Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army											Date: February 2020	
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*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	-	65.311	26.104	13.710	-	13.710	10.556	17.791	26.515	22.552	0.000	182.539
FB2: *Man Transportable Robotic System (MTRS) Inc II*	-	7.842	4.646	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.488
FB3: *Robotics Architecture*	-	1.792	2.876	2.702	-	2.702	2.706	2.707	2.716	2.715	0.000	18.214
FB4: *Common Robotic Systems*	-	24.527	5.396	2.352	-	2.352	0.000	0.000	0.000	0.000	0.000	32.275
FB6: *Squad Multipurpose Equipment Transport (SMET)*	-	10.461	5.000	5.008	-	5.008	4.011	11.014	19.722	15.821	0.000	71.037
FB7: *Robotics Enhanced Program (REP)*	-	6.343	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.343
FB8: *Soldier Borne Sensor (SBS)*	-	3.354	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.354
FB9: *MTRS Standardization*	-	8.123	7.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.123
FG8: *Common Robotic Controller*	-	2.869	1.186	3.648	-	3.648	3.839	4.070	4.077	4.016	0.000	23.705

A. Mission Description and Budget Item Justification

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

FB2: The Man Transportable Robotic System (MTRS) Inc. II is the Army's Soldier transportable, remotely operated, medium size (<= 164 lbs.) common robotic system. The system utilizes both radio and tethered communications allowing dismounted Soldiers to perform hazardous missions from a safe standoff distance. The MTRS Inc. II system consists of an Operator Control Unit (OCU), a suite of various mission payloads, and a mobility platform. Open architecture and the Ground Robotic Autonomous Systems (RAS) Interoperability Profile (IOP) requirements are employed to reduce obsolescence risks and to maximize efficiency in acquiring future capabilities. 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.
FB2 does not have any funding in FY 2021.

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 interfaces, common software and common architecture for robotics & autonomous platforms, payloads & universal controllers. It will establish a Common Specifications Reference

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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*

(CSR) to provide a repository codifying the Army Robotic Autonomous Systems (RAS) standards for open architecture, interoperability interfaces, and common control. RA includes the construction of program specific Interoperability Profiles (IOP) (i.e. Small Multipurpose Equipment Transport (S-MET), Tactical Wheeled Vehicle-Leader Follower (TWV-LF), Route Clearance Interrogation System Type I (RCIS Type I), Common Robotics System (Vehicle) (CRS(V)), Common Robotics System (Medium) (CRS(M)), Common Robotics System (Individual) (CRS(I)) Inc. II, Common Robotics System (Heavy) (CRS(H)), Enhanced Robotic Payload (ERP), Light Reconnaissance Robot (LRR), Optionally Manned Fighting Vehicle (OMFV), Robotic Combat Vehicle (RCV), etc.), new standards addressing emerging requirements and Modular Mission Payloads (MMP) (i.e. Cyber Security, new autonomous behaviors & artificial intelligence, new payloads, lethality, etc.).

FY 2021 RDTE funds in the amount of $2.702 million supports the further development and finalization of the Robotics and Autonomous Systems-Ground (RAS-G) Interoperability Profile (IOP) Version 5.0. IOP V5.0 will provide the required modular open interfaces and compliance test tools for new programs including S-MET Modular Mission Payloads (MMPs), LRR, CRS(M), TWV-LF, OMFV, RCV, ERP, robotic assault breacher vehicles, and robotic applique kits for manned ground systems. Additionally, FY 2021 RDTE funds will continue the development & hardening of Robotic Operating System, Military (ROS-M) software modules and ROS-M instantiation documents, and management of ROS-M registry & repository infrastructure.

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 Robotic Controller (URC), a suite of various payloads, and an open architecture common mobility platform allowing for future capability growth. The CRS(I) will allow the operator to 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 2021 RDTE funding in the amount of $2.352 million will fund the development, testing and validation of Engineering Change Proposals (ECPs), which includes contractor support required for these ECP tasks, as well as the development of Modification Work Orders (MWOs). This funding will also fund further development of Maintainer Technical Manuals and other LOG products needed to transition to full organic sustainment under Full Materiel Release (FMR) in 4QFY21, and resolve open issues listed in the Get Well Plan to meet FMR. This funding also supports programmatic risk mitigation activities including, but not limited to: Cyber Security Controls (i.e. Risk Management Framework), commonality directives, payloads, sensors, condition based maintenance, electronics, standard interfaces and architectures, autonomous operations and other emerging technologies, Interoperability Profile (IOP), and analysis of collaborative operations with various Unmanned Systems assigned at Battalion and below in addition to any program management support costs associated with these activities.

FB6: Small Multipurpose Equipment Transport (S-MET) will help to reduce Soldier loads by transporting mission specific equipment, resupply equipment, and supplies required for extended operations. The S-MET 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 S-MET will reduce Soldier load, increase squad mobility during combat operations and dismounted maneuvers. S-MET will have open architectures, a remote control, support casualty evacuation, power generation/offload and Modular Mission Payloads (MMP).

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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FY 2021 RDTE funding in the amount of $5.008 million supports the development, integration, and procurement of Technical Insertions and Modular Mission Payloads (MMP) to increase mission capabilities to requirements in the Abbreviated Capability Development Document (A-CDD). FY2021 RDTE funding supports procurement of test assets, testing, development of logistics material required to support these efforts. Program support to include travel and miscellaneous expenses in support of these RDTE efforts 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 will inform emerging capabilities and requirements documents in support of a return on investment to support future Army decision making. FB7 does not have any funding in FY 2021.

FB8: The Soldier Borne Sensor (SBS) is a small unmanned aerial vehicle. The SBS provides a near term solution to three Army War-fighting Challenges at the Infantry Squad level: develop situational understanding, conduct air-ground reconnaissance, and conduct joint combined arms maneuver. The system is simple to deploy and use to support the squad leader's decision-making process. The system allows Soldiers to obtain local situational awareness and understanding of their immediate surroundings while remaining in covered or concealed positions. Funding in this project aligns with Army's priorities in support of the National Defense Strategy.
In FY 2020, this project and funding will transition to PE: 06044827A / Soldier Systems - Warrior Dem/Val project 0604827A.FK4.

FB9: 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) units.
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.
FB9 does not have any funding in FY 2021.

FG8: The Universal Robotic Controller (URC) 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 (OCUs) for each system. A controlled UxS may be mobile or stationary, can be smart learning, and self-adaptive. Two URCs 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 URC 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 intent of this requirement allows the Soldier at battalion and below to use the URC to operate unmanned aerial systems (e.g. Raven, PUMA,

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Short Range Micro (SRM), etc.) and unmanned ground vehicles (e.g. CRS(I), CRS(V), CRS(M), CRS(H), S-MET, MTRS INC II, Light Reconnaissance (LR), Wingman, Robotic Combat Vehicle (RCV), etc.) and emerging unmanned air/ground systems. The URC is defined in the Common Robotic System (Individual) (CRS(I)) Capability Development Document (CDD) and is included in the CRS(I) acquisition. A standalone requirements document is being developed.

FY 2021 RDTE funding in the amount of $3.648 million will be utilized to continue test & evaluation and Logistics product development under the CRS(I) contract, mature the Universal Robotic Controller to meet the requirements in the CRS(I) CDD and Universal Controller Information System (UC IS) CDD and emerging programs of record, controller software, architecture, interface updates, and integration and test the URC into other Unmanned Ground Vehicles (UGV) or Unmanned Aerial Vehicles (UAV) programs of record via an Engineering Change Proposal (ECP). This funding will also be used to establish a common software architecture for Unmanned Ground Vehicles and Unmanned Air Systems (UAS).

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	71.435	41.308	25.872	-	25.872
Current President's Budget	65.311	26.104	13.710	-	13.710
Total Adjustments	-6.124	-15.204	-12.162	-	-12.162
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-15.204			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.124	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-12.162	-	-12.162

Change Summary Explanation

A portion of FY21 S-MET RDTE (655053FB6) was recolored to OPA funding due to program acceleration to buy additional S-MET systems.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FB2: *Man Transportable Robotic System (MTRS) Inc II*	-	7.842	4.646	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	12.488
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Man Transportable Robotic System (MTRS) Inc. II is the Army's Soldier transportable, remotely operated, medium size (<= 164 lbs.) common robotic system. The system utilizes both radio and tethered communications allowing dismounted Soldiers to perform hazardous missions from a safe standoff distance. The MTRS Inc. II system consists of an Operator Control Unit (OCU), a suite of various mission payloads, and a mobility platform. Open architecture and the Ground Robotic Autonomous Systems (RAS) Interoperability Profile (IOP) requirements are employed to reduce obsolescence risks and to maximize efficiency in acquiring future capabilities. 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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: MTRS Inc II RDTE ***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.	0.655	-	-
Title: MTRS Inc II RDTE - Engineering Change Proposals ***Description:*** MTRS Inc. II RDTE funding to support Government initiated Engineering Change Proposals (ECP) to the MTRS Inc. II system. ***FY 2020 Plans:*** Funding to support engineering, testing, logistics, etc. activities to support MTRS Inc. II ECP efforts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** MTRS Inc II completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.	-	0.370	-
Title: MTRS Inc II RDTE - IPT Matrix Support Salary ***Description:*** MTRS Inc. II RDTE funding to support engineering and various test efforts to include redesign of test articles, delta PQT test execution, software, engineering test support staff salaries, and System Engineering Program Management (SEPM) costs. ***FY 2020 Plans:***	1.160	0.716	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
Funding to support engineering activities, test article redesign, testing and salaries for IPT and program management costs to include travel and miscellaneous expenses associated with the MTRS Inc. II RDTE efforts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** MTRS Inc II completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.			
Title: MTRS Inc II RDTE ? TARDEC Multi-Robot Operator Controll Unit (MOCU) Software Support ***Description:*** MTRS Inc. II RDTE funding to support the following TARDEC services to include software subject matter expert support, testing support, issue remediation, and transitioning MOCU software lead to TARDEC SEC as the software sustainment agency. ***FY 2020 Plans:*** Funding to support TARDEC SW and engineering activities to include travel and miscellaneous expenses associated with the MTRS Inc. II RDTE efforts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** MTRS Inc II completed its RDTE activities in FY 2020 and is not funded with RDTE in FY2021.	1.073	0.869	-
Title: MTRS Inc II RDTE ? SPAWAR Multi-Robot Operator Control Unit (MOCU) 3 SW Support ***Description:*** MTRS Inc. II RDTE funding to provide subject matter expert support, software updates, incremental software drops for integration and testing, software test simulator, software drop test reports, debugging and issue remediation, and the transition of MOCU software to TARDEC for long term sustainment. ***FY 2020 Plans:*** Funding to support SPAWAR MOCU 3.0 SW and engineering activities to include travel and miscellaneous expenses associated with the MTRS Inc. II RDTE efforts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** MTRS Inc II completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.	1.200	0.670	-
Title: MTRS Inc II RDTE - Virtual Clearance Training Suite (VCTS) ***Description:*** MTRS Inc. II RDTE funding to support the development activities to incorporate MTRS Inc. II into the Virtual Clearance Training Suite. ***FY 2020 Plans:***	-	0.970	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Funding to support simulator suite development and program management costs to include travel and miscellaneous expenses associated with the MTRS Inc. II RDTE efforts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** MTRS Inc II completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.			
Title: MTRS Inc II RDTE - Endeavor Logistic Product development, demonstration and verification ***Description:*** MTRS Inc. II RDTE funding to support the development of a MTRS Inc. II logistic products, demonstration and verification. ***FY 2020 Plans:*** Funding to support logistic activities and program management costs to include travel and miscellaneous expenses associated with the MTRS Inc. II RDTE efforts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** MTRS Inc II completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.	2.643	0.470	-
Title: MTRS Inc II RDTE - Testing ***Description:*** MTRS Inc. II delta Production Qualification Testing (PQT). ***FY 2020 Plans:*** MTRS Inc. II delta Production Qualification Testing (PQT) to include reliability and performance testing. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** MTRS Inc II completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.	1.111	0.370	-
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.211	-
Accomplishments/Planned Programs Subtotals	7.842	4.646	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• R67050: *Man Transportable Robotic Sys Inc II (MTRS Inc II)*	7.456	36.254	63.976	-	63.976	64.507	2.211	-	-	0.000	174.404

Remarks

D. Acquisition Strategy

The MTRS Inc II acquisition strategy executed 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 contract is Firm Fixed Price and included a Critical Design Review (CDR) in FY 2018, design integration, Production Qualification Test (PQT) (FY 2019), Low Rate Initial Production (LRIP) Delta PQT (FY 2020) and Full Rate Production (FRP) (FY 2020). The program will obtain First Unit Equipped (FUE) under a Conditional Materiel Release (CMR) utilizing Interim Logistics Support (ILS) in FY 2020 while working toward obtaining Full Materiel Release (FMR) under organic sustainment in FY 2021.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Costs	MIPR	VARIOUS : MULTIPLE	1.721	3.455	Nov 2018	0.711	Nov 2019	-		-		-	0.000	5.887	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.211		-		-		-	0.000	0.211	-
		Subtotal	1.721	3.455		0.922		-		-		-	0.000	6.098	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Hardware	SS/FFP	Endeavor : Chelmsford, MA	1.977	1.160	Apr 2019	-		-		-		-	0.000	3.137	-
Virtual Clearance Training Suite (VCTS)	Various	Various : Multiple	-	-		0.965	Oct 2019	-		-		-	0.000	0.965	-
		Subtotal	1.977	1.160		0.965		-		-		-	0.000	4.102	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MTRS Inc II MOCU development	Various	Various : Multiple	1.508	2.116	Jan 2019	1.564	Oct 2019	-		-		-	0.000	5.188	-
MTRS Inc II contract data	SS/FFP	Endeavor : Chelmsford, MA	2.786	-		0.465	Oct 2019	-		-		-	0.000	3.251	-
MTRS In II Engineering Change Proposals	TBD	TBD : TBD	-	-		0.365	Oct 2019	-		-		-	0.000	0.365	-
		Subtotal	4.294	2.116		2.394		-		-		-	0.000	8.804	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army		Date: February 2020
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Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test site and test site support for FAT	MIPR	VARIOUS : MULTIPLE	0.879	1.111	Dec 2018	0.365	Oct 2019	-		-		-	0.000	2.355	-
		Subtotal	0.879	1.111		0.365		-		-		-	0.000	2.355	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	8.871	7.842		4.646		-		-		-	0.000	21.359	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
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*

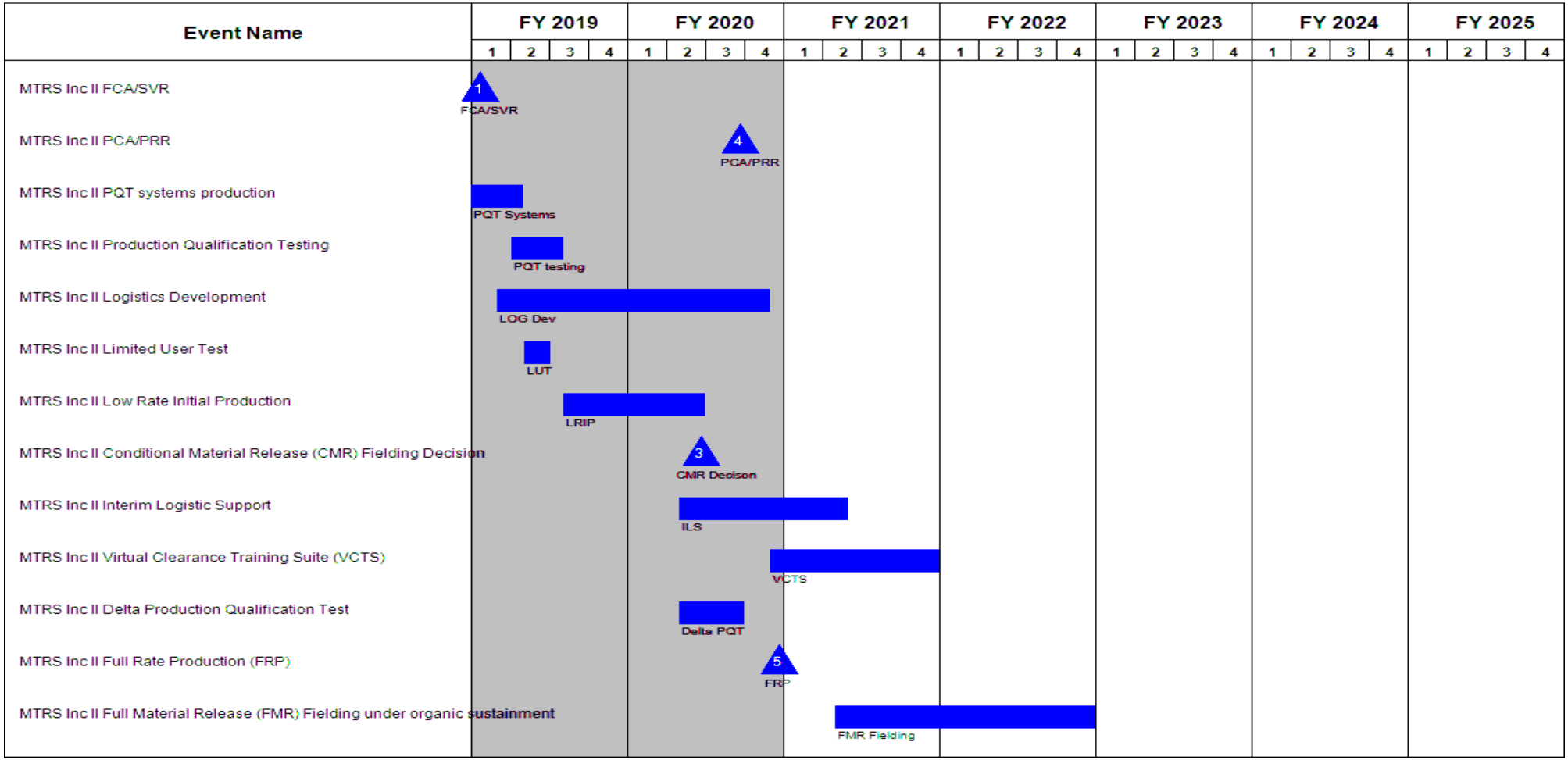

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB2 / *Man Transportable Robotic System (MTRS) Inc II*

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
MTRS Inc II First Unit Equipped (FUE)					2 FUE																							

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
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 Cyber PDR	2	2018	2	2018
MTRS Inc II CDR	3	2018	3	2018
MTRS Inc II FCA/SVR	1	2019	1	2019
MTRS Inc II PCA/PRR	3	2020	3	2020
MTRS Inc II PQT systems production	4	2018	1	2019
MTRS Inc II Production Qualification Testing	2	2019	3	2019
MTRS Inc II Logistics Development	1	2019	4	2020
MTRS Inc II Limited User Test	2	2019	2	2019
MTRS Inc II Low Rate Initial Production	3	2019	2	2020
MTRS Inc II Conditional Material Release (CMR) Fielding Decision	2	2020	2	2020
MTRS Inc II Interim Logistic Support	2	2020	2	2021
MTRS Inc II Virtual Clearance Training Suite (VCTS)	4	2020	4	2021
MTRS Inc II Delta Production Qualification Test	2	2020	3	2020
MTRS Inc II Full Rate Production (FRP)	4	2020	4	2020
MTRS Inc II Full Material Release (FMR) Fielding under organic sustainment	2	2021	4	2022
MTRS Inc II First Unit Equipped (FUE)	2	2020	2	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FB3: *Robotics Architecture*	-	1.792	2.876	2.702	-	2.702	2.706	2.707	2.716	2.715	0.000	18.214
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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 interfaces, common software and common architecture for robotics & autonomous platforms, payloads & universal controllers. It will establish a Common Specifications Reference (CSR) to provide a repository codifying the Army Robotic Autonomous Systems (RAS) standards for open architecture, interoperability interfaces, and common control. RA includes the construction of program specific Interoperability Profiles (IOP) (i.e. Small Multipurpose Equipment Transport (S-MET), Tactical Wheeled Vehicle-Leader Follower (TWV-LF), Route Clearance Interrogation System (RCIS), Common Robotics System (Medium) (CRS(M), Common Robotics System (Individual), (CRS(I)), Man Transportable Robotic System (MTRS) Inc. II, Common Robotics System (Heavy) (CRS(H)), Enhanced Robotic Payloads (ERP), Light Reconnaissance Robot (LRR), Optionally Manned Fighting Vehicle (OMFV), Robotic Combat (RCV) variants, robotic assault breacher vehicles, robotic applique kits for manned ground systems, etc.), and new standards addressing emerging requirements and Modular Mission Payloads (MMP) including Cyber Security, software safety requirements from MIL-STD-882E, new autonomous behaviors & artificial intelligence, new payloads, lethality, etc.
FY 2021 RDTE funds in the amount of $2.702 million supports the further development and finalization of the Robotics and Autonomous Systems, Ground (RAS-G) Interoperability Profile (IOP) Version 5.0. IOP V5.0 will provide the required modular open interfaces and compliance test tools for new programs including S-MET Modular Mission Payloads (MMPs), LRR, CRS(M), TWV-LF, OMFV, RCV, ERP, robotic assault breacher vehicles, and robotic applique kits for manned ground systems. Additionally, FY 2021 RDTE funds will continue the development & hardening of Robotic Operating System, Military (ROS-M) software modules and ROS-M instantiation documents, and management of ROS-M registry & repository infrastructure.

In FY 2021, $.178 million in Reimbursable Manpower for this line has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Robotics Architecture	1.792	2.745	2.702
Description: Provide architecture tools and support for current Programs of Record (PoR) & new requirements to allow for interoperability within the Joint community for Robotics & Autonomous Systems.			
FY 2020 Plans: FY 2020 funding for Robotics Architecture will develop & apply Interoperability (IOP) & ROS-M artifacts and Conformance Validation Tools for programs of record including the Squad Multipurpose Equipment Transport (SMET), SMET Modular Mission Payloads (MMPs), Tactical Wheeled Vehicle-Leader Follower (TWV-LF), Route Clearance Interrogation System Type I (RCIS Type I), Common Robotics System (Vehicle) (CRS(V)), Common Robotics System (Individual) (CRS(I)) Inc. II, Common Robotics			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
System (Heavy) (CRS(H)), Enhanced Robotic Payload (ERP), Light Reconnaissance Robot (LRR), Optionally Manned Fighting Vehicle (OMFV), Optionally Manned Tank (OMT), and Robotic Combat (RCV). It will develop and update IOP and tools to evaluate and assess the RCIS Type I, SMET MMPs, LRR, and Enhanced Robotics Payloads (ERP) and refine tools for TWV-LF, CRS(I), MTRS Inc. II & SMET. It will establish a Common Specifications Reference (CSR) to provide a repository codifying the Army RAS standards for open architecture, interoperability interfaces, and common control. It will initiate the development of IOP V5 which will provide interfaces for near term emerging programs such as key SMET MMPs & ERP payloads, CRS(V), LRR, RCV, and Autonomous Convoy Operations. Additionally, FY 2020 RDTE funds will support the development & hardening of Robotic Operating System, Military (ROS-M) software modules and ROS-M instantiation documents, and management of ROS-M registry & repository infrastructure. ***FY 2021 Plans:*** FY 2021 RDTE funds in the amount of $2.702 million supports the further development and finalization of the Robotics and Autonomous Systems, Ground (RAS-G) Interoperability Profile (IOP) Version 5.0. IOP V5.0 will provide the required modular open interfaces and compliance test tools for new programs including S-MET Modular Mission Payloads (MMPs), LRR, CRS(M), TWV-LF, OMFV, RCV, ERP, robotic assault breacher vehicles, and robotic applique kits for manned ground systems. Additionally, FY 2021 RDTE funds will continue the development & hardening of Robotic Operating System, Military (ROS-M) software modules and ROS-M instantiation documents, and management of ROS-M registry & repository infrastructure. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The decrease in funding from FY 2020 to FY 2021 is due to the completion of MTRS Inc II and CRS-H RDTE efforts in FY 2020, and the reduction of RDTE for CRS(I) and S-MET because of the limited scope of RDTE efforts needed in FY 2021.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.131	-
Accomplishments/Planned Programs Subtotals	1.792	2.876	2.702

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

D. Acquisition Strategy

In FY 2021 the Robotics Architecture line funds supporting matrix personnel & related contracts to develop IOP & ROS-M tools and supporting infrastructure. It leverages intellectual capital and products which allow for Joint interoperability and helps meet Army Program of Record cost and schedule while delivering high quality products for fielding. The architecture and tools developed under this line provide enterprise wide efficiencies and are central to the Army's acquisition philosophy of a modular open system approach between the major subsystems of robotics and autonomous systems, as described throughout the Army approved Robotics & Autonomous Systems (RAS) Initial Capabilities Document (ICD).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	Various : Multiple	0.766	0.925	Nov 2018	0.114	Oct 2019	-		-		-	0.000	1.805	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.131		-		-		-	0.000	0.131	-
		Subtotal	0.766	0.925		0.245		-		-		-	0.000	1.936	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IOP V4	Various	Various : Multiple	0.914	0.557	May 2019	-		-		-		-	0.000	1.471	-
Instantiation Tool Development	SS/CPFF	DCS : Warren, MI	-	-		0.084	Jun 2020	-		-		-	0.000	0.084	-
Conformance Verification Testing (CVT) Update	MIPR	TARDEC : Warren, MI	-	-		0.283	Apr 2020	-		-		-	0.000	0.283	-
IOP V5 Development	Various	Various : Multiple	-	-		1.053	Jan 2020	1.000	Jan 2021	-		1.000	0.000	2.053	-
Robotic Operating System - Military (ROS-M)	Various	Various : Multiple	-	-		0.783	Apr 2020	0.800	Apr 2021	-		0.800	0.000	1.583	-
IOP V4 Radio Interfaces Development	MIPR	NAVSEA : Washington D.C.	0.250	0.310	Jun 2019	-		-		-		-	0.000	0.560	-
Instantiation Tool Development	Various	Various : Multiple	-	-		-		0.100	May 2021	-		0.100	0.000	0.100	-
IOP Software Safety	RO	GVSC : Warren	-	-		-		0.150	Apr 2021	-		0.150	0.000	0.150	-
		Subtotal	1.164	0.867		2.203		2.050		-		2.050	0.000	6.284	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Conformance Verification Testing (CVT) Maintenance	MIPR	TARDEC : Warren, MI	-	-		0.110	Jan 2020	0.123	Jan 2021	-		0.123	0.000	0.233	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Robotic Operating System - Military (ROS-M) Infrastructure Management	MIPR	TARDEC : Warren, MI	-	-		0.134		0.150	Jan 2021	-		0.150	0.000	0.284	-
		Subtotal	-	-		0.244		0.273		-		0.273	0.000	0.517	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
New IOP & ROS-M Artifacts Stress Testing	MIPR	TARDEC : Warren, MI	-	-		0.184	Apr 2020	0.379	Apr 2021	-		0.379	0.000	0.563	-
		Subtotal	-	-		0.184		0.379		-		0.379	0.000	0.563	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1.930	1.792		2.876		2.702		-		2.702	0.000	9.300	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

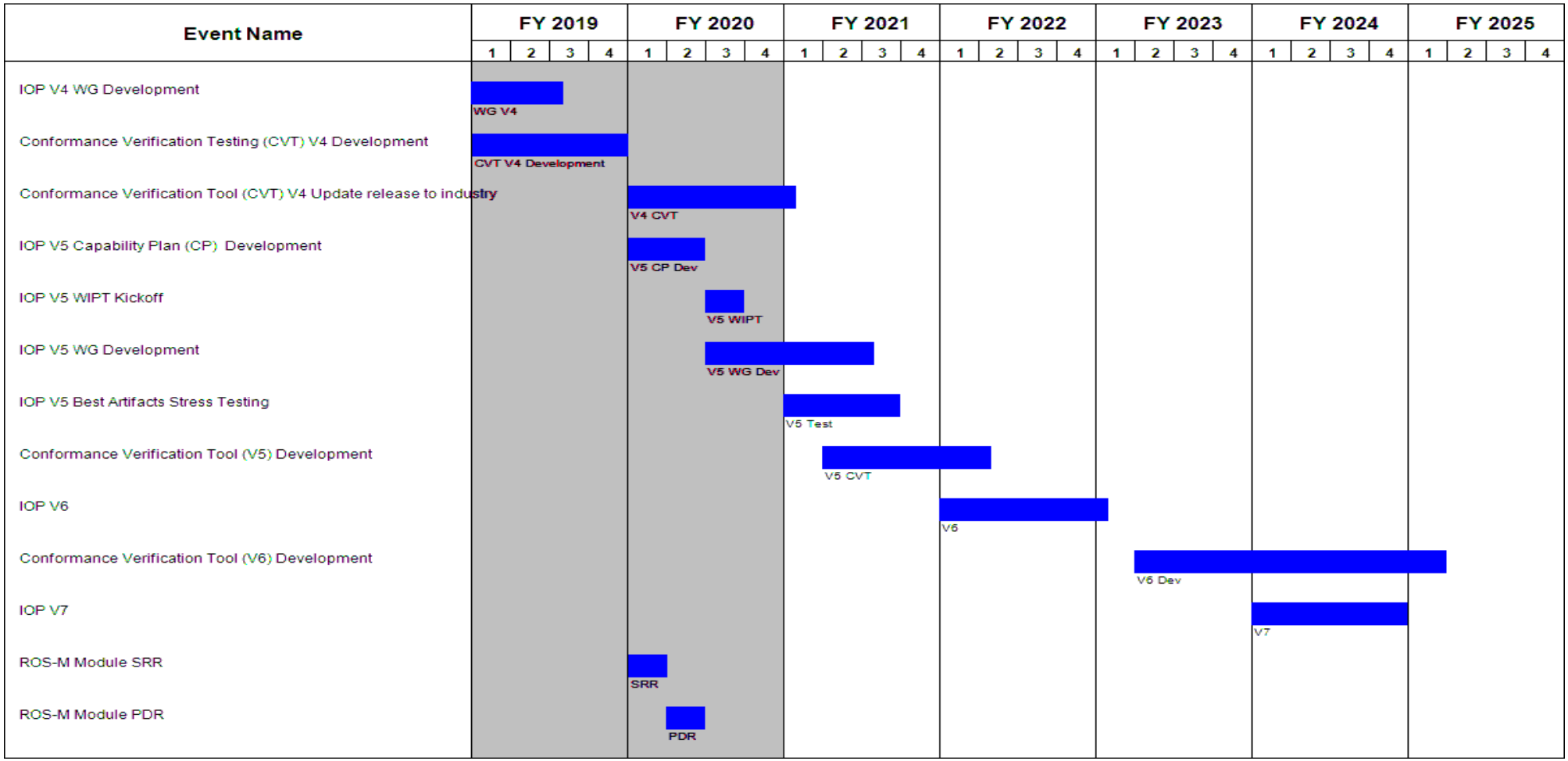

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

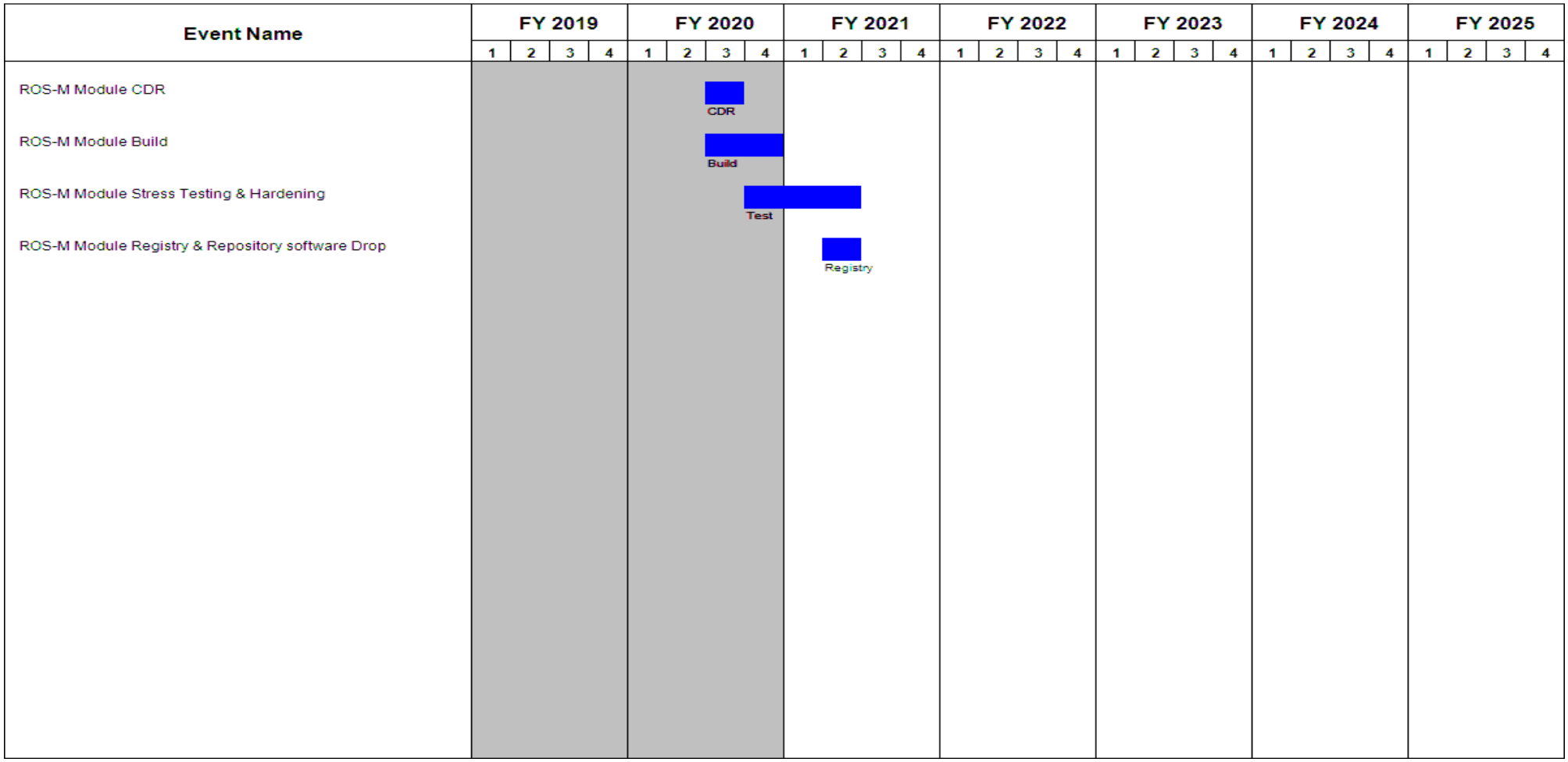

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

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
Conformance Verification Tool (CVT) V4 Update release to industry	1	2020	1	2021
IOP V5 Capability Plan (CP) Development	1	2020	2	2020
IOP V5 WIPT Kickoff	3	2020	3	2020
IOP V5 WG Development	3	2020	3	2021
IOP V5 Best Artifacts Stress Testing	1	2021	3	2021
Conformance Verification Tool (V5) Development	2	2021	2	2022
IOP V6	1	2022	1	2023
Conformance Verification Tool (V6) Development	2	2023	1	2025
IOP V7	1	2024	4	2024
ROS-M Module SRR	1	2020	1	2020
ROS-M Module PDR	2	2020	2	2020
ROS-M Module CDR	3	2020	3	2020
ROS-M Module Build	3	2020	4	2020
ROS-M Module Stress Testing & Hardening	4	2020	2	2021
ROS-M Module Registry & Repository software Drop	2	2021	2	2021

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FB4: *Common Robotic Systems*	-	24.527	5.396	2.352	-	2.352	0.000	0.000	0.000	0.000	0.000	32.275
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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 Robotic Controller (URC), a suite of various payloads, and an open architecture common mobility platform allowing for future capability growth. The CRS(I) will allow the operator to 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 2021 RDTE funding in the amount of $2.352 million will fund the development, testing and validation of Engineering Change Proposals (ECPs), which includes contractor support required for these ECP tasks as well as the development of Modification Work Orders (MWOs). This funding will also fund further development of Maintainer Technical Manuals and other Logistics products needed to transition to full organic sustainment under Army Full Materiel Release (FMR) in 4th quarter of FY 2021, and resolve open issues listed in the Get Well Plan to meet FMR. This funding also supports programmatic risk mitigation activities including, but not limited to: Cyber Security Controls (i.e. Risk Management Framework), commonality directives, mission payloads, sensors, Condition Based Maintenance, electronics, standard interfaces and architectures, autonomous operations and other emerging technologies, Interoperability (IOP), and analysis of collaborative operations with various Unmanned Systems assigned at Battalion and below in addition to any program management support costs associated with these activities.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: CRS(I) Engineering Manufacturing Design (EMD) ***Description:*** Two vendors entered 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. Completed the EMD phase and down-selected to a single vendor.	5.537	-	-
Title: CRS(I) Contractor support to test and design updates ***Description:*** CRS(I) contractor to provide support to Production Qualification Test (PQT) and Limited User Test (LUT) and make critical design fixes. ***FY 2020 Plans:***	0.653	0.559	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Funding for contractor to provide direct onsite support to PQT and LUT and well as provide reach back Engineering support to troubleshoot systems under test and make design updates for critical issues found in test. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Engineering and Manufacturing Development (EMD) phase completed.			
Title: CRS(I) PQT and LUT execution ***Description:*** ATEC costs to execute Production Qualification Test (PQT) and Limited User Test (LUT). ***FY 2020 Plans:*** Funding for ATEC to execute PQT and LUT in accordance with program TEMP. ***FY 2021 Plans:*** Funding for Army Test and Evaluation Command (ATEC) to execute Production Qualification Testing (PQT) and Limited User Testing (LUT) in accordance with program Test and Evaluation Master Plan (TEMP). ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Continuation of Delta Product Qualification Testing, target completion in 1st quarter of FY 2021.	5.493	1.560	0.250
Title: CRS(I) Log manuals ***Description:*** CRS(I) RDTE funding for contractor to complete development of Operator and Maintainer Technical Manuals. ***FY 2020 Plans:*** Funding for the development and verification of Technical Manuals (TM), LOG Demo, development of training packages to support CRS(I) PQT and LUT to support Conditional Materiel Release (CMR) and towards Full Materiel Release (FMR). ***FY 2021 Plans:*** Funding for further development and verification of Maintainer Technical Manuals (TM), Logistics Demonstration, training packages to support transition to full organic sustainment under Full Materiel Release (FMR). ***FY 2020 to FY 2021 Increase/Decrease Statement:*** ECP changes will merit additional changes to manuals.	4.184	0.859	0.250
Title: CRS(I) TARDEC Software Support ***Description:*** CRS(I) RDTE funding to support the following Engineering services to include software subject matter expert support, testing support, issue remediation, and transitioning platform software lead to the software sustainment agency. ***FY 2020 Plans:***	3.250	0.859	0.452

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
Funding to support TARDEC software and engineering activities to include travel and miscellaneous expenses associated with the CRS(I) RDTE efforts. ***FY 2021 Plans:*** Funding to support software and engineering activities to include travel associated with the CRS(I) software efforts to enhance security vulnerabilities and software performance. Develop Software Loader Verifier (SLV) and Software Integration Lab (SIL). ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding reduced to address issues related to security vulnerabilities and remaining software performance issues in a Software Maturation Plan.			
Title: CRS(I) IPT Matrix Support Salary ***Description:*** CRS(I) RDTE funding to support System Engineering Program Management (SEPM) costs. ***FY 2020 Plans:*** Funding to support engineering activities, test article redesign, testing and salaries for IPT and program management costs to include travel and miscellaneous expenses associated with the CRS(I) RDTE efforts. ***FY 2021 Plans:*** Funding to support engineering activities, test article refurbishment, testing and salaries for Integrated Product Team (IPT) members to include travel associated with transition to full organic sustainment under Full Material Release (FMR). ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Reduced support in engineering activities, testing and travel for RDTE efforts.	4.392	0.659	0.300
Title: CRS(I) SPAWAR MOCU software support ***Description:*** CRS(I) RDTE funding to provide subject matter expert support, software updates, incremental software drops for integration and testing, software test simulator, software drop test reports, debugging and issue remediation, and the transition of platform software into sustainment. ***FY 2020 Plans:*** Funding to support SPAWAR MOCU software and engineering activities to include travel and miscellaneous expenses associated with the MTRS Inc II RDTE efforts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Effort complete, software supported by a different agency.	1.018	0.655	-
Title: CRS(I) Engineering Change Proposals (ECPs) Development, Testing and Validation and Modification Work Orders	-	-	1.100

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
Description: Changes to proposed configuration after baseline performance established at initial PQT. ***FY 2021 Plans:*** Funding to develop, test, and validate proposed configuration changes to the CRS(I) and its baselined performance requirements and configuration documentation. This includes CRS(I) contractor support for contractor tasks associated with these ECPs. This will also fund tasks associated with developing Modification Work Orders to retrofit fielded systems. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Additional testing requested for Full Material Release (FMR) and Fielding.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.245	-
Accomplishments/Planned Programs Subtotals	24.527	5.396	2.352

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• G99595: *Common Robotic System-Individual (CRS-I)*	3.563	2.285	1.154	-	1.154	1.155	1.241	1.449	1.415	0.000	12.262
• G93696: *Common Robotic System - Individual (CRS-I)*	-	30.387	54.528	-	54.528	22.857	-	-	-	0.000	107.772

Remarks

In FY 2019, CRS(I) and the Common Robotic Controller OPA funding was in the same funding line G99595. Beginning in FY 2020, CRS(I) had its own OPA funding line G93696 separate from the Common Robotic controller G99595.

D. Acquisition Strategy

The CRS(I) competitive Firm Fixed Price (FFP) contract was awarded to a single contractor in March 2019 for the CRS (I) Low Rate Initial Production (LRIP) phase. This phase includes Full Materiel Release (FMR) (FY 2021) and Full Rate Production (FRP) (FY 2021).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	MIPR	Combat Support - Combat Service Support : Warren MI	2.662	4.392	Nov 2018	0.659	Oct 2019	0.300	Oct 2020	-		0.300	0.000	8.013	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.245		-		-		-	0.000	0.245	-
		Subtotal	2.662	4.392		0.904		0.300		-		0.300	0.000	8.258	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Manufacturing & Design	C/CPFF	Endeavor and Qinetiq North America : Massachusetts	18.930	7.548	Nov 2018	0.559	Oct 2019	-		-		-	0.000	27.037	-
Government Furnished Equipment	Various	Various : Multiple	-	0.200	Sep 2019	-		-		-		-	0.000	0.200	-
		Subtotal	18.930	7.748		0.559		-		-		-	0.000	27.237	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Log manuals	C/CPFF	Multiple : Various	-	-		0.859	Oct 2019	0.250	Dec 2020	-		0.250	0.000	1.109	-
		Subtotal	-	-		0.859		0.250		-		0.250	0.000	1.109	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB4 / *Common Robotic Systems*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Production Qualification Testing (PQT) & Limited User Testing (LUT)	Various	Aberdeen Test Center : Aberdeen MD	0.115	8.137	Jan 2019	1.560	Dec 2019	0.250	Jan 2021	-		0.250	0.000	10.062	-
TARDEC software support	Various	TARDEC : Warren, MI	0.862	3.250	Jan 2019	0.859	Oct 2019	0.452	Jan 2021	-		0.452	0.000	5.423	-
SPAWAR software support	Various	SPAWAR : San Diego, CA	-	1.000	Apr 2019	0.655	Oct 2019	-		-		-	0.000	1.655	-
ECP/MWO Development Testing and Validation	C/CPFF	Qinetiq North America : Waltham, MA	-	-		-		1.100	Dec 2020	-		1.100	0.000	1.100	-
		Subtotal	0.977	12.387		3.074		1.802		-		1.802	0.000	18.240	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	22.569	24.527		5.396		2.352		-		2.352	0.000	54.844	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB4 / *Common Robotic Systems*

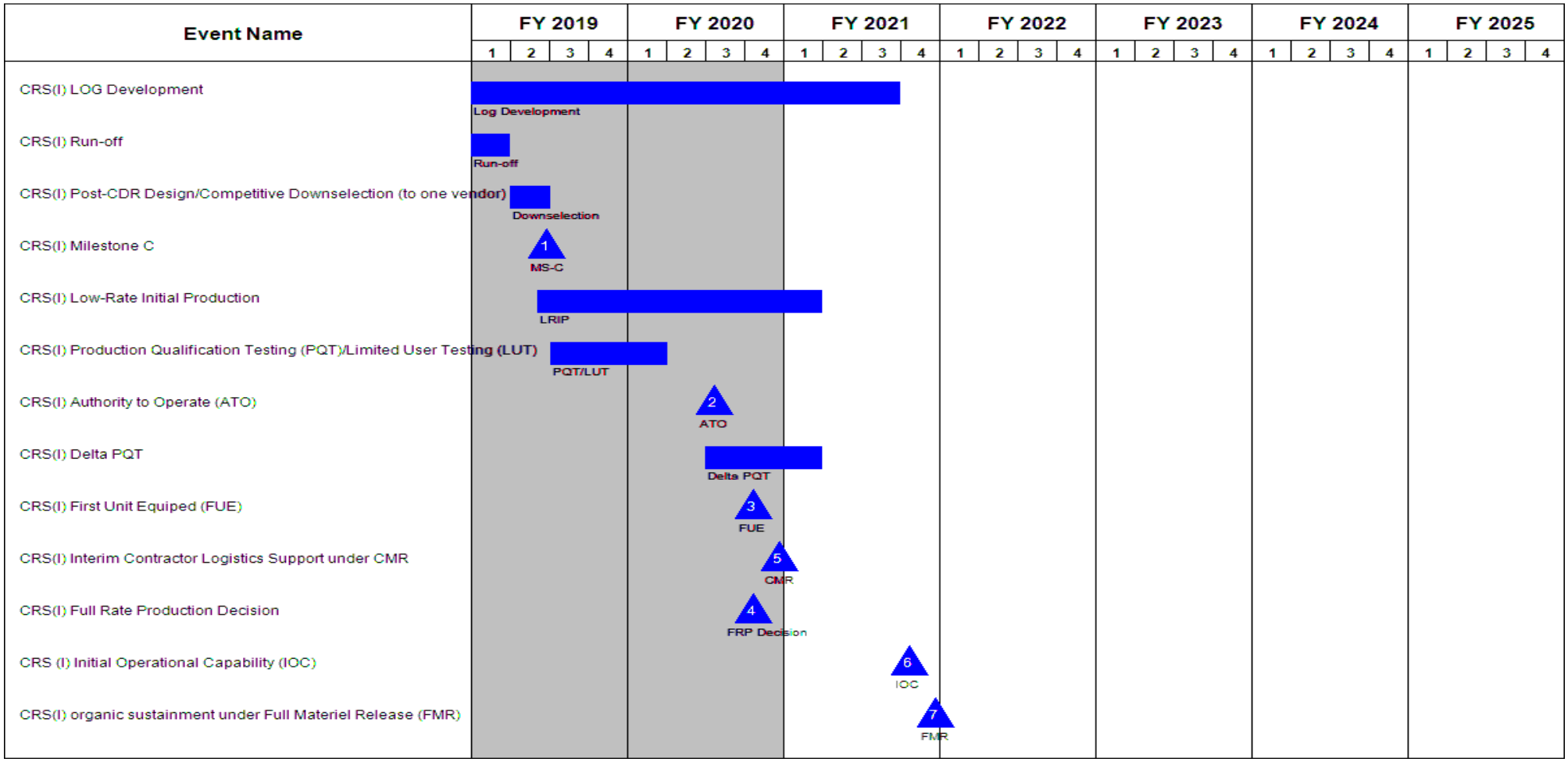

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB4 / *Common Robotic Systems*

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) LOG Development	3	2018	3	2021
CRS(I) Critical Design Review (CDR) (x2)	3	2018	3	2018
CRS(I) Run-off	1	2019	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	1	2021
CRS(I) Production Qualification Testing (PQT)/Limited User Testing (LUT)	3	2019	1	2020
CRS(I) Authority to Operate (ATO)	3	2020	3	2020
CRS(I) Delta PQT	3	2020	1	2021
CRS(I) First Unit Equiped (FUE)	4	2020	4	2020
CRS(I) Interim Contractor Logistics Support under CMR	4	2020	4	2020
CRS(I) Full Rate Production Decision	4	2020	4	2020
CRS (I) Initial Operational Capability (IOC)	4	2021	4	2021
CRS(I) organic sustainment under Full Materiel Release (FMR)	4	2021	4	2021

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FB6: *Squad Multipurpose Equipment Transport (SMET)*	-	10.461	5.000	5.008	-	5.008	4.011	11.014	19.722	15.821	0.000	71.037
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Small Multipurpose Equipment Transport (S-MET) will help to reduce Soldier loads by transporting mission specific equipment, resupply equipment, and supplies required for extended operations. The S-MET 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 S-MET will reduce Soldier load, increase squad mobility during combat operations and dismounted maneuvers. S-MET will have open architectures, a remote control and support casualty evacuation, power generation/offload and reintegration of Modular Mission Payloads (MMP) and technical insertions.

FY 2021 RDTE funding in the amount of $5.008 million supports the development, integration, test and purchase of Technical Insertions and Modular Mission Payloads (MMP) to increase mission capabilities to meet objective requirements in the Abbreviated Capability Development Document (A-CDD). FY 2021 RDTE funding supports remaining testing at Army Test Engineering Center (ATEC) for the Program of Record. Program support to include salaries, travel and miscellaneous expense for the S-MET program will also be funded.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: S-MET	10.461	4.773	5.008
Description: Small Multipurpose Equipment Transport (S-MET)			
FY 2020 Plans: FY 2020 RDTE funding supports the development and purchase of Technical Insertions and Modular Mission Payloads (MMP). FY 2020 RDTE funding supports Developmental testing at Aberdeen and other remaining testing required for the Program of Record to include cyber testing and air drop certification. Program support to include salaries, travel and miscellaneous expense for the SMET program will also be funded.			
FY 2021 Plans: FY 2021 RDTE funding supports the development, integration, test and procurement of Technical Insertions and Modular Mission Payloads (MMP) to increase mission capabilities to requirements in the Abbreviated Capability Development Document (A-CDD). FY 2021 RDTE funding supports procurement of test assets, testing, development of logistics material required to support these efforts. Program support to include travel and miscellaneous expenses in support of these RDTE efforts will also be funded.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
FY 2021 increase of $0.008 million covers any additional costs relative to meeting objective requirements in the Abbreviated Capability Development Document (A-CDD).			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.227	-
Accomplishments/Planned Programs Subtotals	10.461	5.000	5.008

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• R12154: *Squad Multipurpose Equipment Transport (SMET)*	-	8.768	33.355	-	33.355	30.086	35.172	46.232	94.779	0.000	248.392

Remarks

D. Acquisition Strategy

The Small Multipurpose Equipment Transport (S-MET) Assessment effort was completed as part of the Robotics Development effort under the Tactical Unmanned Ground Vehicle (654641DV7) funding line in FY 2017. This Phase I Assessment supported a rapid start to establish an Other Transaction Authority (OTA) Acquisition Strategy supporting the Directed Requirement, signed 14 April 2017. The Phase I OTA awarded a five-day test event to 8 S-MET prototype solutions in FY 2017 as part of the Robotic Enhancement Program (REP) under the Tactical Unmanned Ground Vehicle (654641DV7) funding line. In FY 2018 Phase II down selected to 4 vendors awarded the Phase II OTA. This OTA provided system testing at Aberdeen Test Center (ATC) and issued systems to Soldiers for a 7 month Technology Demonstration. Twenty systems were purchased from each of the 4 vendors issued to IBCTs. This Technology Demonstration guided the development of the Abbreviated Capability Development Document (A-CDD) approved 29 July 2019 following the Army Requirements Oversight Council (AROC) decision on 19 July 2019.

Project Manager Force Projection (PM FP) received authority from the Army Acquisition Executive (AAE), on 13 Aug 2019, to pursue a Rapid Fielding pathway under Section 804 Middle Tier Acquisition (MTA) in accordance with Fiscal Year (FY) 2016 National Defense Authorization Act (NDAA). Under an approved Section 804 Rapid Fielding pathway, the PM will down select to one or more of the four prototypes and award refurbishment of Phase II systems, completed testing, complete logistics development to provide for an organic support strategy, and proceed into production.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

The Phase III FAR follow on contract for the Program Of Record (POR) production system was awarded on 30 Oct 2019 to General Dynamic Land Systems. Army Contracting Command - Warren received a Government Accountability Office (GAO) level protest on 14 Nov 2019. In response to the protest, the Government will be taking corrective action and resoliciting the Phase III requirement. The planned Request for Proposal (RFP) release is on 29 Jan 2020, with a target award date of 30 Apr 2020.

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 (IOP) for S-MET. The PdM plans to gather sufficient data during the S-MET Technology Demonstration to reduce development efforts and provide cost savings by incorporating the developed S-MET technology to include future technical insertions and Modular Mission Payloads (MMP) into the Program of Record. Throughout the life of the program, the Army will continue to survey the marketplace to identify opportunities for technology insertions and required Modular Mission Payloads (MMP), relying on competition to drive down costs.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Costs	MIPR	PM FP : Warren, MI	1.000	1.461	Oct 2018	1.563	Oct 2019	1.408	Oct 2020	-		1.408	0.000	5.432	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.227		-		-		-	0.000	0.227	-
		Subtotal	1.000	1.461		1.790		1.408		-		1.408	0.000	5.659	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Directed Requirement Technology Demonstration	C/FFP	Year Long Excursion : TBD	10.328	2.200	Dec 2018	-		-		-		-	0.000	12.528	-
Technical Insertions	C/FFP	TBD : TBD	-	3.000	Nov 2018	0.162	Nov 2019	0.800	Feb 2021	-		0.800	0.000	3.962	-
Modular Mission Payloads (MMP)	MIPR	Ft Benning : Ft Benning, GA	-	0.800	Mar 2019	0.462	Jan 2020	2.000	Nov 2020	-		2.000	0.000	3.262	-
		Subtotal	10.328	6.000		0.624		2.800		-		2.800	0.000	19.752	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Cyber / Integration	MIPR	TBD : TBD	1.000	1.000	Oct 2018	0.962	Oct 2019	-		-		-	0.000	2.962	-
		Subtotal	1.000	1.000		0.962		-		-		-	0.000	2.962	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATEC Test Support	MIPR	Army Test Engineering Center : Various	3.802	1.600	Nov 2018	0.862	Nov 2019	0.800	Nov 2020	-		0.800	0.000	7.064	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Air Drop Testing	MIPR	NATICK : Various	-	0.400	Dec 2018	0.762	Oct 2019	-		-		-	0.000	1.162	-
		Subtotal	3.802	2.000		1.624		0.800		-		0.800	0.000	8.226	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	16.130	10.461		5.000		5.008		-		5.008	0.000	36.599	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

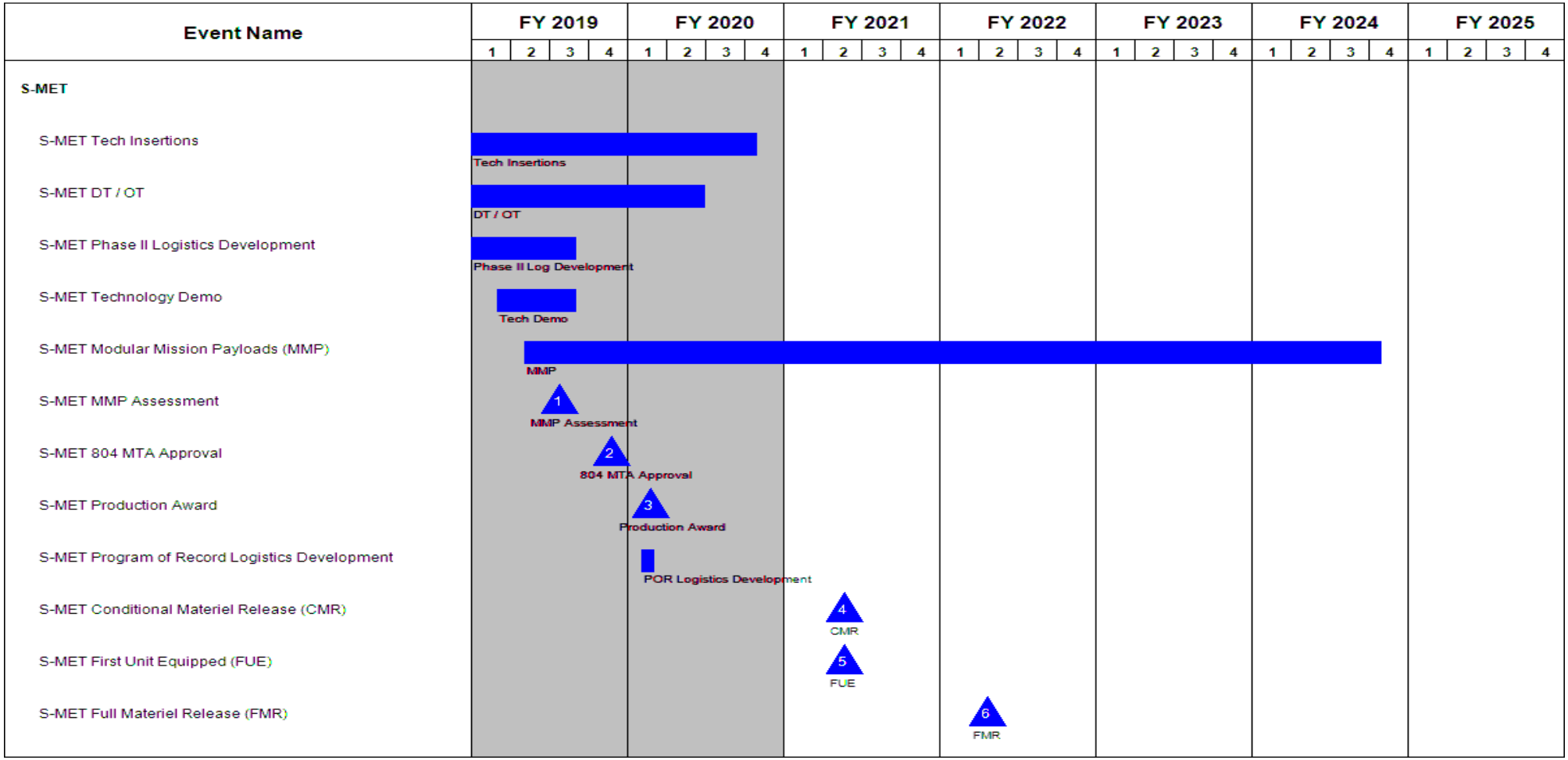

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
S-MET	1	2018	4	2022
S-MET Tech Insertions	3	2018	4	2020
S-MET DT / OT	4	2018	2	2020
S-MET Phase II Logistics Development	3	2018	3	2019
S-MET Technology Demo	1	2019	3	2019
S-MET Modular Mission Payloads (MMP)	2	2019	4	2024
S-MET MMP Assessment	3	2019	3	2019
S-MET 804 MTA Approval	4	2019	4	2019
S-MET Production Award	1	2020	1	2020
S-MET Program of Record Logistics Development	1	2020	1	2020
S-MET Conditional Materiel Release (CMR)	2	2021	2	2021
S-MET First Unit Equipped (FUE)	2	2021	2	2021
S-MET Full Materiel Release (FMR)	2	2022	2	2022

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FB7: *Robotics Enhanced Program (REP)*	-	6.343	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	6.343
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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.

This program has no FY 2021 RDTE funding.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Robotic Enhanced Program (REP)	6.343	-	-
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.			
Accomplishments/Planned Programs Subtotals	6.343	-	-

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.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	Various : Multiple	2.447	0.918	Apr 2019	-		-		-		-	0.000	3.365	-
		Subtotal	2.447	0.918		-		-		-		-	0.000	3.365	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Iteration 18.1	Various	Various : Multiple	0.037	-		-		-		-		-	0.000	0.037	-
Iteration 18.2	Various	Various : Multiple	1.707	-		-		-		-		-	0.000	1.707	-
Iteration 19.1	Various	Various : Multiple	-	2.049	Apr 2019	-		-		-		-	0.000	2.049	-
		Subtotal	1.744	2.049		-		-		-		-	0.000	3.793	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Iteration 18.1	Various	Various : Multiple	0.854	-		-		-		-		-	0.000	0.854	-
Iteration 18.2	Various	Various : Multiple	1.402	-		-		-		-		-	0.000	1.402	-
Iteration 19.1	Various	Various : Multiple	0.638	1.372	Jun 2019	-		-		-		-	0.000	2.010	-
REP Out-of-Cycle Initiatives	Various	Various : Various	0.598	2.004	Aug 2019	-		-		-		-	0.000	2.602	-
		Subtotal	3.492	3.376		-		-		-		-	0.000	6.868	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	7.683	6.343		0.000		-		-		-	0.000	14.026	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB7 / *Robotics Enhanced Program (REP)*

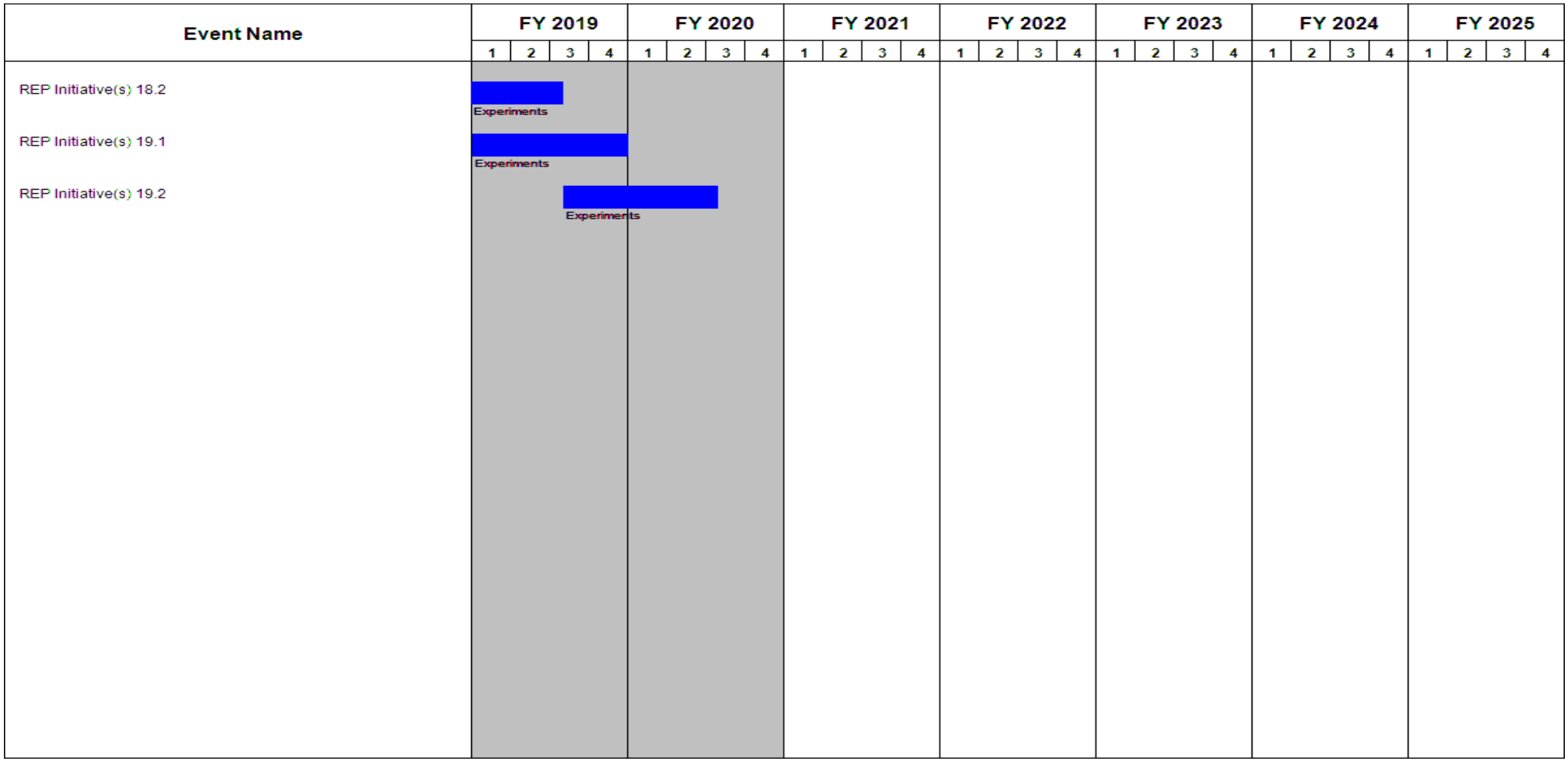

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB7 / *Robotics Enhanced Program (REP)*

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

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FB8: *Soldier Borne Sensor (SBS)*	-	3.354	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	3.354
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Soldier Borne Sensor (SBS) is a small unmanned aerial vehicle. The SBS provides a near term solution to three Army War-fighting Challenges at the Infantry Squad level: develop situational understanding, conduct air-ground reconnaissance, and conduct joint combined arms maneuver. The system is simple to deploy and use to support the squad leader's decision-making process. The system allows Soldiers to obtain local situational awareness and understanding of their immediate surroundings while remaining in covered or concealed positions. Funding in this project aligns with Army's priorities in support of the National Defense Strategy.

In FY 2020, this project and funding transitioned to PE: 0604827A / Soldier Systems - Warrior Dem/Val, Project FK4.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Soldier Borne Sensor (SBS)	3.354	-	-
Description: The SBS is a small Unmanned Aerial System that 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.			
Accomplishments/Planned Programs Subtotals	3.354	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• FK4: *Soldier Borne Sensor (SBS)*	-	1.252	1.476	-	1.476	2.237	3.545	5.001	4.474	Continuing	Continuing
• W63798: *Soldier Borne Sensor (SBS)*	24.437	23.362	18.907	-	18.907	18.141	19.081	19.273	19.168	Continuing	Continuing

Remarks

D. Acquisition Strategy

SBS achieved Milestone C September 2017. The program office is utilizing Defense Logistics Agency - Tailored Logistics Support contracts to procure Tranche 1 systems in FY 2018, FY 2019, and FY 2020.

SBS plans to initiate prototype projects via other transaction agreement in. The Tranche 2 SBS solution will be selected from these prototypes in FY 2021.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army		Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 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	0.394	0.139	Dec 2018	-		-		-		-	0.000	0.533	-
		Subtotal	0.394	0.139		-		-		-		-	0.000	0.533	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Better Data Thermal Camera	MIPR	NVESD : Fort Belvoir, Virginia 22060	0.472	1.510	Feb 2019	-		-		-		-	0.000	1.982	-
Obstacle Avoidance	MIPR	NSRDEC : NATICK, Massachusetts 01760	-	0.148	Nov 2018	-		-		-		-	0.000	0.148	-
OTA Incremental Development	MIPR	NSRDEC : NATICK, Massachusetts 01760	-	1.026	Apr 2020	-		-		-		-	0.000	1.026	-
		Subtotal	0.472	2.684		-		-		-		-	0.000	3.156	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Matrix Support	MIPR	Various : Various	0.552	0.356	Dec 2018	-		-		-		-	0.000	0.908	-
		Subtotal	0.552	0.356		-		-		-		-	0.000	0.908	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB8 / *Soldier Borne Sensor (SBS)*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 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	0.779	0.175	Mar 2019	-		-		-		-	0.000	0.954	-
		Subtotal	0.779	0.175		-		-		-		-	0.000	0.954	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.197	3.354		0.000		-		-		-	0.000	5.551	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB8 / *Soldier Borne Sensor (SBS)*

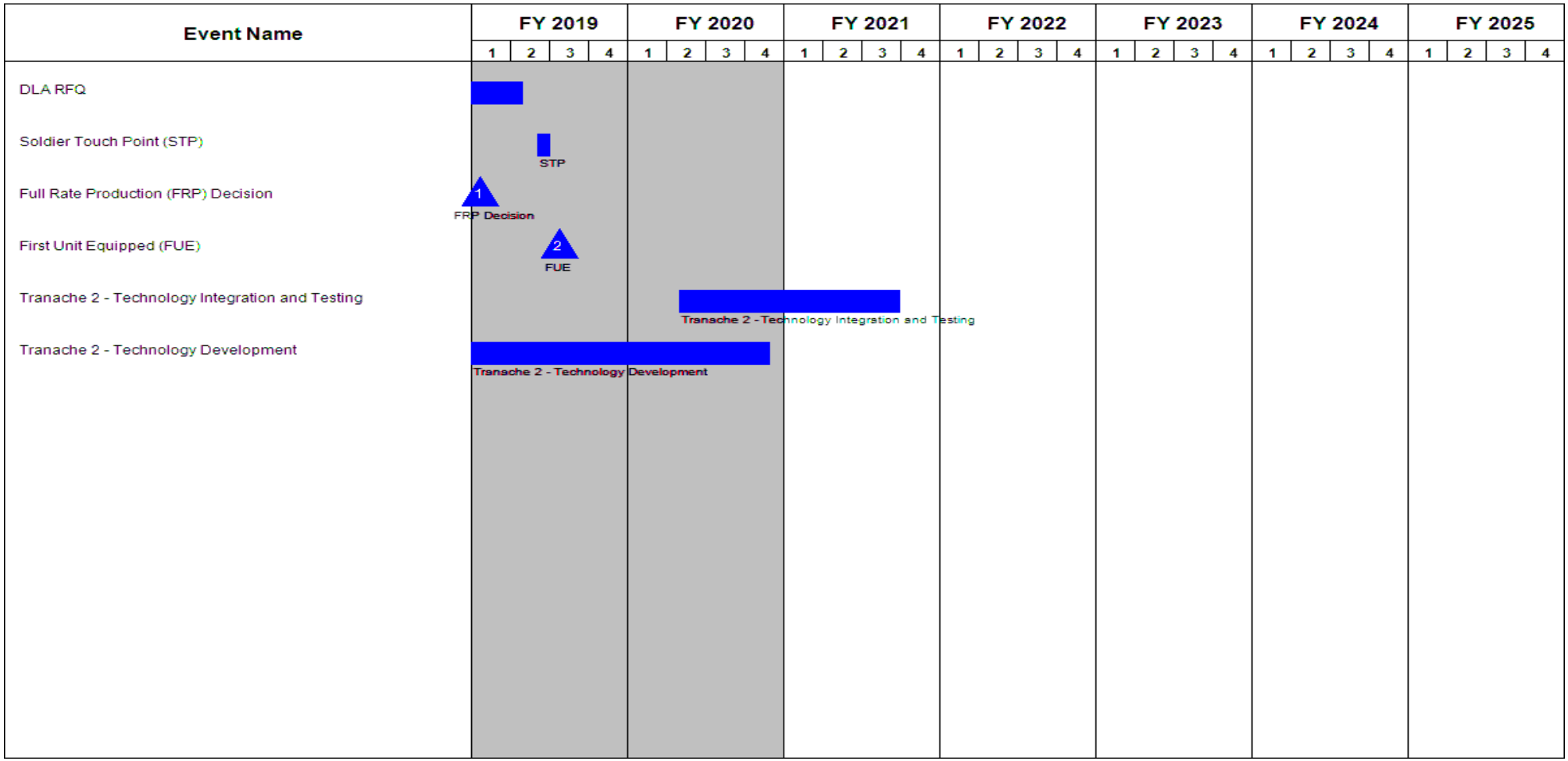

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB8 / *Soldier Borne Sensor (SBS)*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
DLA RFQ	1	2019	1	2019
Soldier Touch Point (STP)	2	2019	2	2019
Full Rate Production (FRP) Decision	1	2019	1	2019
First Unit Equipped (FUE)	3	2019	3	2019
Tranache 2 - Technology Integration and Testing	2	2020	3	2021
Tranache 2 - Technology Development	4	2018	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FB9: *MTRS Standardization*	-	8.123	7.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.123
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Common Robotic System, Heavy (CRS(H)) is a modular large-sized system that provides enhanced protection to the Explosive Ordnance Disposal (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 EOD units.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: Additive Manufacturing ***Description:*** Supports 3D printed part evaluative efforts.	0.149	-	-
Title: CRS(H) IPT Matrix Support Salary Support ***Description:*** CRS(H) RDTE funding to support engineering and various test efforts to include redesign of test articles, software, engineering test support staff salaries, and System Engineering Program Management (SEPM) costs. ***FY 2020 Plans:*** Funding to support engineering activities, testing, logistics, and salaries for IPT and program management costs to include travel and miscellaneous expenses associated with the CRS(H) RDTE efforts. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** CRS-H completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.	1.549	0.936	-
Title: CRS(H) testing ***Description:*** CRS(H) cyber security and performance testing efforts. ***FY 2020 Plans:*** Funding is provided for cyber security testing, cyber security scans, and additional reliability and performance testing. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** CRS-H completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.	6.425	1.937	-
Title: CRS(H) test article refurbishment	-	0.336	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
Description: CRS(H) test article refurbishment for payloads. ***FY 2020 Plans:*** Funding is to refurbish test articles to "Like-New" condition to support payload integration activities. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** CRS-H completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.			
Title: CRS(H) contract data ***Description:*** CRS(H) data required to support Materiel Release. ***FY 2020 Plans:*** Funding is provided for Risk Management Framework (RMF) artifacts, Logistics data, provisioning, training development, and engineering data. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** CRS-H completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.	-	2.937	-
Title: CRS(H) Payload Development ***Description:*** CRS(H) payload development, integration, and testing activities. ***FY 2020 Plans:*** Funding is provided for CRS(H) payload development, integration, and testing activities. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** CRS-H completed its RDTE activities in FY 2020 and is not funded with RDTE in FY 2021.	-	0.536	-
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.318	-
Accomplishments/Planned Programs Subtotals	8.123	7.000	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• W12001: *EOD Robotics Systems Recapitalization*	17.736	23.115	36.584	-	36.584	-	-	-	-	0.000	77.435

Remarks

This is a shared OPA line with Robotic Logistic Support Center (RLSC). Funding split is as follows:

Program	FY 2019	FY 2020	FY 2021
EOD (RLSC)	$13,118	0	0
CRS(H)	$4,618	$23,115	$36,584

D. Acquisition Strategy

The CRS-H acquisition strategy entered at Milestone C and awarded three Other Transaction Authority (OTA) agreements to conduct a dual phase fly-off. The CRS-H program used the fly-off results to down-select to one Original Equipment Manufacturer (OEM) and proceed directly into production in FY2019 and field under a Conditional Materiel Release (CMR) utilizing Interim Logistics Support (ILS) in FY 2020. The CRS-H program will complete all required engineering and logistics activities to support Full Materiel Release (FMR) under organic sustainment and Full Rate Production (FRP) in FY 2021.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) Program Management costs	Various	Various : Multiple	-	1.546	Dec 2018	0.936	Oct 2019	-		-		-	0.000	2.482	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.318		-		-		-	0.000	0.318	-
		Subtotal	-	1.546		1.254		-		-		-	0.000	2.800	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Platform to Support Payload Development	C/TBD	Robot Logistics Support Center (RLSC) : Selfridge Air National Guard Base (SANG)	1.150	-		-		-		-		-	0.000	1.150	-
CRS(H) Payload Development	Various	Various : Multiple	-	-		0.536	Dec 2019	-		-		-	0.000	0.536	-
		Subtotal	1.150	-		0.536		-		-		-	0.000	1.686	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) Contract data	SS/FFP	TBD : TBD	-	-		2.937	Nov 2019	-		-		-	0.000	2.937	-
		Subtotal	-	-		2.937		-		-		-	0.000	2.937	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) System Evaluation	Various	Various : Multiple	-	6.425	Feb 2019	1.937	Nov 2019	-		-		-	0.000	8.362	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB9 / *MTRS Standardization*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) Test Article refurbishment	SS/FFP	TBD : TBD	-	-		0.336	Nov 2019	-		-		-	0.000	0.336	-
Additive Manufacturing524	TBD	TBD : TBS	-	0.152	Jan 2019	-		-		-		-	0.000	0.152	-
		Subtotal	-	6.577		2.273		-		-		-	0.000	8.850	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	1.150	8.123		7.000		-		-		-	0.000	16.273	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

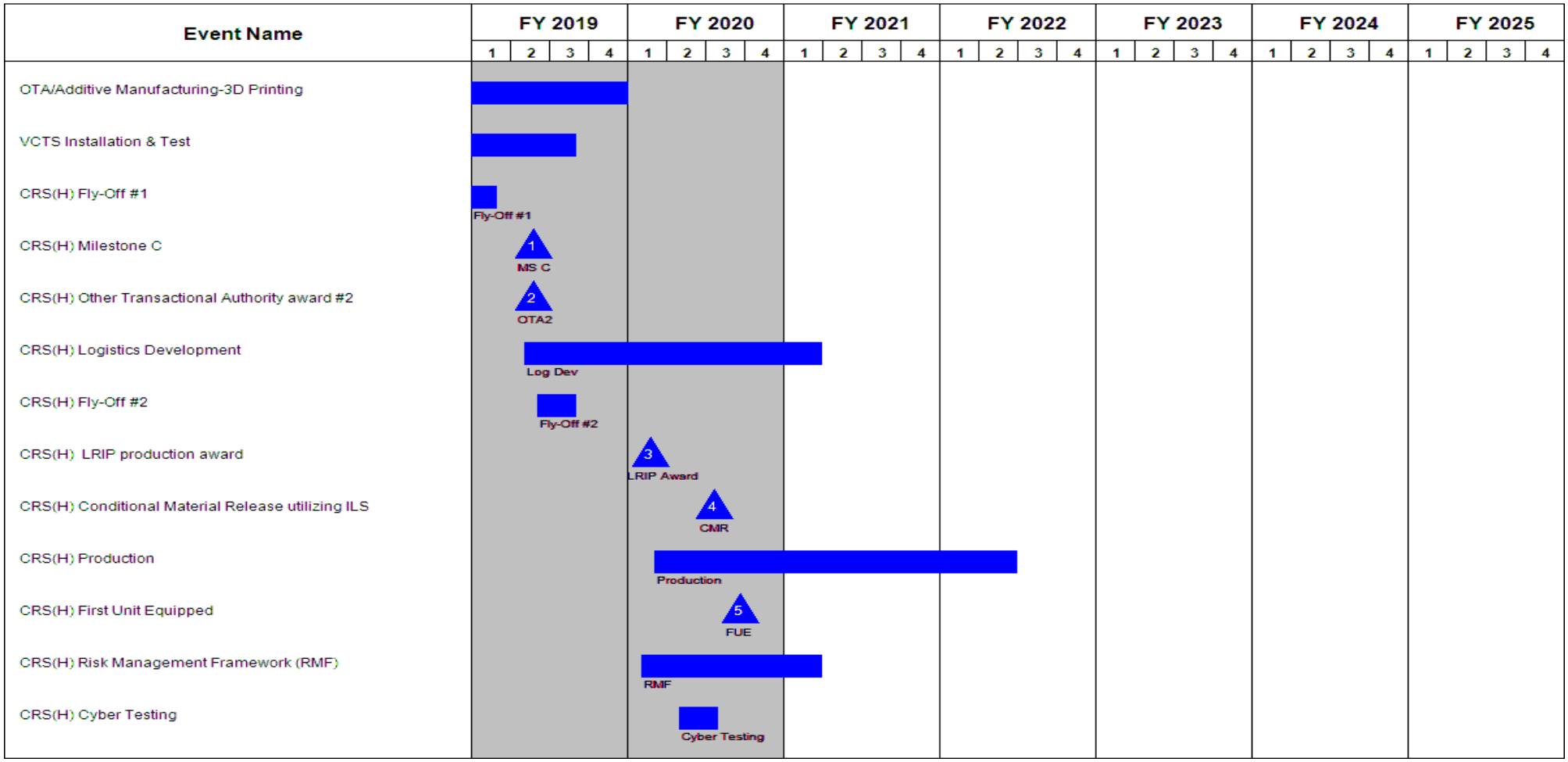

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
CRS(H) Full Materiel Release (FMR) under organic sustainment											6 FMR																	

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
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
VCTS Software Integration	2	2018	3	2018
VCTS Installation & Test	3	2018	3	2019
CRS(H) Capabilitiy Producton Document (CPD)	3	2018	3	2018
CRS(H) Request for Project Proposal (RPP) Release	3	2018	3	2018
CRS(H) Other Transactional Authority award #1	4	2018	4	2018
CRS(H) Milestone Decisions Document (MDD)	4	2018	4	2018
CRS(H) Fly-Off #1	4	2018	1	2019
CRS(H) Milestone C	2	2019	2	2019
CRS(H) Other Transactional Authority award #2	2	2019	2	2019
CRS(H) Logistics Development	2	2019	1	2021
CRS(H) Fly-Off #2	2	2019	3	2019
CRS(H) LRIP production award	1	2020	1	2020
CRS(H) Conditional Material Release utilizing ILS	3	2020	3	2020
CRS(H) Production	1	2020	2	2022
CRS(H) First Unit Equipped	3	2020	3	2020
CRS(H) Risk Management Framework (RMF)	1	2020	1	2021
CRS(H) Cyber Testing	2	2020	3	2020
CRS(H) Full Materiel Release (FMR) under organic sustainment	3	2021	3	2021

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army			Date: February 2020
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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FG8: *Common Robotic Controller*	-	2.869	1.186	3.648	-	3.648	3.839	4.070	4.077	4.016	0.000	23.705
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Universal Robotic Controller (URC) 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 (OCUs) for each system. A controlled UxS may be mobile or stationary, can be smart learning, and self-adaptive. Two URCs 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 URC 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 intent of this requirement is to allow the Soldier at battalion and below to use the URC to operate unmanned aerial systems (e.g. Raven, PUMA, Short Range Micro (SRM), etc.) and unmanned ground vehicles (e.g. Common Robotic System (Individual) CRS(I), CRS (Vehicle)(V), CRS (Medium)(M), CRS (Heavy) (H), Small Multipurpose Equipment Transport (SMET), Man Transportable Robotic System (MTRS) INC II, Light Reconnaissance (LR), Wingman, Robotic Combat Vehicle (RCV), etc.) and emerging unmanned air/ground systems. The URC is defined in the CRS(I) Capability Development Document (CDD) and is included in the CRS(I) acquisition. A standalone requirements document is being developed.

FY 2021 RDTE funding in the amount of $3.648 million will be utilized to continue test evaluation and Logistics product development under the CRS(I) contract, mature the Universal Robotic Controller to meet the requirements in the CRS(I) CDD and Universal Controller Information Systems (UC IS) CDD and emerging programs of record, controller software, architecture, interface updates, and integration and test the URC into other Unmanned Ground Vehicles (UGV) or Unmanned Aerial Vehicles (UAS) programs of record via an Engineering Change Proposal (ECP). This funding will also be used to establish a common software architecture for Unmanned Ground Vehicles and Unmanned Air Systems moving forward. Support development of IS CDD (Analysis of Alternatives (AoA), Cost- Benefit Analysis (C-BA)).

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020	FY 2021
Title: URC improves Soldier situational awareness while reducing cognitive load on Soldiers and the robotics portfolio logistics footprint	2.869	1.132	3.648
Description: The Universal Robotic Controller (URC) 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 URCs 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 URC 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			

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
programmed to use them. If and when the use of lethal systems on the URC is approved, the weaponized payloads will be controlled via several fail-safe mechanisms to prevent accidental discharge. ***FY 2020 Plans:*** FY 2020 RDTE funds will be utilized to complete test evaluation and Log product development under the CRS(I) contract, mature the Universal Robotic Controller to meet the requirements in the CDD and emerging programs of record, controller software updates, risk mitigation activities, and integration and test the URC into other Unmanned Ground Vehicles (UGV) or Unmanned Aerial Vehicles (UAS) programs of record via an Engineering Change Proposal (ECP). ***FY 2021 Plans:*** FY 2021 RDTE funds will be utilized to continue test evaluation and Log product development under the CRS(I) contract, mature the Universal Robotic Controller to meet the requirements in the CDD and emerging programs of record, controller software, architecture, interface updates, risk mitigation activities, and integration and test the URC into other Unmanned Ground Vehicles (UGV) or Unmanned Aerial Vehicles (UAS) programs of record via an Engineering Change Proposal (ECP). This funding will also be used to establish a common software architecture for UGV and UAS moving forward. Supports development of IS CDD (AoA, C-BA). ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increase of $2.462 million in funding due to the Army moving towards a software based strategy and development of IS CDD.			
Title: FY 2020 SBIR/STTR Transfer ***Description:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 Plans:*** Funding transferred in accordance with Title 15 USC ?638 ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC ?638	-	0.054	-
Accomplishments/Planned Programs Subtotals	2.869	1.186	3.648

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• G99595: *Common Robotic System-Individual (CRS-I)*	3.563	2.285	1.154	-	1.154	1.155	1.241	1.449	1.415	0.000	12.262
• G93696: *Common Robotic System - Individual (CRS-I)*	-	30.387	54.528	-	54.528	22.857	-	-	-	0.000	107.772

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost

Remarks

In FY 2019, CRS(I) and the Common Robotic Controller OPA funding was in the same funding line G99595. Beginning in FY 2020, CRS(I) had its own funding line G93696 separate from the Common Robotic controller G99595.

D. Acquisition Strategy

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

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
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 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management support	Various	Various : Multiple	-	0.187	Apr 2019	0.075	Oct 2019	-		-		-	0.000	0.262	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.054		-		-		-	0.000	0.054	-
		Subtotal	-	0.187		0.129		-		-		-	0.000	0.316	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Manufacturing & Development	C/CPFF	TBD : TBD	-	-		0.189	Oct 2019	3.648	Feb 2021	-		3.648	0.000	3.837	-
Engineering Change Proposal	TBD	Various : Multiple	-	-		0.490	Oct 2019	-		-		-	0.000	0.490	-
Software support	Various	Various : Various	-	1.284	Apr 2019	-		-		-		-	0.000	1.284	-
		Subtotal	-	1.284		0.679		3.648		-		3.648	0.000	5.611	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Log Manuals	Various	Various : Multiple	-	0.738	May 2019	0.189	Oct 2019	-		-		-	0.000	0.927	-
		Subtotal	-	0.738		0.189		-		-		-	0.000	0.927	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATEC testing	Various	Varous : Multiple	-	-		0.189	Dec 2019	-		-		-	0.000	0.189	-
Contractor PQT	Various	Endeavor & QinetiQ : Massachusetts	-	0.660	Apr 2019	-		-		-		-	0.000	0.660	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army			Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FG8 / *Common Robotic Controller*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Subtotal			-	0.660		0.189		-		-		-	0.000	0.849	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	2.869		1.186		3.648		-		3.648	0.000	7.703	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

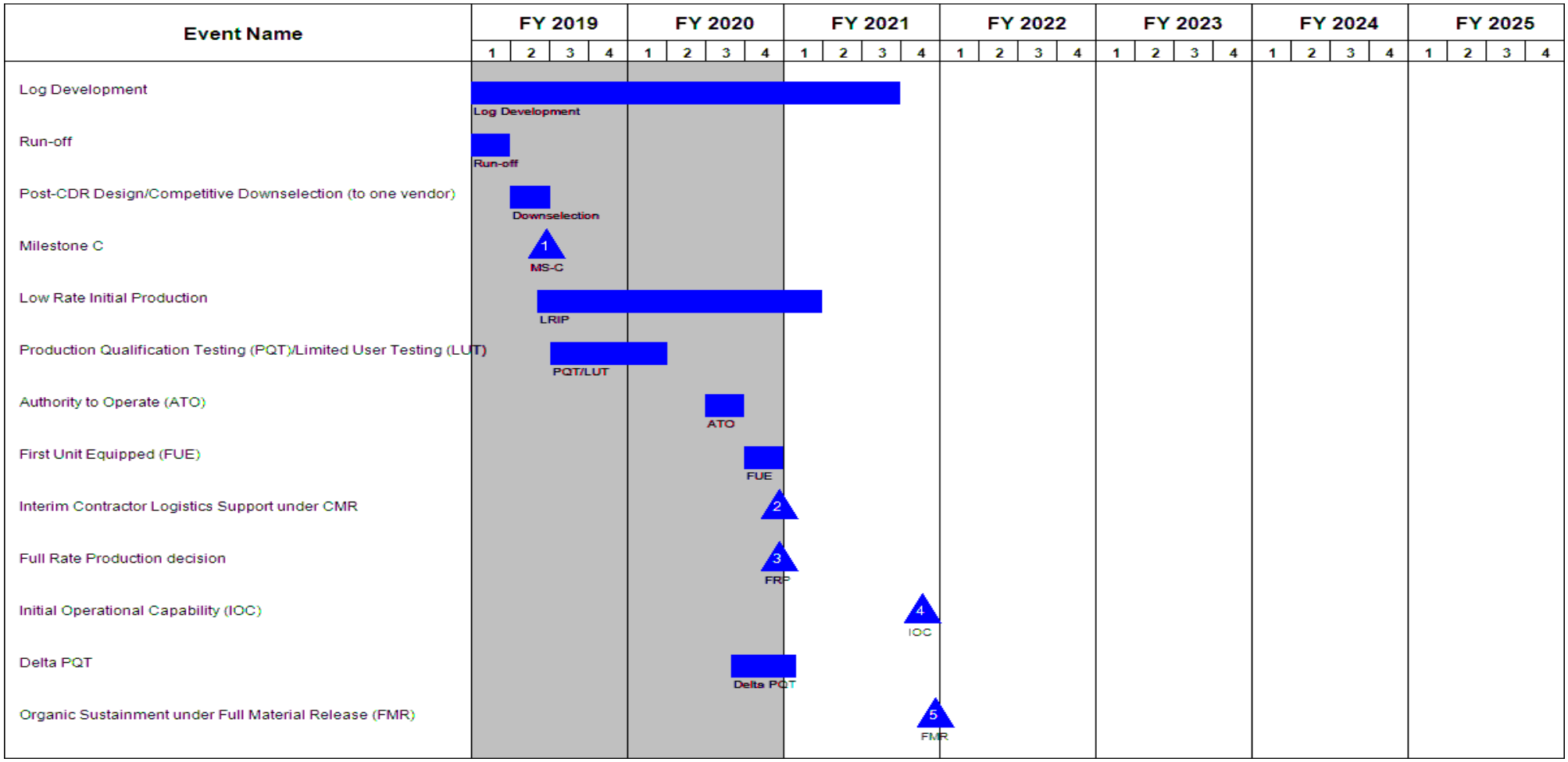

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

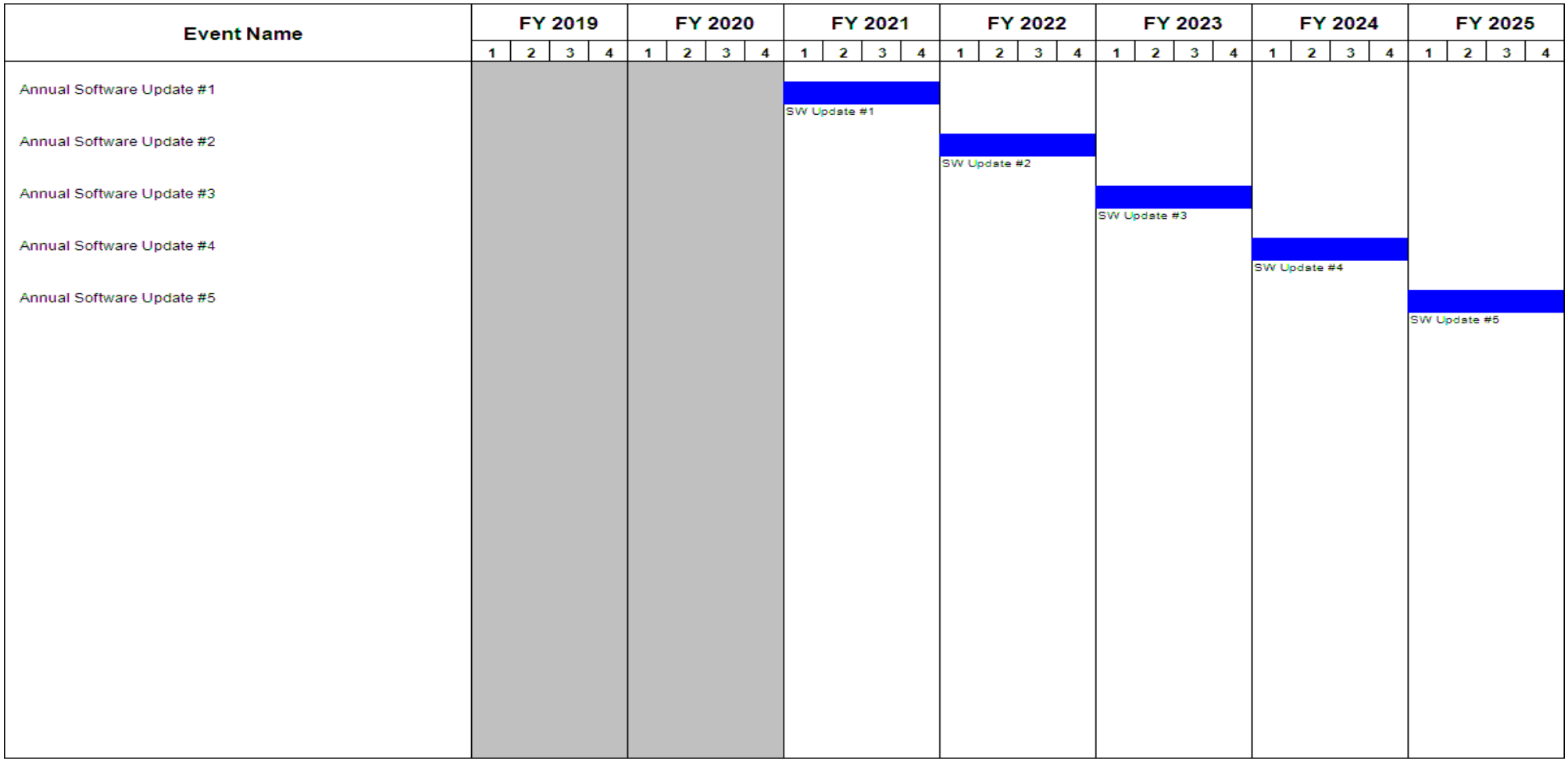

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Milestone B	2	2018	2	2018
Contract award	2	2018	2	2018
Critical Design Review	3	2018	3	2018
Log Development	3	2018	3	2021
Run-off	1	2019	1	2019
Post-CDR Design/Competitive Downselection (to one vendor)	1	2019	2	2019
Milestone C	2	2019	2	2019
Low Rate Initial Production	2	2019	1	2021
Production Qualification Testing (PQT)/Limited User Testing (LUT)	3	2019	1	2020
Authority to Operate (ATO)	3	2020	3	2020
First Unit Equipped (FUE)	4	2020	4	2020
Interim Contractor Logistics Support under CMR	4	2020	4	2020
Full Rate Production decision	4	2020	4	2020
Initial Operational Capability (IOC)	4	2021	4	2021
Delta PQT	3	2020	1	2021
Organic Sustainment under Full Material Release (FMR)	4	2021	4	2021
Annual Software Update #1	1	2021	4	2021
Annual Software Update #2	1	2022	4	2022
Annual Software Update #3	1	2023	4	2023
Annual Software Update #4	1	2024	4	2024
Annual Software Update #5	1	2025	4	2025