, MI	-	-		0.200	Jun 2018	0.200	Nov 2018	-		0.200	0.000	0.400	-
Conformance Verification Testing (CVT) Update for IOP V4	MIPR	TARDEC : Warren, MI	-	-		0.200	Jun 2018	0.200	Nov 2018	-		0.200	0.000	0.400	-
NAMC OTA ROS-M Controller Development	MIPR	Multiple : Various	-	-		-		0.220	Nov 2018	-		0.220	0.000	0.220	-
		Subtotal	-	-		1.500		1.600		-		1.600	0.000	3.100	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Conformance Verification Testing (CVT) Maintenance	MIPR	TARDEC : Warren, MI	-	-		0.100	Jun 2018	0.123	Nov 2018	-		0.123	0.000	0.223	-
		Subtotal	-	-		0.100		0.123		-		0.123	0.000	0.223	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB3 / *Robotics Architecture*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IOP Lab Support	MIPR	TARDEC : Warren, MI	-	-		0.100	Jun 2018	0.100	Nov 2018	-		0.100	0.000	0.200	-
		Subtotal	-	-		0.100		0.100		-		0.100	0.000	0.200	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		2.003		1.853		-		1.853	0.000	3.856	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

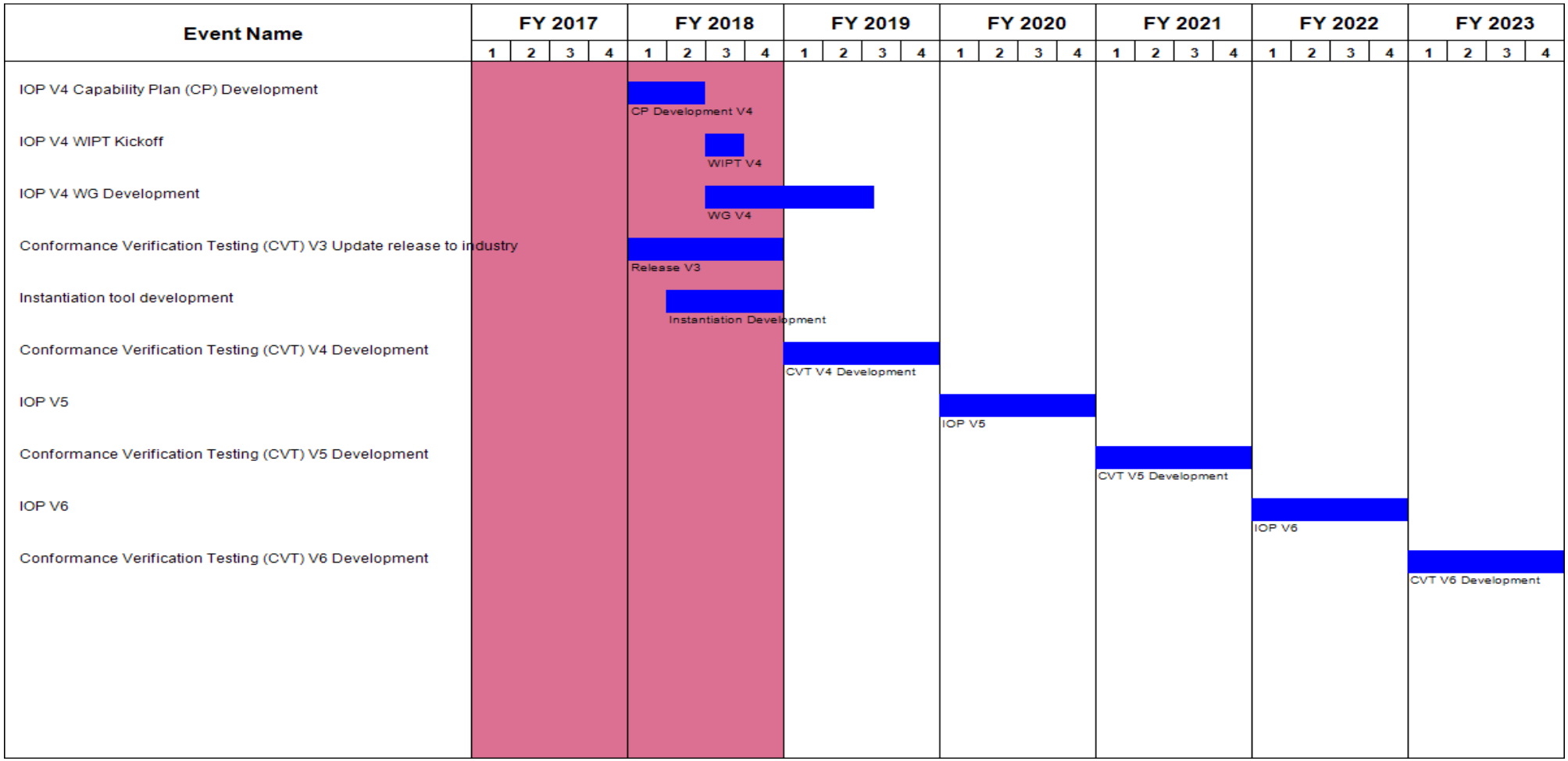

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
IOP V4 Capability Plan (CP) Development	1	2018	2	2018
IOP V4 WIPT Kickoff	3	2018	3	2018
IOP V4 WG Development	3	2018	3	2019
Conformance Verification Testing (CVT) V3 Update release to industry	1	2018	4	2018
Instantiation tool development	2	2018	4	2018
Conformance Verification Testing (CVT) V4 Development	1	2019	4	2019
IOP V5	1	2020	4	2020
Conformance Verification Testing (CVT) V5 Development	1	2021	4	2021
IOP V6	1	2022	4	2022
Conformance Verification Testing (CVT) V6 Development	1	2023	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB4 / *Common Robotic Systems*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FB4: *Common Robotic Systems*	-	0.000	31.252	29.337	-	29.337	28.438	12.087	0.000	0.000	0.000	101.114
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2019 the Common Robotic System, Universal Controller effort will transition from PE 0605053A Ground Robotics, Project FB4 Common Robotic Systems to PE 0605053A Ground Robotics, Project FG8 Common Robotic Controller.

In FY 2018 funding for Common Robotic Systems (CRS) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0605053A Ground Robotics, Project FB4 Common Robotic Systems.

A. Mission Description and Budget Item Justification

The Common Robotic System - Individual (CRS(I)) is the Army's small sized (<25 lbs.) Soldier back-packable, remotely operated, common robotic system. The system provides dismounted Soldiers with increased standoff capability from hazardous threats. The system consists of a Universal Controller (UC), a suite of payloads, and open architecture common mobility platform allowing for future capability growth. The CRS(I) will be designed so the operator can quickly re-configure for other various missions by adding or removing modules and/or payloads. The CRS(I) will provide interrogation, detection, confirmation, and neutralization capabilities employed to support a wide spectrum of mobility missions for current and future forces. This capability provides commanders the ability to persistently monitor the Operating Environment (OE) while protecting and sustaining the force. The CRS(I) complements the Joint Integrated War-fighting Force by providing standoff to the Warfighter during major combat, stability, and homeland security operations.

FY 2019 RDTE funding support up to two vendors to develop prototypes for submission to government down-select. An option will be issued for Low Rate Initial Production (LRIP) to provide 15 RDTE Production Qualification Test (PQT) articles. This funding also supports a government IPT to provide program management, test and evaluation, and programmatic risk mitigation to address Cyber Security Controls, interoperability (IOP), and analysis of collaborative operations with various Unmanned Systems (i.e. MTRS Inc. II, Light Reconnaissance, Short Range Reconnaissance UAS, etc.) assigned at Battalion and below.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: CRS(I) Engineering Manufacturing Design (EMD)	-	31.252	29.337
Description: Up to two vendors will enter the Engineering & Manufacturing Design (EMD) Phase and support activities up to the Critical Design Review (CDR) to include providing robots to test during the Government run-off.			
FY 2018 Plans: This funding supports up to two vendors to participate in Preliminary Design Review (PDR) and prepare for Critical Design Review (CDR) supported by a vendor conducted sub-system developmental test and evaluations. Funding supports both vendors to			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB4 / *Common Robotic Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
provide equipment for developmental testing and program management to include technical risk mitigation initiatives. This funding also supports government IPT to provide program management, test and evaluation, and programmatic risk mitigation initiatives. ***FY 2019 Plans:*** FY 2019 RDTE funding support up to two vendors to develop prototypes for submission to government down-select. An option will be issued for Low Rate Initial Production (LRIP) to provide 15 RDTE Production Qualification Test (PQT) articles. This funding also supports a government IPT to provide program management, test and evaluation, and programmatic risk mitigation to address Cyber Security Controls, interoperability (IOP), and analysis of collaborative operations with various Unmanned Systems (i.e. MTRS Inc. II, Light Reconnaissance, Short Range Reconnaissance UAS, etc.) assigned at Battalion and below. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** The reduction between FY 2018 and FY 2019 is accounted for by the Common Controller activities being moved to Project FG8.			
Accomplishments/Planned Programs Subtotals	-	31.252	29.337

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• G99595: *Common Robotics System (Individual) (CRS(I))*	-	-	3.161	-	3.161	8.297	28.603	49.745	75.093	0.000	164.899

Remarks

D. Acquisition Strategy

The CRS(I) acquisition strategy includes awarding a competitive Cost-Plus/Fixed-Fee (CPFF) contract allowing for up to two contractors to compete in the Engineering and Manufacturing Development (EMD) Phase following Milestone (MS) B (FY18) approval. The EMD phase includes a Critical Design Review (CDR) (FY18), the procurement of Production Qualification Test (PQT) (FY19) assets and a "Government Run-Off" to determine which contractor will proceed into the Production and Deployment (P&D) Phase following MS C (FY19) approval. P&D includes a Firm-Fixed Price (FFP) option for Low Rate Initial Production (LRIP) (FY19), Production Qualification Testing (FY19), Safety Release, Limited User Test (LUT), Conditional Material Release (CMR) (FY20) development of logistics products, Full Material Release (FMR) and Full Rate Production (FRP) (FY21).

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB4 / *Common Robotic Systems*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	MIPR	Combat Support - Combat Service Support : Warren MI	-	-		4.500	Jul 2018	1.736	Dec 2018	-		1.736	0.000	6.236	-
Risk Mitigation	MIPR	Various : Various	-	-		4.250	Aug 2018	0.325	Oct 2018	-		0.325	0.000	4.575	-
		Subtotal	-	-		8.750		2.061		-		2.061	0.000	10.811	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Manufacturing & Design	C/CPFF	tbd : tbd	-	-		15.000	Mar 2018	24.148	Oct 2018	-		24.148	0.000	39.148	-
Government Furnished Equipment	Various	Various : Multiple	-	-		1.881	Jun 2018	2.163	Oct 2018	-		2.163	0.000	4.044	-
		Subtotal	-	-		16.881		26.311		-		26.311	0.000	43.192	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Training and external PM services support	Various	Various : Multiple	-	-		5.541	Jun 2018	0.740	Oct 2018	-		0.740	0.000	6.281	-
		Subtotal	-	-		5.541		0.740		-		0.740	0.000	6.281	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATEC Test Support	MIPR	Army Test Engineering Center : Various	-	-		0.080	Jun 2018	0.225	Oct 2018	-		0.225	0.000	0.305	-
		Subtotal	-	-		0.080		0.225		-		0.225	0.000	0.305	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB4 / *Common Robotic Systems*	

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		31.252		29.337		-		29.337	0.000	60.589	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB4 / *Common Robotic Systems*

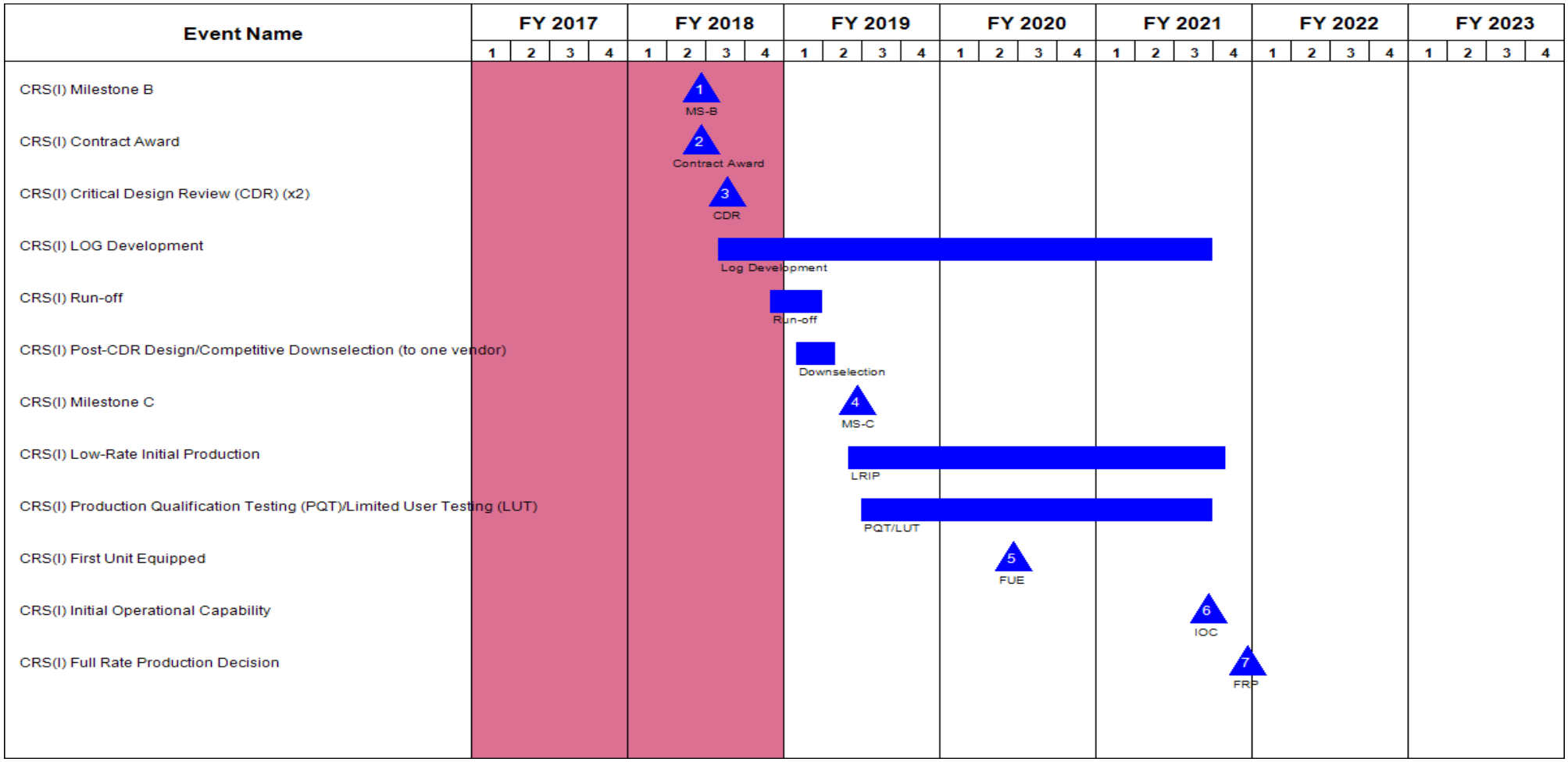

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB4 / *Common Robotic Systems*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
CRS(I) Milestone B	2	2018	2	2018
CRS(I) Contract Award	2	2018	2	2018
CRS(I) Critical Design Review (CDR) (x2)	3	2018	3	2018
CRS(I) LOG Development	3	2018	3	2021
CRS(I) Run-off	4	2018	1	2019
CRS(I) Post-CDR Design/Competitive Downselection (to one vendor)	1	2019	2	2019
CRS(I) Milestone C	2	2019	2	2019
CRS(I) Low-Rate Initial Production	2	2019	4	2021
CRS(I) Production Qualification Testing (PQT)/Limited User Testing (LUT)	3	2019	3	2021
CRS(I) First Unit Equipped	2	2020	2	2020
CRS(I) Initial Operational Capability	3	2021	3	2021
CRS(I) Full Rate Production Decision	4	2021	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB6 / *Squad Multipurpose Equipment Transport (SMET)*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FB6: *Squad Multipurpose Equipment Transport (SMET)*	-	0.000	16.802	19.139	-	19.139	24.077	23.827	14.255	0.000	0.000	98.100
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The Squad Multipurpose Equipment Transport (SMET) program funded on PE 0605053A Ground Robotics, Project FB6 was a new start in FY2018.

A. Mission Description and Budget Item Justification

FY 2019 RDTE funds Operational Technology finalization, System downselect and Program of Record (PoR) Full Material Release testing.

Squad Multipurpose Equipment Transport (SMET) will help to reduce Soldier loads by transporting mission specific equipment, resupply equipment, and supplies required for extended operations. The SMET will be capable of carrying the equipment currently required to support Infantry and Engineer Platoons in the Infantry Brigade Combat Team (IBCT) for a 72 hour mission without resupply. The SMET will reduce Soldier load, increase squad mobility during combat operations and dismounted maneuvers. SMET will have open architectures, a remote control and support casualty evacuation, power generation/offload and chemical/biological payloads.

FY2019 RDTE funding supports the development and purchase of Technical Insertions, Logistics Support Data, and SMET Program of Record (POR) production contract development to include the Statement of Work (SOW) and Request for Project Proposal (RPP). FY2019 RDTE funding also supports Developmental testing at Aberdeen and the completion of the Technology Demonstration. Program management costs to include salaries, travel and miscellaneous expense for the SMET program will also be funded.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: SMET	-	16.802	19.139
Description: Squad Multipurpose Equipment Transport (SMET)			
FY 2018 Plans: Funding will be used to acquire systems from multiple vendors to conduct a Technology Demonstration in support of the Directed Requirement, Aberdeen Test Center support, and associated logistics support. Program management costs to include salaries, travel and miscellaneous expenses associated with the SMET program will also be funded.			
FY 2019 Plans: Funding supports the development and purchase of Technical Insertions, Payload platform automation, Logistics Support Data, and SMET Program of Record (POR) production contract development to include the Statement of Work (SOW) and Request			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
for Project Proposal (RPP). FY2019 RDTE funding also supports Developmental testing at Aberdeen and the completion of the Technology Demonstration, Program Management costs to include salaries, travel and miscellaneous expense for the SMET program. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding increased from FY 2018 to FY 2019 due to increased testing and tech insertions.			
Accomplishments/Planned Programs Subtotals	-	16.802	19.139

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• R12154: *Squad Multipurpose Equipment Transport (SMET)*	-	-	0.000	-	0.000	8.768	20.767	45.490	94.681	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Squad Multipurpose Equipment Transport (SMET) assessment effort was completed as part of the Robotics Development effort under the Tactical Unmanned Ground Vehicle (654641DV7) funding line in FY2017. This supported a rapid start to establish an Other Transaction Authority (OTA) agreement supporting the Directed Requirement, signed 14 April 2017. The OTA began with a Request For Project Proposal (RPP), followed by an evaluation and down select to 10 vendors in FY17 as part of the Robotic Enhancement Program under the Tactical Unmanned Ground Vehicle (654641DV7) funding line. In FY18 a down select from 10 to 4 vendors decided which platforms would participate in a 12 month Technology Demonstration. This Technology Demonstration will guide the development of the Capability Production Document (CPD) leading to a Army Requirements Oversight Council (AROC) decision in 3QFY19.

It is the Army's intent to maximize the use of an Open Systems Architecture (OSA), as well as the approved Unmanned Ground Vehicle (UGV) interoperability profiles for SMET. The PdM plans to gather sufficient data during the SMET Technology Demonstration to reduce development efforts and provide cost savings by incorporating the developed SMET technology into the Program of Record. Throughout the life of the program, the Army will continue to survey the marketplace to identify opportunities for technology insertion and required payloads, relying on competition to drive down costs.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB6 / *Squad Multipurpose Equipment Transport (SMET)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Costs	MIPR	PM FP : Warren, MI	-	-		1.000		1.465	Oct 2018	-		1.465	0.000	2.465	-
		Subtotal	-	-		1.000		1.465		-		1.465	0.000	2.465	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Directed Requirement Technology Demonstration	C/FFP	Year Long Excursion : TBD	-	-		11.000		2.985	Dec 2018	-		2.985	0.000	13.985	-
Technical Insertions	C/FFP	TBD : TBD	-	-		-		5.200	Nov 2018	-		5.200	0.000	5.200	-
		Subtotal	-	-		11.000		8.185		-		8.185	0.000	19.185	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Materiel Battle Lab / TARDEC Technology Demonstration Support	MIPR	TARDEC : Multiple Locations	-	-		1.000		-		-		-	0.000	1.000	-
Logistics Development	MIPR	ILSC : Warren, MI	-	-		-		5.444	Oct 2018	-		5.444	0.000	5.444	-
		Subtotal	-	-		1.000		5.444		-		5.444	0.000	6.444	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATEC Test Support	MIPR	Army Test Engineering Center : Various	-	-		3.802		2.250	Nov 2018	-		2.250	0.000	6.052	-
Air Drop Testing	MIPR	NATICK : Various	-	-		-		1.795	Dec 2018	-		1.795	0.000	1.795	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	-	-		3.802		4.045		-		4.045	0.000	7.847	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		16.802		19.139		-		19.139	0.000	35.941	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

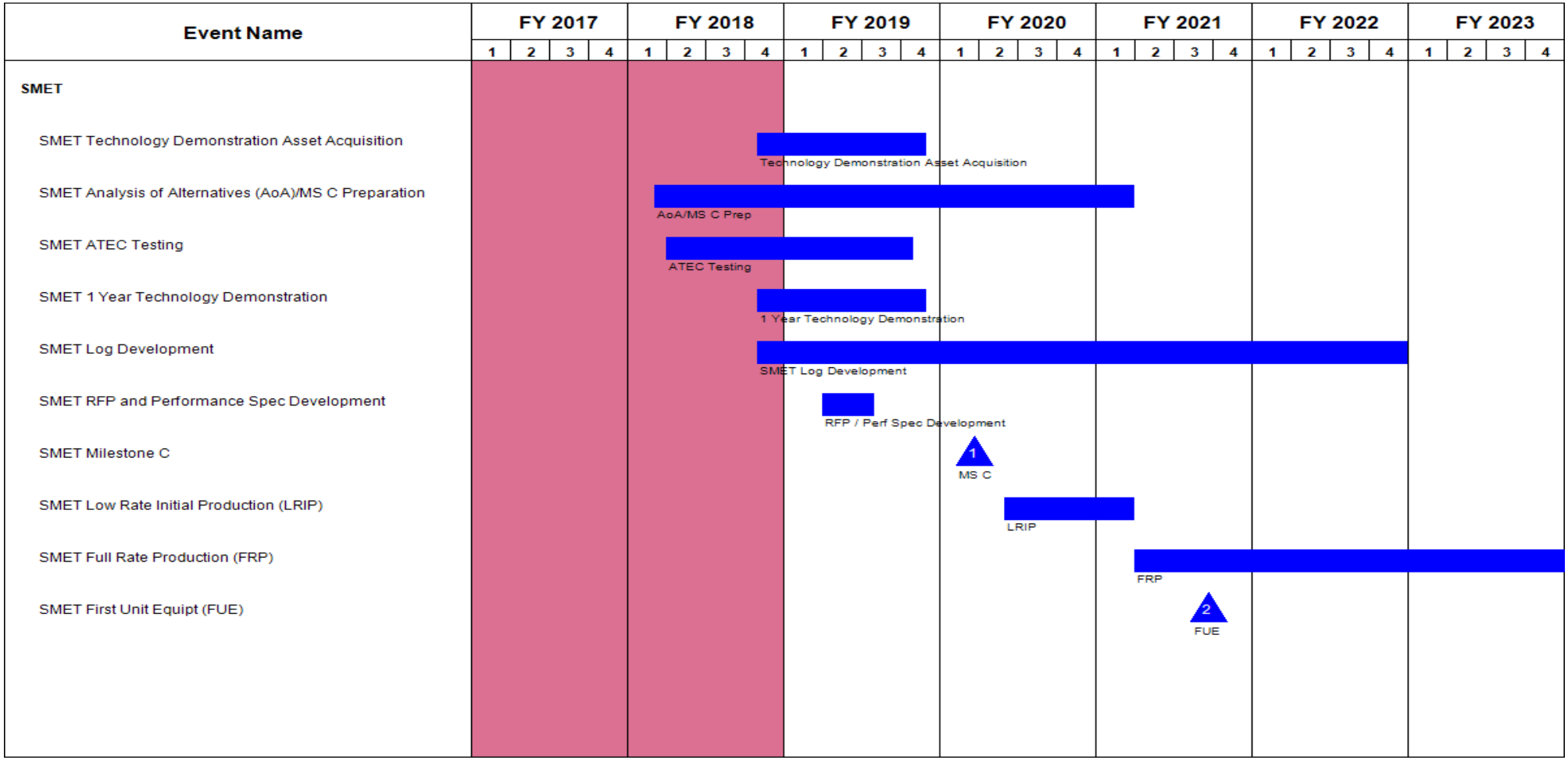

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
SMET	1	2018	4	2022
SMET Technology Demonstration Asset Acquisition	4	2018	4	2019
SMET Analysis of Alternatives (AoA)/MS C Preparation	1	2018	1	2021
SMET ATEC Testing	2	2018	4	2019
SMET 1 Year Technology Demonstration	4	2018	4	2019
SMET Log Development	4	2018	4	2022
SMET RFP and Performance Spec Development	2	2019	3	2019
SMET Milestone C	1	2020	1	2020
SMET Low Rate Initial Production (LRIP)	2	2020	1	2021
SMET Full Rate Production (FRP)	2	2021	1	2026
SMET First Unit Equipt (FUE)	3	2021	3	2021

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB7 / *Robotics Enhanced Program (REP)*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FB7: *Robotics Enhanced Program (REP)*	-	0.000	7.989	9.399	-	9.399	9.506	9.554	9.717	9.694	0.000	55.859
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for Robotic Enhanced Program (REP) transitions from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0605053A Ground Robotics, Project FB7 Robotic Enhanced Program.

A. Mission Description and Budget Item Justification

The Robotics Enhanced Program (REP) uses a "buy/lease, try and inform" methodology to evaluate Commercial Off the Shelf (COTS), Government Off the Shelf (GOTS) and Non-Developmental Item (NDI) robotics products that have the potential to enhance Soldier combat effectiveness. Actual operational user feedback and evaluation results obtained will inform emerging capabilities and requirements documents in support of a return on investment to support future Army decision making.

Fiscal Year 2019 RDTE funding for the REP will be utilized to fund Iteration 19.1 and 19.2 and out-of-cycle iterations which will fund salaries, travel, ERDC and ATEC support, RDECOM support, CoE support, Battle Lab support, and associated experiments. REP will also prepare for and complete Knowledge Point 3 (KP3) in 4QFY19, which will provide a status of the REP to the Program Executive Officer.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Robotic Enhanced Program (REP)	-	7.989	9.399
Description: Annual funding for the REP is broken up into two iterations occurring each fiscal year. RDTE funds are utilized in an experimental effort to inform Army User Communities (i.e. Centers of Excellence (CoE), TRADOC, ARCIC) determined requirements as outlined in the Robotic and Autonomous Systems (RAS) Strategy.			
FY 2018 Plans: FY 2018 funding for the REP will be utilized to fund Iteration 18.1 and 18.2 and any additional off-cycle iterations as needed, which will fund salaries, travel, Engineer Research and Development Center (ERDC) and Army Test and Evaluation Command (ATEC) support; Research, Development and Engineering Command (RDECOM) support, CoE support, Battle Lab support, and associated experiments.			
FY 2019 Plans: FY 2019 funding for the REP will be utilized to fund Iteration 19.1 and 19.2 and out-of-cycle iterations which will fund salaries, travel, ERDC and ATEC support, RDECOM support, CoE support, Battle Lab support, and associated experiments. REP will also			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB7 / *Robotics Enhanced Program (REP)*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
prepare for and complete Knowledge Point 3 (KP3) in 4QFY19, which will provide a status of the REP to the Program Executive Officer. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** The delta of a $1.500 million increase in RDT&E from FY 2018 to FY 2019 supports investigating capabilities to inform numerous emerging Programs of Record (PoR) identified within the LIRA/SPAR between FY 2019-2023.			
Accomplishments/Planned Programs Subtotals	-	7.989	9.399

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Robotics Enhanced Program (REP) uses a "buy/lease, try and inform" methodology to evaluate Commercial Off the Shelf (COTS), Government Off the Shelf (GOTS) and Non-Developmental Item (NDI) robotics products that have the potential to enhance Soldier combat effectiveness. Actual operational user feedback and evaluation results obtained will inform emerging capabilities and requirements documents in support of a return on investment to support future Army decision making.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB7 / *Robotics Enhanced Program (REP)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	Various : Multiple	-	-		0.717	Mar 2018	0.899	Nov 2018	-		0.899	0.000	1.616	-
		Subtotal	-	-		0.717		0.899		-		0.899	0.000	1.616	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Iteration 18.1	Various	Various : Multiple	-	-		2.500	Aug 2018	-		-		-	0.000	2.500	-
Iteration 18.2	Various	Various : Multiple	-	-		1.500	Feb 2019	-		-		-	0.000	1.500	-
Iteration 19.1	Various	Various : Multiple	-	-		-		3.000	Nov 2018	-		3.000	0.000	3.000	-
Iteration 19.2	Various	Various : Multiple	-	-		-		2.000	Mar 2019	-		2.000	0.000	2.000	-
		Subtotal	-	-		4.000		5.000		-		5.000	0.000	9.000	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Iteration 18.1	Various	Various : Multiple	-	-		2.000	Aug 2018	-		-		-	0.000	2.000	-
Iteration 18.2	Various	Various : Multiple	-	-		1.272	Feb 2019	-		-		-	0.000	1.272	-
Iteration 19.1	Various	Various : Multiple	-	-		-		2.000	Dec 2018	-		2.000	0.000	2.000	-
Iteration 19.2	Various	Various : Multiple	-	-		-		1.500	Apr 2019	-		1.500	0.000	1.500	-
		Subtotal	-	-		3.272		3.500		-		3.500	0.000	6.772	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		7.989		9.399		-		9.399	0.000	17.388	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB7 / *Robotics Enhanced Program (REP)*

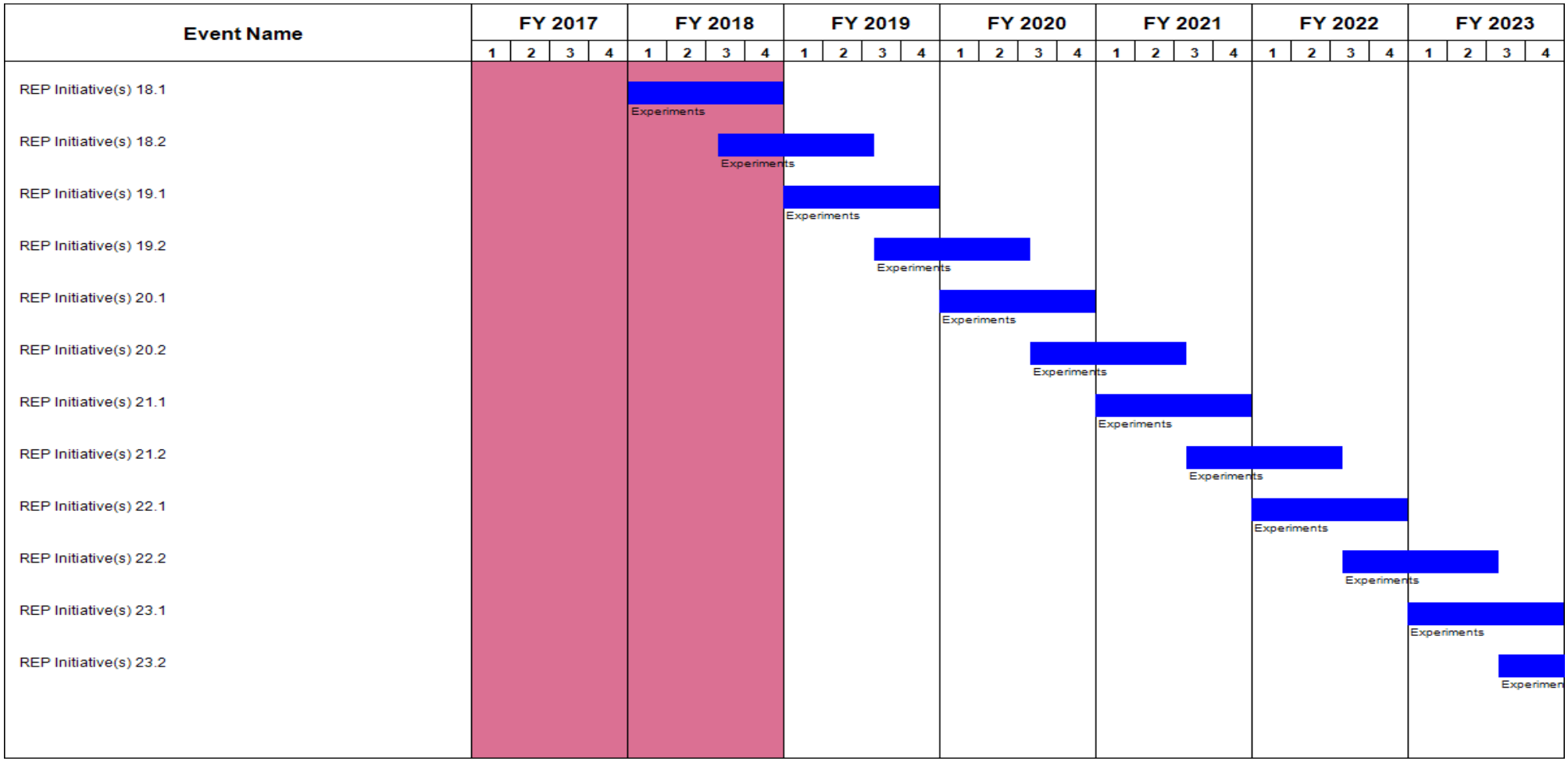

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB7 / *Robotics Enhanced Program (REP)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
REP Initiative(s) 18.1	1	2018	4	2018
REP Initiative(s) 18.2	3	2018	3	2019
REP Initiative(s) 19.1	1	2019	4	2019
REP Initiative(s) 19.2	3	2019	3	2020
REP Initiative(s) 20.1	1	2020	4	2020
REP Initiative(s) 20.2	3	2020	3	2021
REP Initiative(s) 21.1	1	2021	4	2021
REP Initiative(s) 21.2	3	2021	3	2022
REP Initiative(s) 22.1	1	2022	4	2022
REP Initiative(s) 22.2	3	2022	3	2023
REP Initiative(s) 23.1	1	2023	4	2023
REP Initiative(s) 23.2	3	2023	3	2024

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB8 / *Soldier Borne Sensor (SBS)*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FB8: *Soldier Borne Sensor (SBS)*	-	0.000	2.289	3.469	-	3.469	1.512	1.213	2.239	3.548	0.000	14.270
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Soldier Borne Sensor (SBS) provides a near term solution to three Army War-fighting Challenges at the Infantry Squad level: develop situational understanding, conduct air-ground reconnaissance, and conduct joint combined arms maneuver. The SBS provides the small unit "quick look" capability when higher echelon assets are unavailable and time is of the essence. The system is simple to use, expendable, and deployable in a matter of seconds to support the squad leader's decision-making process. The system allows Soldiers to obtain local situational awareness and understanding of their immediate surroundings while remaining in covered or concealed positions.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Soldier Borne Sensor (SBS)	-	2.289	3.469
Description: The SBS provides the small unit a "quick look" capability providing Situational Awareness (SA) of routes, building, tunnels, obstacles blocking line of sight, and similar concealed threat locations. ***FY 2018 Plans:*** Conduct Production Qualification Testing (PQT), Initial Operational Test and Evaluation (IOT&E) of SBS Increment 1, and initiate integration of Increment 2 technology insertions. ***FY 2019 Plans:*** Continue to conduct user testing to select and type classification the best value non-developmental solution for SBS Increment 1, and initiate integration of increment 2 technology insertions. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** This increase is due to maturing research and development of SBS Increment 1, 2 and 3 technology insertions in preparation for subsequent pre production activities.			
Accomplishments/Planned Programs Subtotals	-	2.289	3.469

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• FD2: *FD2 - Soldier Robotics Systems*	-	1.512	2.130	-	2.130	2.859	3.367	3.345	3.398	Continuing	Continuing

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB8 / *Soldier Borne Sensor (SBS)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• W63798: *Soldier Borne Sensor (SBS) (SSN W63798)*	-	3.000	11.824	-	11.824	15.531	18.454	3.823	11.866	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Soldier Enhancement Program (SEP) was leveraged to initiate the Soldier Borne Sensor (SBS) program allowing for a Rapid Fielding of capabilities to the field. Post Milestone C, the program office intends to assess whether to leverage non-developmental technologies with each tranche (every two to three years) as tech insertions or to re-compete off the open market. This allows the warfighter to have the most current technology on the market.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB8 / *Soldier Borne Sensor (SBS)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	Allot	Project Manager Soldier Sensors and Lasers : Fort Belvior, Virginia 22060	-	-		0.569		0.626	Dec 2018	-		0.626	Continuing	Continuing	-
		Subtotal	-	-		0.569		0.626		-		0.626	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Support	MIPR	Various : Various	-	-		0.618		0.680	Dec 2018	-		0.680	Continuing	Continuing	-
		Subtotal	-	-		0.618		0.680		-		0.680	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test and Evaluation Support	MIPR	Army Test and Evauation Command : White Sands Missile Range, New Mexico	-	-		1.102		2.163	Dec 2018	-		2.163	Continuing	Continuing	-
		Subtotal	-	-		1.102		2.163		-		2.163	Continuing	Continuing	N/A

	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		2.289		3.469		-		3.469	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB8 / *Soldier Borne Sensor (SBS)*

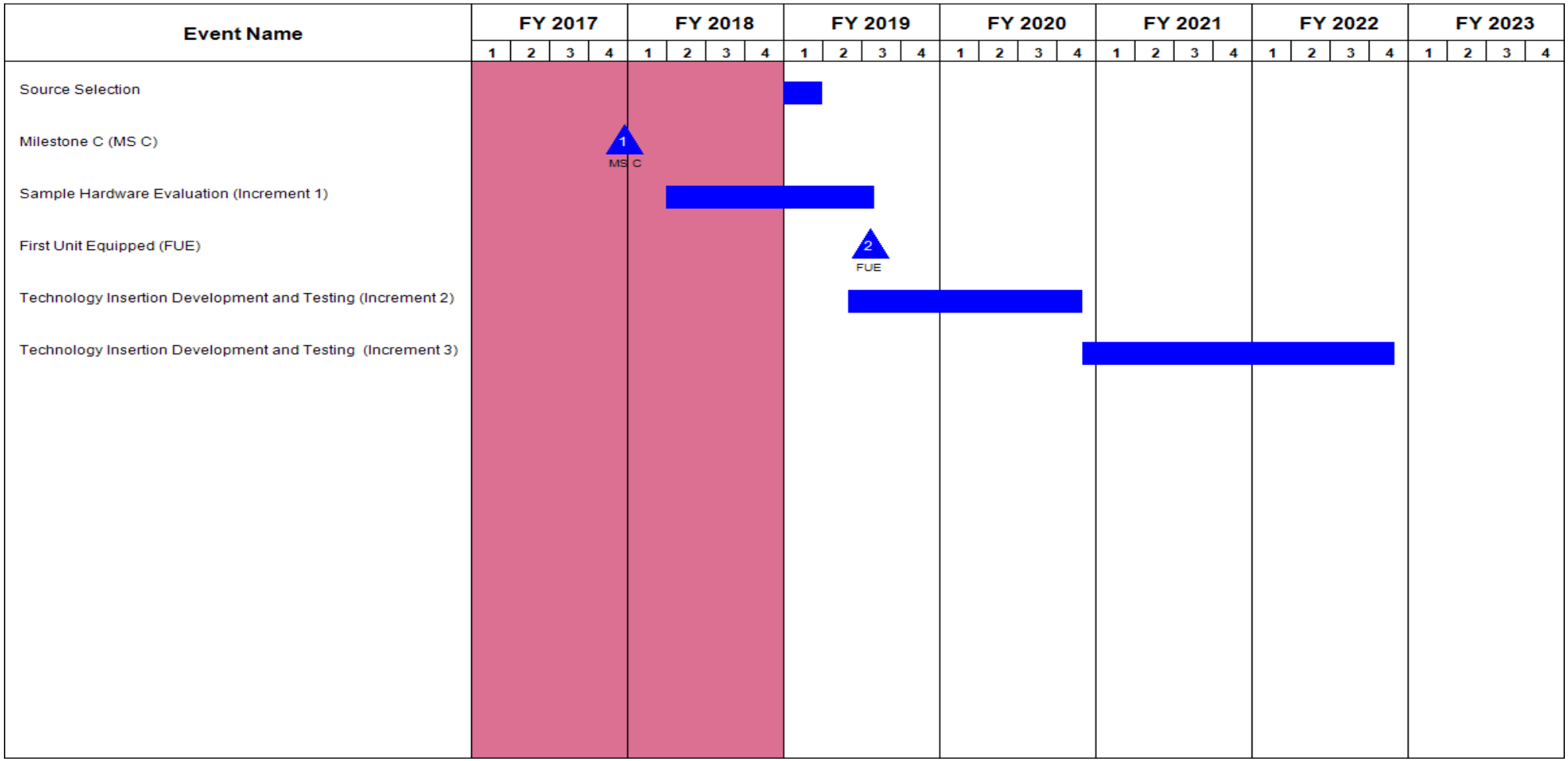

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB8 / *Soldier Borne Sensor (SBS)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Source Selection	1	2019	1	2019
Milestone C (MS C)	4	2017	4	2017
Sample Hardware Evaluation (Increment 1)	2	2018	3	2019
First Unit Equipped (FUE)	3	2019	3	2019
Technology Insertion Development and Testing (Increment 2)	2	2019	4	2020
Technology Insertion Development and Testing (Increment 3)	4	2020	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB9 / *MTRS Standardization*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FB9: *MTRS Standardization*	-	0.000	3.645	15.698	-	15.698	19.937	16.626	7.927	4.363	0.000	68.196
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

The CRS(H) program is a new start effort in FY 2019.

A. Mission Description and Budget Item Justification

The MTRS Standardization project provides the platforms to support integration and testing of payloads and technology for non-standard unmanned ground robotics systems used by Army Engineers, Explosive Ordnance Disposal (EOD), Chemical, Biological, Radiological, and Nuclear (CBRN) and Special Operational Forces (SOF) units. Current system characteristics include the following: a remote controlled articulated arm with a gripper, operating range up to 800 meters, multiple illuminated cameras, a pan/tilt surveillance camera, two-way radio, and a ruggedized operator control unit. The platforms provided will support development and testing of the following capabilities: High Dexterous Manipulation System (HDMS), Multi-Spectral Image Fusion System (MIFS), and Precision Aimed Multishot Disruptor (PAMD). The use of robotics allows the first approach, to potentially explosive hazards, to be made by a robot rather than a Soldier.

This project will also support the development of a library of robot parts that can be 3D printed via additive manufacturing. The funding will also test the operational compatibility of the 3D printed parts with robot platforms.

The Common Robotic System, Heavy (CRS(H)) is a modular large-sized system that provides enhanced protection to the EOD Soldier in order to support the Joint Force Commander with the ability to identify, render safe and dispose of explosive ordnance (EO) and improvised explosive devices (IEDs) in support of the Range of Military Operations (ROMO) and Home Land Defense (HLD) operations. CRS(H) will also enable EOD Soldiers to execute Defense Support of the Civil Authorities (DSCA) operations in response to requests from federal, state, local, and tribal authorities for domestic incidents, emergencies, disasters, designated law enforcement support and other activities. CRS(H) will support current and future missions for Explosive Ordnance Disposal (EOD) and Chemical Biological Radiological and Nuclear (CBRN) units. FY 2019 RDTE funds will enable the CRS(H) program to progress into the EMD/LRIP phases by funding the following: Production Qualification Test asset procurement, test support, design efforts, contract data procurement, program support and engineering, travel, and other expenses related to the CRS(H) RDTE program. The Army Acquisition Objective (AAO) for CRS(H) robots is 225. FY 2019 funding will also be utilized to support Enhanced Robotic Payload (ERP) program initiation.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Platform to Support Payload Developement & Test	-	1.500	-
Description: Testing of multi-shot disruptor and fire set for EOD robotics systems.			
FY 2018 Plans:			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Provide platforms to be used in the development and testing of the following payloads: High Dexterous Manipulation System (HDMS), Multi-Spectral Image Fusion System (MIFS), and Precision Aimed Multishot Disruptor (PAMD). ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding for platform to support payload development and test is not required for FY 2019.			
Title: Other Transactional Authority ***FY 2018 Plans:*** Funding will support the establishment of a library of robot parts which can be 3D printed via additive manufacturing. Funds will also test the operational capability of 3D printed parts with robot platforms. ***FY 2019 Plans:*** Funds will test the operational capability of 3D printed parts with robot platforms ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Less funding is required for Fy 2019 for other transactional authority.	-	2.145	1.080
Title: CRS(H) / ERP ***Description:*** CRS(H) RDTE funding to support prototype upgrades & testing ***FY 2019 Plans:*** Funding will be used to award two contracts for CRS(H) prototype enhancements, delivery & testing of Production Qualification Test (PQT) articles, initiation of CRS(H) logistics development, and program management costs to include salaries, travel and miscellaneous expenses associated with the CRS(H) RDTE program. Funding will also be utilized to support Enhanced Robotic Payload (ERP) program initiation. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** CRS(H) is a new requirement within this project for FY 2019.	-	-	14.618
Accomplishments/Planned Programs Subtotals	-	3.645	15.698

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Procure mobility platforms from existing IDIQ contract. Utilize Other Transactional Authority contract for additive manufacturing effort.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

The CRS(H) acquisition strategy will enter at Milestone B/C and award two contracts to execute a final prototype enhancement phase to upgrade commercial systems to meet the Robotics & Autonomous Systems, Ground (RAS-G) Interoperability Profile (IOP) and cybersecurity requirements, followed by delivery of production representative test articles for performance testing, limited user test and logistics development. Subsequently the program will down-select to one contractor and field production systems under a Conditional Materiel Release (CMR). An Other Transaction Authority (OTA) contract may be utilized if appropriate to accelerate program schedule.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB9 / *MTRS Standardization*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) Program Management costs	Various	Various : Multiple	-	-		-		3.488	Oct 2018	-		3.488	0.000	3.488	-
		Subtotal	-	-		-		3.488		-		3.488	0.000	3.488	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Platform to Support Payload Developement	C/TBD	Robot Logistics Support Center (RLSC) : Selfridge Air National Guard Base (SANG)	-	-		1.500	Feb 2018	-		-		-	0.000	1.500	-
Other Transactional Authority	C/TBD	TBD : TBS	-	-		2.145	Feb 2018	-		-		-	0.000	2.145	-
CRS(H) Developmental Engineering	Various	Various : Multiple	-	-		-		9.080	Oct 2018	-		9.080	0.000	9.080	-
CRS(H) Prototype hardware	Various	Various : Multiple	-	-		-		1.850	Oct 2018	-		1.850	0.000	1.850	-
		Subtotal	-	-		3.645		10.930		-		10.930	0.000	14.575	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Other Transactional Authority	C/TBD	TBD : TBS	-	-		-		1.080	Oct 2018	-		1.080	0.000	1.080	-
CRS(H) System Evaluation	Various	Various : Multiple	-	-		-		0.200	Oct 2018	-		0.200	0.000	0.200	-
		Subtotal	-	-		-		1.280		-		1.280	0.000	1.280	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB9 / *MTRS Standardization*	

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		3.645		15.698		-		15.698	0.000	19.343	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

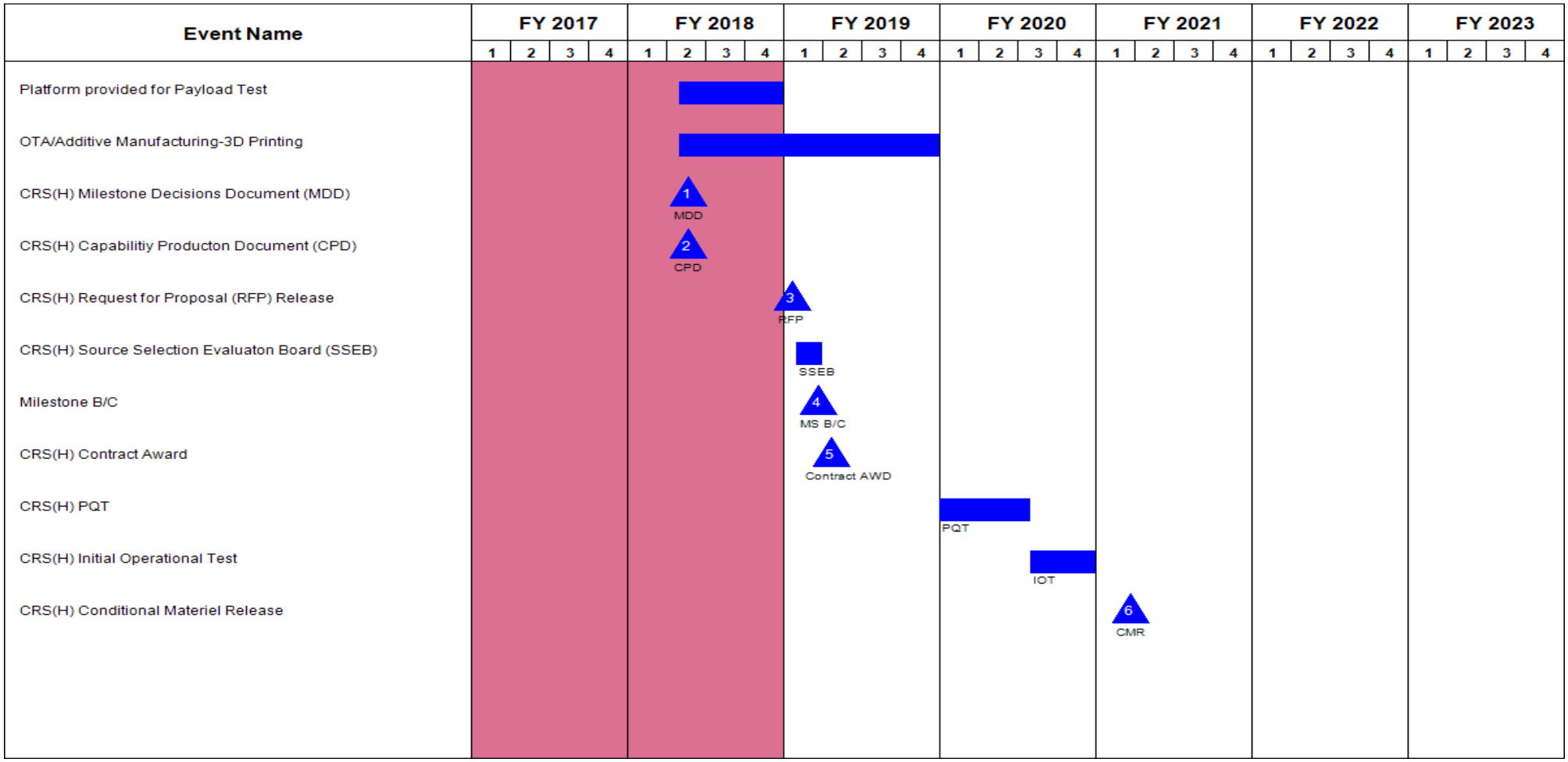

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Platform provided for Payload Test	2	2018	4	2018
OTA/Additive Manufacturing-3D Printing	2	2018	4	2019
CRS(H) Milestone Decisions Document (MDD)	2	2018	2	2018
CRS(H) Capabilitiy Producton Document (CPD)	2	2018	2	2018
CRS(H) Request for Proposal (RFP) Release	1	2019	1	2019
CRS(H) Source Selection Evaluaton Board (SSEB)	1	2019	1	2019
Milestone B/C	1	2019	1	2019
CRS(H) Contract Award	2	2019	2	2019
CRS(H) PQT	1	2020	3	2020
CRS(H) Initial Operational Test	3	2020	4	2020
CRS(H) Conditional Materiel Release	1	2021	1	2021

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FG8 / *Common Robotic Controller*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FG8: *Common Robotic Controller*	-	0.000	0.000	2.968	-	2.968	1.186	1.186	1.186	1.186	0.000	7.712
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Project FG8 Common Robotic Controller is not a new start effort in FY2019. In FY 2018, the Common Robotic System, Universal Controller was a subset of the Common Robotic System (Individual) program funded on PE 0605053A Ground Robotics Project FB4. The effort will transition from PE 0605053A Ground Robotics, Project FB4 Common Robotic Systems in FY 2018 to PE 0605053A Ground Robotics, Project FG8 Common Robotic Controller in 2019.

A. Mission Description and Budget Item Justification

The Common Robotic Controller/Common Robotic System (Universal Controller) (CRS(UC)) provides the capability to individually and/or concurrently control multiple Unmanned Systems (UxS) platforms and control/monitor a mesh network without having to obtain and/or carry separate Operator Control Unit (OCU)s for each system. A controlled UxS may be mobile or stationary, can be smart learning, and self-adaptive. Two CRS(UC)s will be used to hand-off control of a system to a receiver, reducing hand-off time and the need for the UxSs to have multiple OCUs. The CRS(UC) will also be capable of "hot swapping" batteries where one of its two batteries can be replaced without the system being shut down, halting mission progress, and use current or new Soldier power sources that will maximize its operational time and minimize the number of replacement batteries needed for most missions. The controller will also use haptic indicators inside the hand grips to give the user active feedback of the controlled system's movements if the UxS software is programmed to use them. If and when the use of lethal systems on the CRS(UC) is approved, the weaponized payloads will be controlled via several fail-safe mechanisms to prevent accidental discharge. The intent of this requirement is allow the Soldier at battalion and below to use the Common Robotic System (Universal Controller) to operate unmanned aerial systems (e.g. Raven, PUMA, Short Range Micro (SRM), Lethal Miniature Aerial Munition System (LMAMS), Autonomous Aerial Resupply, etc.) and unmanned ground vehicles (e.g. CRS(I), CRS(V), CRS(H), SMET, MTRS INC II, Light Reconnaissance (LR), Wingman, etc.). In addition, the project will investigate backwards compatibility for the non-standard equipment robots (e.g. FirstLook, SUGV, Soldier Borne Sensor (SBS), MTRS MK II, etc.).

The CRS(UC) is defined in the Common Robotic System (Individual) (CRS(I)) Capability Development Document (CDD) and is included in the CRS(I) acquisition. A standalone Capability Production Document (CPD) is being developed to allow CRS(UC) to have a standalone funding line allowing for improving alignment with future programs.

FY 2019 RDTE funds will be utilized to conduct user testing and select a Universal Controller.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: CRS(UC) improves Soldier situational awareness while reducing cognitive load on Soldiers and the robotics portfolio logistics footprint	-	-	2.968

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: The Common Robotic Controller/Common Robotic System (Universal Controller) (CRS(UC)) provides the capability to individually and/or concurrently control multiple Unmanned Systems (UxS) platforms and control/monitor a mesh network without having to obtain and/or carry separate Operator Control Unit (OCU)s for each system. A controlled UxS may be mobile or stationary, can be smart learning, and self-adaptive. Two CRS(UC)s will be used to hand-off control of a system to a receiver, reducing hand-off time and the need for the UxSs to have multiple OCUs. The CRS(UC) will also be capable of "hot swapping" batteries where one of its two batteries can be replaced without the system being shut down, halting mission progress, and use current or new Soldier power sources that will maximize its operational time and minimize the number of replacement batteries needed for most missions. The controller will also use haptic indicators inside the hand grips to give the user active feedback of the controlled system's movements if the UxS software is programmed to use them. If and when the use of lethal systems on the CRS(UC) is approved, the weaponized payloads will be controlled via several fail-safe mechanisms to prevent accidental discharge. ***FY 2019 Plans:*** FY 2019 RDTE funds will be utilized to conduct user testing and select a Universal Controller. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** The delta of a $3.000 million increase in RDT&E from FY 2018 to FY 2019 supports the Department of the Army's intent to separate the CRS(UC) Capability Production Document and from the CRS(I) Program of Record; therefore, a new funding line is required to fund the maturation of the CRS(UC) capabilities.			
Accomplishments/Planned Programs Subtotals	-	-	2.968

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• G99595: *Common Robotic System - INdividual (CRS(I)*	-	-	3.161	-	3.161	8.297	28.603	49.745	75.093	0.000	164.899

Remarks

D. Acquisition Strategy

The Common Robotic System (Universal Controller) is a component of the CRS(I) and does not have its own Acquisition Strategy at this time.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FG8 / *Common Robotic Controller*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management support	Various	Various : Multiple	-	-		-		0.468	Jan 2019	-		0.468	0.000	0.468	-
		Subtotal	-	-		-		0.468		-		0.468	0.000	0.468	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Manufacturing & Development	C/CPFF	TBD : TBD	-	-		-		2.500	Jan 2019	-		2.500	0.000	2.500	-
		Subtotal	-	-		-		2.500		-		2.500	0.000	2.500	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		2.968		-		2.968	0.000	2.968	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

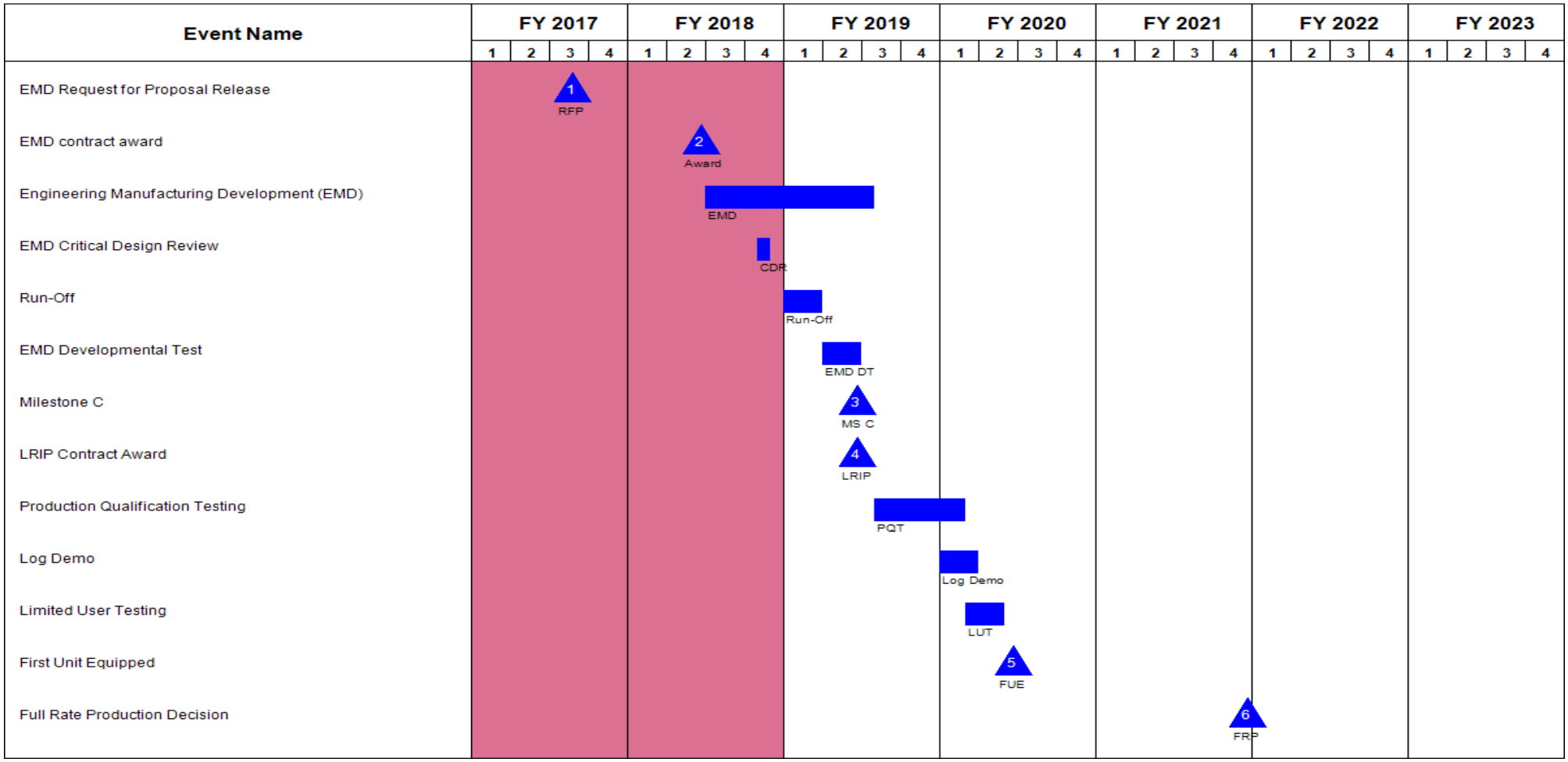

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
EMD Request for Proposal Release	3	2017	3	2017
EMD contract award	2	2018	2	2018
Engineering Manufacturing Development (EMD)	3	2018	3	2019
EMD Critical Design Review	4	2018	4	2018
Run-Off	1	2019	1	2019
EMD Developmental Test	2	2019	2	2019
Milestone C	2	2019	2	2019
LRIP Contract Award	2	2019	2	2019
Production Qualification Testing	3	2019	1	2020
Log Demo	1	2020	1	2020
Limited User Testing	1	2020	2	2020
First Unit Equipped	2	2020	2	2020
Full Rate Production Decision	4	2021	4	2021