Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army											Date: May 2021	
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 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	-	24.747	12.010	18.241	-	18.241	-	-	-	-	-	-
BS9: *Robotic Payloads*	-	-	-	8.531	-	8.531	-	-	-	-	-	-
FB2: *Man Transportable Robotic System (MTRS) Inc II*	-	4.455	-	-	-	-	-	-	-	-	-	-
FB3: *Robotics Architecture*	-	2.758	2.604	2.346	-	2.346	-	-	-	-	-	-
FB4: *Common Robotic Systems*	-	4.191	1.766	-	-	-	-	-	-	-	-	-
FB6: *Squad Multipurpose Equipment Transport (SMET)*	-	4.794	4.125	3.763	-	3.763	-	-	-	-	-	-
FB9: *MTRS Standardization*	-	7.412	-	-	-	-	-	-	-	-	-	-
FG8: *Common Robotic Controller*	-	1.137	3.515	3.601	-	3.601	-	-	-	-	-	-

Note

For Project FD2 Soldier Robotics Systems, the primary program funded in Fiscal Year (FY) 2021 was Enhanced Robotic Payloads which has a new FY 2022 Program of Record (POR) line under Program Element (PE) 0605053A Project BS9 Robotic Payloads.

For Project FB4 Common Robotic Systems, efforts ended in FY 2021. Program is eliminated in FY 2022.

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.

BS9: The Robotic Payloads project is a suite of modular capabilities designed with open architecture to provide and increased level of standoff, situational awareness, disruption capability and dexterity to respond to current and emergent Engineer, CBRN and EOD requirements. Current Man Transportable Robotic Systems Increment II (MTRS Inc II) and Common Robotic System - Heavy (CRS-H) 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: Extended Range Mesh Network (ERMN), Pan/Tilt Imager (PTI) and Obstacle Avoidance & Digital Modeling (OA&DM). The use of robotic payloads allows the first approach, to potentially explosive hazards, to be made by a robot rather than a Soldier. These multiple, modular robotic mission payloads will use open architecture to integrate with the MTRS Inc II and CRS-H platforms to form the Army's next generation platform adaptable robotics systems.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
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*

FY 2022 funding in the amount of $8.531 million supports development of Extended Range Mesh Network (ERMN) and Pan/Tilt Imager (PTI) payload prototypes and payload to platform integration requirements. Additionally, FY 2022 funding will support development of integration provisions for mounting the ERMN and PTI to both the MTRS Inc II and CRS-H platforms as well as development of the necessary software updates to allow for payload to platform communications.

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 has no FY22 funding request.

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 (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), Assault Breacher Vehicle Remote Control System (ABV RCS), Advanced Reconnaissance Vehicle (ARV), Universal Robotic Controller, 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 2022 RDTE funds in the amount of $2.346 million supports the initial development of the Robotics and Autonomous Systems-Ground (RAS-G) Interoperability Profile (IOP) Version 6.0. IOP V6.0 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, Assault Breacher Vehicle Remote Control System (ABV RCS), Advanced Reconnaissance Vehicle (ARV), Universal Robotic Controller, and robotic applique kits for manned ground systems. Additionally, FY 2022 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 2022 RDTE funds will also continue the development and refinement of the Common Specification Reference (CSR).

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.

FB4 has no FY22 funding request.

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).

FY 2022 RDTE funding in the amount of $3.763 million supports the development, integration, and procurement of Technical Insertions, Engineering Change Proposals, and Modular Mission Payloads (MMP) to increase mission capabilities and address requirements in the Abbreviated Capability Development Document (A-CDD). FY2022 RDTE funds testing and development of logistics material required to support MMP efforts. Program support to include labor, travel and miscellaneous expenses in support of these RDTE efforts will also be funded.

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 transitioned 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army	Date: May 2021
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*

FB9 has no FY22 funding request.

FG8: Universal Robotics Control (URC) will provide the common operational software to run specific applications (Apps) for all battalion and below Robotic and Autonomous Systems (RAS). URC will provide multiple layers of situational awareness while reducing the Soldier's physical and cognitive load as well as the training burden. URC is both backwards compatible with existing Army RAS and forward compatible with emerging Army and Joint RAS. URC will integrate across all RAS programs for interoperability, network transport (radio wave forms), and the larger common Network. URC is a critical enabling capability for NGCV OMFV and RCV programs.
PEO Aviation will assess the technology readiness level of Universal Robotics Control (URC) in FY 21 and determine via analysis or prototype the acquisition pathway to fulfill the Capability Requirements outlined in the RAS ICD. The Prototype Demonstration and Data Analysis Framework will help determine if the URC should be a hardware-based program requiring a Capability Development Document (CDD), a software-based program requiring an Information System Capability Development Document (IS-CDD), or a Capability Needs Statement and User Agreement associated with a Software Acquisition Pathway. Will leverage RAS ICD, Navy Common Control System IS ICD, FUAS ICDs, RPUAS CPD, CRS-I CDD, OMFV, etc., will also be used in the analysis.

FY 2022 RDTE funding in the amount of $3.601 million will be utilized for Systems Engineering and Program Management (SEPM) support in preparing the Contracts Requirements Package (CRP) for URC. This includes Statement of Work and System Specification preparation, as well as follow up from the FY22 prototype/ demonstration and analysis to further shape the acquisition strategy. FY22 funding will also be utilized for risk reduction activities to include using a government or contractor provider to further enhance the prototype product and inform the CRP process.

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	26.104	13.710	10.556	-	10.556
Current President's Budget	24.747	12.010	18.241	-	18.241
Total Adjustments	-1.357	-1.700	7.685	-	7.685
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-1.200			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.283	-			
• SBIR/STTR Transfer	-1.074	-0.500			
• Adjustments to Budget Years	-	-	7.685	-	7.685

Change Summary Explanation

Increase from FY2021PB to FY2022PB in PE 605053A is due to new start project BS9, Robotic Payloads ($9.260 million). This project is required as the program successfully transitions from Robotic technologies into a Program of Record (PoR) by utilizing 604017 (FD2).

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) BS9 / *Robotic Payloads*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
BS9: *Robotic Payloads*	-	-	-	8.531	-	8.531	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

For Project FD2 Soldier Robotics Systems, the primary program funded in Fiscal Year (FY) 2021 was Enhanced Robotic Payloads which has a new FY 2022 Program of Record (POR) line under Program Element (PE) 0605053A Project BS9 Robotic Payloads.

A. Mission Description and Budget Item Justification

The Ground Robotics - Robotic Payloads project is a suite of modular capabilities designed with open architecture to provide and increased level of standoff, situational awareness, disruption capability and dexterity to respond to current and emergent Engineer, CBRN and EOD requirements. Current Man Transportable Robotic Systems Increment II (MTRS Inc II) and Common Robotic System - Heavy (CRS-H) 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: Extended Range Mesh Network (ERMN), Pan/Tilt Imager (PTI) and Obstacle Avoidance & Digital Modeling (OA&DM). The use of robotic payloads allows the first approach, to potentially explosive hazards, to be made by a robot rather than a Soldier. These multiple, modular robotic mission payloads will use open architecture to integrate with the MTRS Inc II and CRS-H platforms to form the Army's next generation platform adaptable robotics systems.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: Prototype and Payload Development ***Description:*** Development of Extended Range Mesh Network (ERMN), Pan/Tilt Imager (PTI) and Obstacle Avoidance & Digital Modeling (OA&DM) payload prototypes and payload to platform integration requirements. ***FY 2022 Plans:*** Development of Extended Range Mesh Network (ERMN) and Pan/Tilt Imager (PTI) payload prototypes and payload to platform integration requirements. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** BS9 Robotic Payloads is a new start in FY 2022.	-	-	4.678
Title: Integration & Software Development (Platform) ***Description:*** Development of integration provisions for mounting the ERMN, PTI, and OA&DM to both the MTRS Inc II and CRS-H platforms. Development of the necessary software updates to allow for payload to platform communications. ERMN & PTI payloads will take priority over OA&DM due to technology readiness level of the OA&DM. ***FY 2022 Plans:***	-	-	2.941

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** BS9 / *Robotic Payloads*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Development of integration provisions for mounting the ERMN and PTI to both the MTRS Inc II and CRS-H platforms. Development of the necessary software updates to allow for payload to platform communications. ERMN & PTI payloads will take priority over OA&DM due to technology readiness level of the OA&DM. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** BS9 Robotic Payloads is a new start in FY 2022.			
Title: Program Support ***FY 2022 Plans:*** Funding will support the Enhanced Robotic Payloads program during the prototype and development of the payloads as well as integration & software development for the platforms. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** BS9 Robotic Payloads is a new start in FY 2022.	-	-	0.912
Accomplishments/Planned Programs Subtotals	-	-	8.531

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• FD2: *Soldier Robotics Systems*	2.657	3.138	-	-	-	-	-	-	-	-	-

Remarks

PE 0604017A FD2 is a shared funding line. FD2 is 6.4 RDT&E funding used to transition Robotic technologies into Program of Records (PoR). FD2 line was used in FY2019-FY2021 to transition the Enhanced Robotic Payloads technologies into a PoR as follows: FY2019: 0.375; FY 2020: 1.196; FY 2021: 1.738

D. Acquisition Strategy

PdM RAS will develop a unique Performance Specification for each payload from the ERP-UGS Capability Development Document (CDD). PdM RAS will seek out proposals from industry on capabilities to meet the payload performance specifications and select the best capability to then be further developed, integrated into the platforms, and tested as a system in an abbreviated Engineering Manufacturing Development (EMD) phase. After a successful EMD, a production decision will be made to enter Production and Deployment (PD) phase.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) BS9 / *Robotic Payloads*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Support	MIPR	PdM RAS : Warren, MI	-	-		-		0.912	Nov 2021	-		0.912	0.000	0.912	-
Prototype and Payload Development	SS/TBD	FLIR : Boston, MA	-	-		-		4.678	Jan 2022	-		4.678	0.000	4.678	-
Integration & Software Development (Platform)	SS/TBD	FLIR : Boston, Ma	-	-		-		2.941	May 2022	-		2.941	0.000	2.941	-
		Subtotal	-	-		-		8.531		-		8.531	0.000	8.531	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.000		8.531		-		8.531	0.000	8.531	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** BS9 / *Robotic Payloads*

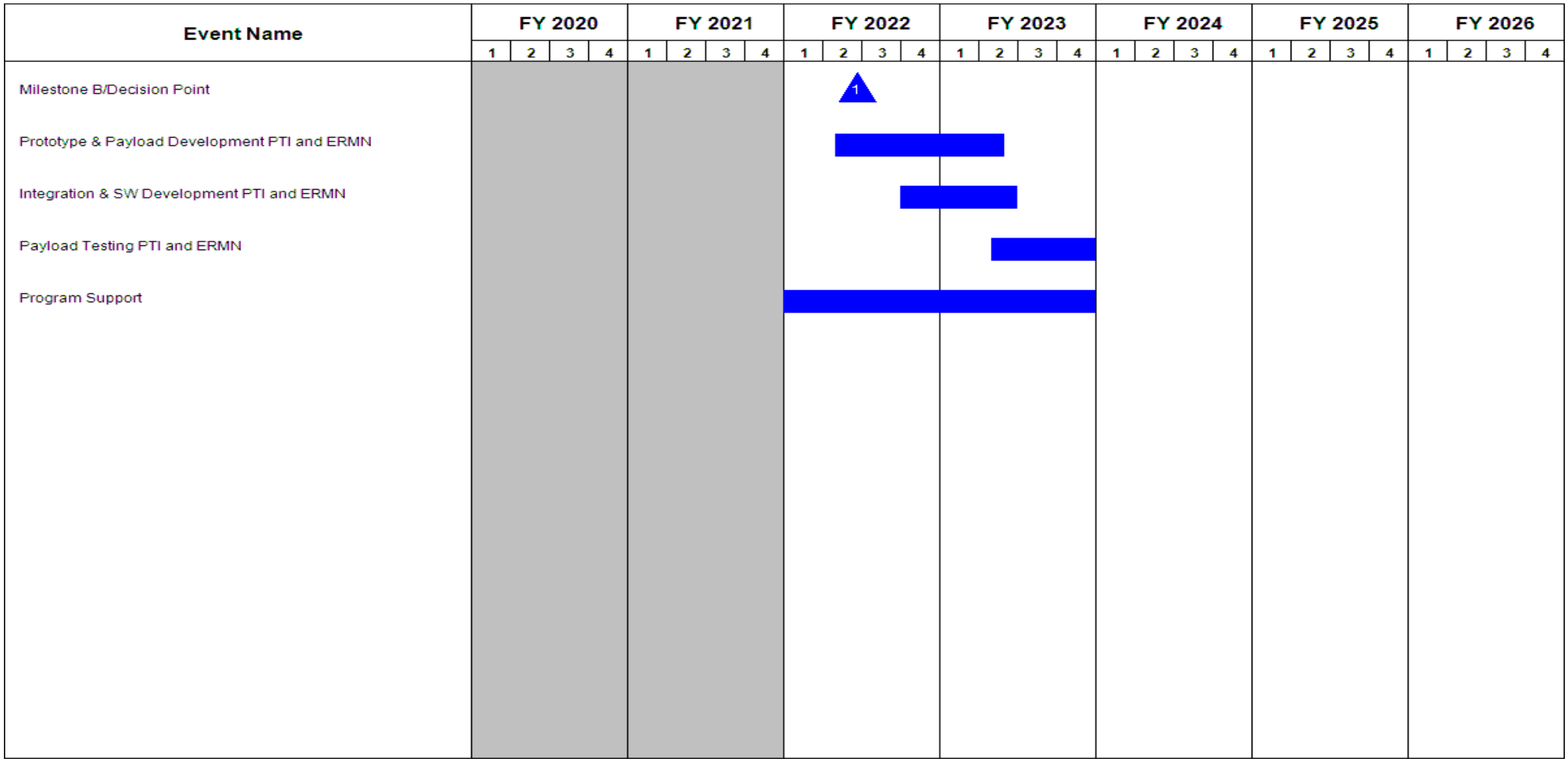

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** BS9 / *Robotic Payloads*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Milestone B/Decision Point	2	2022	2	2022
Prototype & Payload Development PTI and ERMN	2	2022	2	2023
Integration & SW Development PTI and ERMN	4	2022	2	2023
Payload Testing PTI and ERMN	2	2023	4	2023
Program Support	1	2022	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FB2: *Man Transportable Robotic System (MTRS) Inc II*	-	4.455	-	-	-	-	-	-	-	-	-	-
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.

0605053A FB2 has no FY22 funding request.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
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.	0.100	-	-
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.	0.055	-	-
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.	1.732	-	-
Title: MTRS Inc II RDTE ? SPAWAR Multi-Robot Operator Control Unit (MOCU) 3 SW Support	1.146	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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 2020	FY 2021	FY 2022
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.			
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.	0.591	-	-
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.	0.211	-	-
Title: MTRS Inc II RDTE - Testing ***Description:*** MTRS Inc. II delta Production Qualification Testing (PQT).	0.620	-	-
Accomplishments/Planned Programs Subtotals	4.455	-	-

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• R67050: *Man Transportable Robotic Sys Inc II (MTRS Inc II)*	36.254	63.976	62.365	-	62.365	-	-	-	-	-	-

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 has obtained First Unit Equipped (FUE) under a Conditional Materiel Release (CMR) utilizing Interim Logistics Support (ILS) in 2QFY20 while working toward obtaining Full Materiel Release (FMR) under organic sustainment in FY 2021.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
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*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Costs	MIPR	VARIOUS : MULTIPLE	5.176	0.317	Nov 2019	-		-		-		-	0.000	5.493	-
		Subtotal	5.176	0.317		-		-		-		-	0.000	5.493	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Hardware	SS/FFP	Endeavor : Chelmsford, MA	3.137	-		-		-		-		-	0.000	3.137	-
Virtual Clearance Training Suite (VCTS)	Various	Various : Multiple	-	0.591	Oct 2019	-		-		-		-	0.000	0.591	-
		Subtotal	3.137	0.591		-		-		-		-	0.000	3.728	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MTRS Inc II MOCU development	Various	Various : Multiple	3.624	2.689	Oct 2019	-		-		-		-	0.000	6.313	-
MTRS Inc II contract data	SS/FFP	Endeavor : Chelmsford, MA	2.786	0.138	Oct 2019	-		-		-		-	0.000	2.924	-
MTRS In II Engineering Change Proposals	TBD	TBD : TBD	-	0.100	Oct 2019	-		-		-		-	0.000	0.100	-
		Subtotal	6.410	2.927		-		-		-		-	0.000	9.337	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test site and test site support for FAT	MIPR	VARIOUS : MULTIPLE	1.990	0.620	Oct 2019	-		-		-		-	0.000	2.610	-
		Subtotal	1.990	0.620		-		-		-		-	0.000	2.610	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	16.713	4.455		0.000		-		-		-	0.000	21.168	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB2 / *Man Transportable Robotic System (MTRS) Inc II*

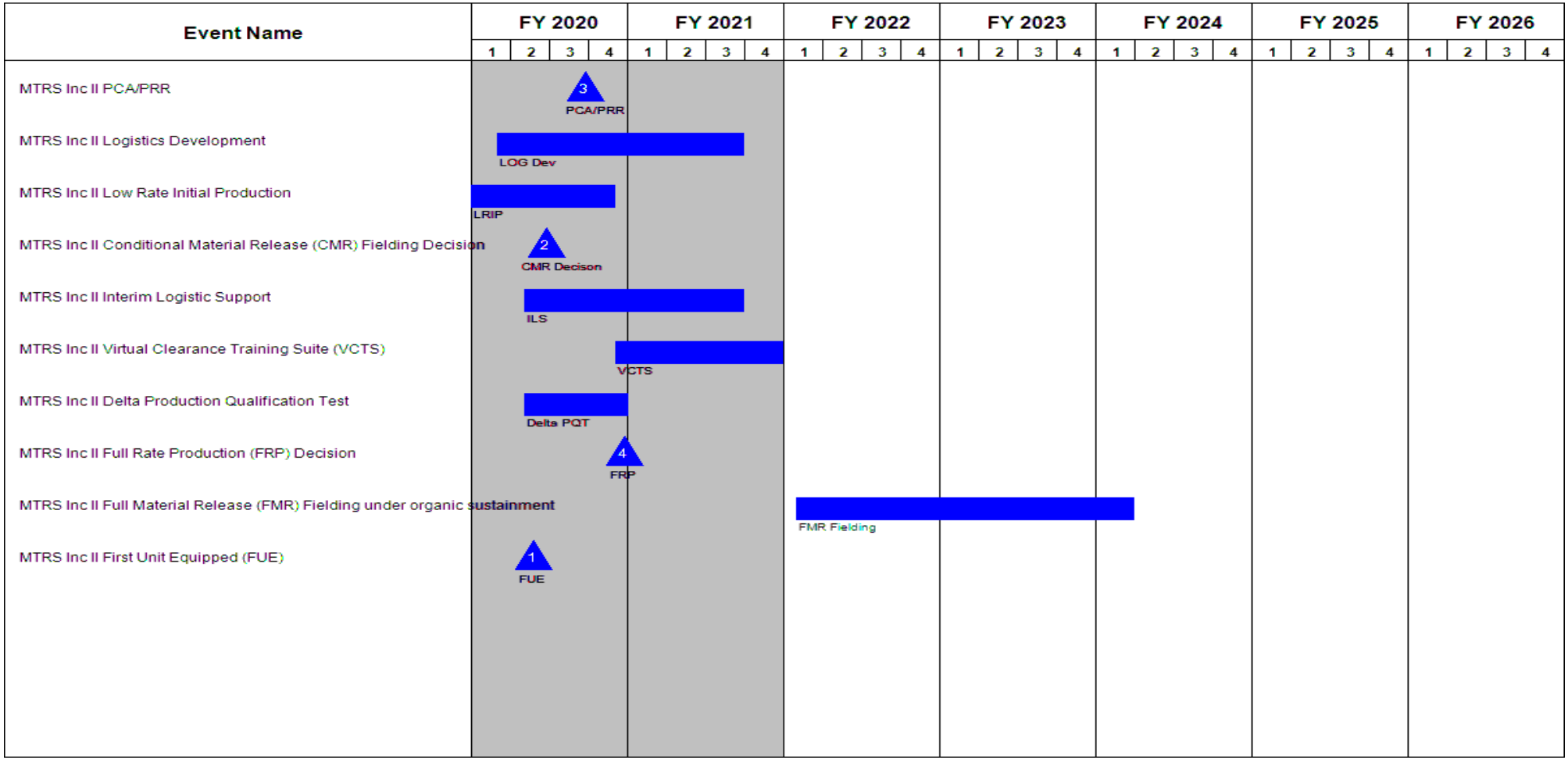

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB2 / *Man Transportable Robotic System (MTRS) Inc II*

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	3	2021
MTRS Inc II Limited User Test	2	2019	2	2019
MTRS Inc II Low Rate Initial Production	3	2019	4	2020
MTRS Inc II Conditional Material Release (CMR) Fielding Decision	2	2020	2	2020
MTRS Inc II Interim Logistic Support	2	2020	3	2021
MTRS Inc II Virtual Clearance Training Suite (VCTS)	4	2020	4	2021
MTRS Inc II Delta Production Qualification Test	2	2020	4	2020
MTRS Inc II Full Rate Production (FRP) Decision	4	2020	4	2020
MTRS Inc II Full Material Release (FMR) Fielding under organic sustainment	1	2022	1	2024
MTRS Inc II First Unit Equipped (FUE)	2	2020	2	2020

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army										Date: May 2021		
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 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
FB3: *Robotics Architecture*	-	2.758	2.604	2.346	-	2.346	-	-	-	-	-	-
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 2022 RDTE funds in the amount of $2.346 million supports the initial development of the Robotics and Autonomous Systems, Ground (RAS-G) Interoperability Profile (IOP) Version 6.0. IOP V6.0 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, Assault Breacher Vehicle Remote Control System (ABV RCS), Advanced Reconnaissance Vehicle (ARV), Universal Robotic Controller, and robotic applique kits for manned ground systems. Additionally, FY 2022 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 2022 RDTE funds will also continue the development and refinement of the Common Specification Reference (CSR).

B. Accomplishments/Planned Programs ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022**
Title: Robotics Architecture	2.758	2.604	2.346
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 2021 Plans: FY 2021 RDTE funds in the amount of $2.604 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			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
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 2022 Plans:*** FY 2022 RDTE funds in the amount of $2.346 million supports the initial development of the Robotics and Autonomous Systems, Ground (RAS-G) Interoperability Profile (IOP) Version 6. IOP V6.0 will provide the required modular open interfaces and compliance test tools for new programs including S-MET Modular Mission Payloads (MMPs), LRR, CRS(M), TWVLF, OMFV, RCV, ERP, ABV RCS, ARV, URC, and robotic applique kits for manned ground systems. Additionally, FY 2022 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 2022 RDTE funds will also continue the development and refinement of the Common Specification Reference (CSR). ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding increase in FY 2022 is minimal due to inflation.			
Accomplishments/Planned Programs Subtotals	2.758	2.604	2.346

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

In FY 2021 the Robotics Architecture line funds supporting matrix personnel & related contracts to develop IOP, ROS-M, and CSR 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 2022 Army			Date: May 2021
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 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	MIPR	Various : Multiple	1.691	0.127	Oct 2019	-		0.200	Nov 2021	-		0.200	0.000	2.018	-
		Subtotal	1.691	0.127		-		0.200		-		0.200	0.000	2.018	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
IOP V4	Various	Various : Multiple	1.471	-		-		-		-		-	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 and V6 Development	SS/CPFF	Various,DCS : Warren, MI	-	1.053	Jan 2020	1.000	Jan 2021	1.221	Jun 2022	-		1.221	0.000	3.274	-
Robotic Operating System - Military (ROS-M)	Various	Various : Multiple	-	0.783	Apr 2020	0.702	Apr 2021	0.525	May 2022	-		0.525	0.000	2.010	-
IOP V4 Radio Interfaces Development	MIPR	NAVSEA : Washington D.C.	0.560	-		-		-		-		-	0.000	0.560	-
Instantiation Tool Development	Various	Various : Multiple	-	-		0.100	May 2021	-		-		-	0.000	0.100	-
IOP Software Safety	RO	GVSC : Warren	-	-		0.150	Apr 2021	-		-		-	0.000	0.150	-
Common Specification Reference (CSR)	C/CPFF	TBD : TBD	-	-		-		0.400	Mar 2022	-		0.400	0.000	0.400	-
		Subtotal	2.031	2.203		1.952		2.146		-		2.146	0.000	8.332	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 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	-		-		-	0.000	0.233	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB3 / *Robotics Architecture*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 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	-		-		-	0.000	0.284	-
		Subtotal	-	0.244		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 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 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	-		-		-	0.000	0.563	-
		Subtotal	-	0.184		0.379		-		-		-	0.000	0.563	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3.722	2.758		2.604		2.346		-		2.346	0.000	11.430	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

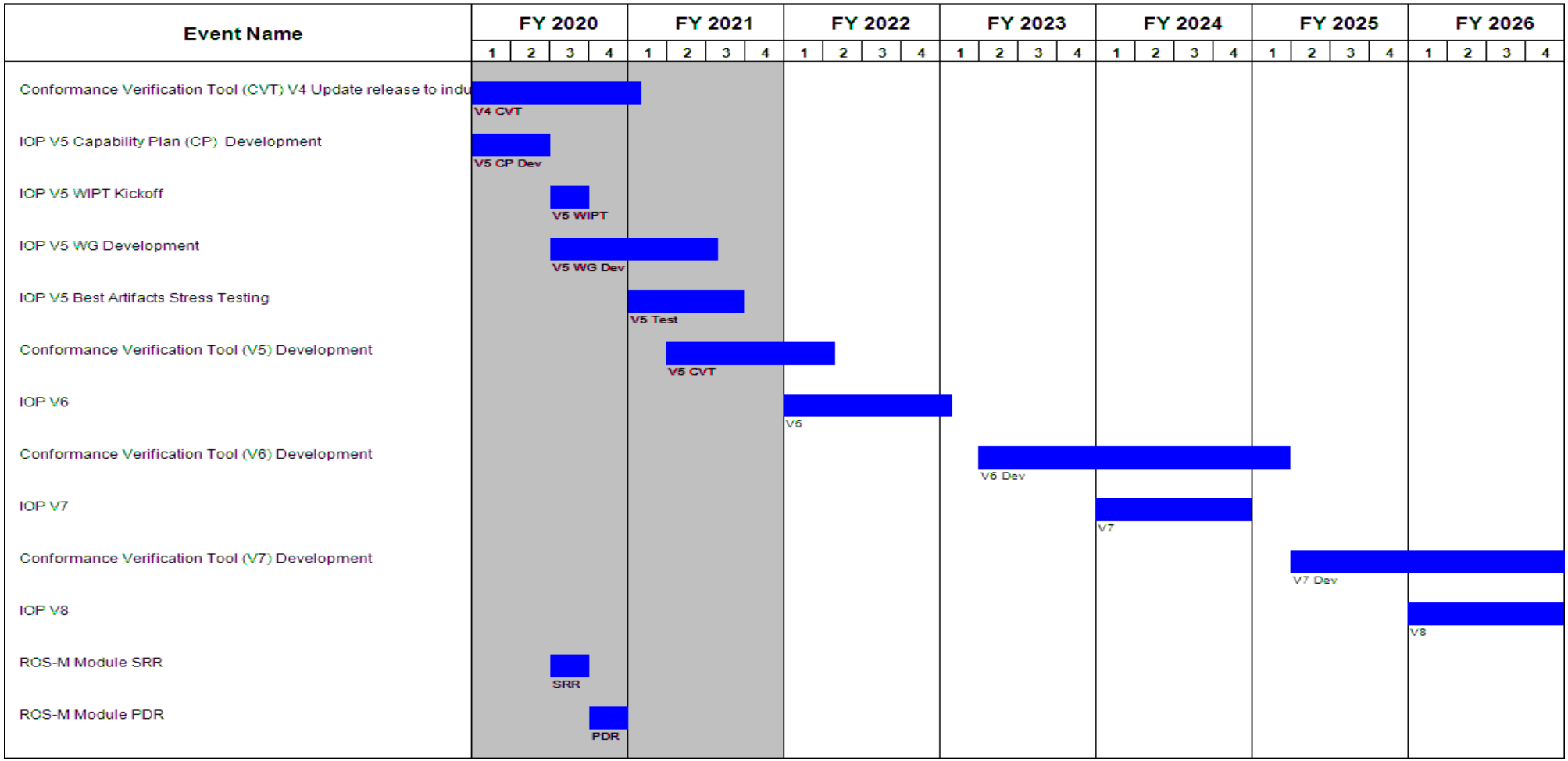

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

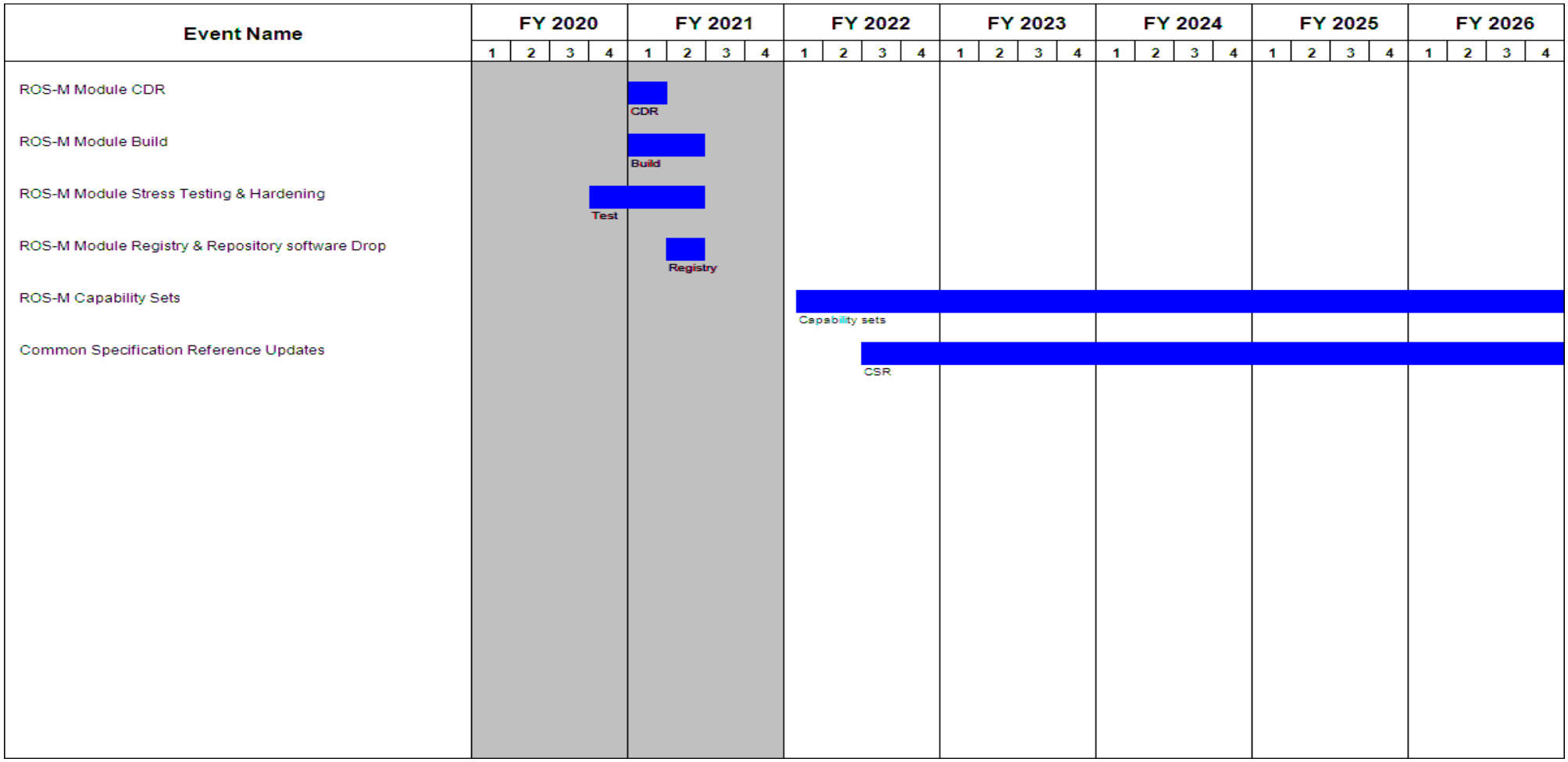

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

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
Conformance Verification Tool (V7) Development	2	2025	1	2027
IOP V8	1	2026	4	2026
ROS-M Module SRR	3	2020	3	2020
ROS-M Module PDR	4	2020	4	2020
ROS-M Module CDR	1	2021	1	2021
ROS-M Module Build	1	2021	2	2021
ROS-M Module Stress Testing & Hardening	4	2020	2	2021
ROS-M Module Registry & Repository software Drop	2	2021	2	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB3 / *Robotics Architecture*

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
ROS-M Capability Sets	1	2022	4	2026
Common Specification Reference Updates	3	2022	4	2026

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FB4: *Common Robotic Systems*	-	4.191	1.766	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FB4 / Common Robotic Systems is being eliminated for Fiscal Year (FY) 2022.

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.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: CRS(I) PQT and LUT execution ***Description:*** ATEC costs to execute Production Qualification Test (PQT) and Limited User Test (LUT). ***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 2021 to FY 2022 Increase/Decrease Statement:*** Effort ends in FY 2021.	2.788	0.265	-
Title: CRS(I) Log manuals ***Description:*** CRS(I) RDTE funding for contractor to complete development of Operator and Maintainer Technical Manuals. ***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 2021 to FY 2022 Increase/Decrease Statement:***	0.260	0.400	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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 2020	FY 2021	FY 2022
Effort ends in FY 2021.			
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 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 2021 to FY 2022 Increase/Decrease Statement:*** Effort ends in FY 2021.	0.370	0.416	-
Title: CRS(I) IPT Matrix Support Salary ***Description:*** CRS(I) RDTE funding to support System Engineering Program Management (SEPM) costs.	0.505	-	-
Title: CRS(I) NIWC 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.	0.230	-	-
Title: CRS(I) Engineering Change Proposals (ECPs) Development, Testing and Validation and Modification Work Orders ***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 2021 to FY 2022 Increase/Decrease Statement:*** Effort ends in FY 2021.	0.038	0.685	-
Accomplishments/Planned Programs Subtotals	4.191	1.766	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB4 / *Common Robotic Systems*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• G99595: *Common Robotic System-Individual (CRS-I)*	2.285	1.154	1.141	-	1.141	-	-	-	-	-	-
• G93696: *Common Robotic System - Individual (CRS-I)*	30.387	52.528	12.625	-	12.625	-	-	-	-	-	-

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 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB4 / *Common Robotic Systems*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	MIPR	Combat Support - Combat Service Support : Warren MI	-	0.505	Oct 2019	-		-		-		-	0.000	0.505	-
		Subtotal	-	0.505		-		-		-		-	0.000	0.505	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Log manuals	C/CPFF	Multiple : Various	-	0.260	Jan 2021	0.265	May 2021	-		-		-	0.000	0.525	-
		Subtotal	-	0.260		0.265		-		-		-	0.000	0.525	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 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	-	2.788	Dec 2019	0.400	Feb 2021	-		-		-	0.000	3.188	-
TARDEC software support	Various	TARDEC : Warren, MI	-	0.370	Oct 2019	0.416	Jan 2021	-		-		-	0.000	0.786	-
NIWC software support	Various	SPAWAR : San Diego, CA	-	0.230	Oct 2019	-		-		-		-	0.000	0.230	-
ECP/MWO Development Testing and Validation	C/CPFF	Qinetiq North America : Waltham, MA	-	0.038	Dec 2020	0.685	Jun 2021	-		-		-	0.000	0.723	-
		Subtotal	-	3.426		1.501		-		-		-	0.000	4.927	N/A

	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	4.191		1.766		-		-		-	0.000	5.957	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB4 / *Common Robotic Systems*	

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB4 / *Common Robotic Systems*

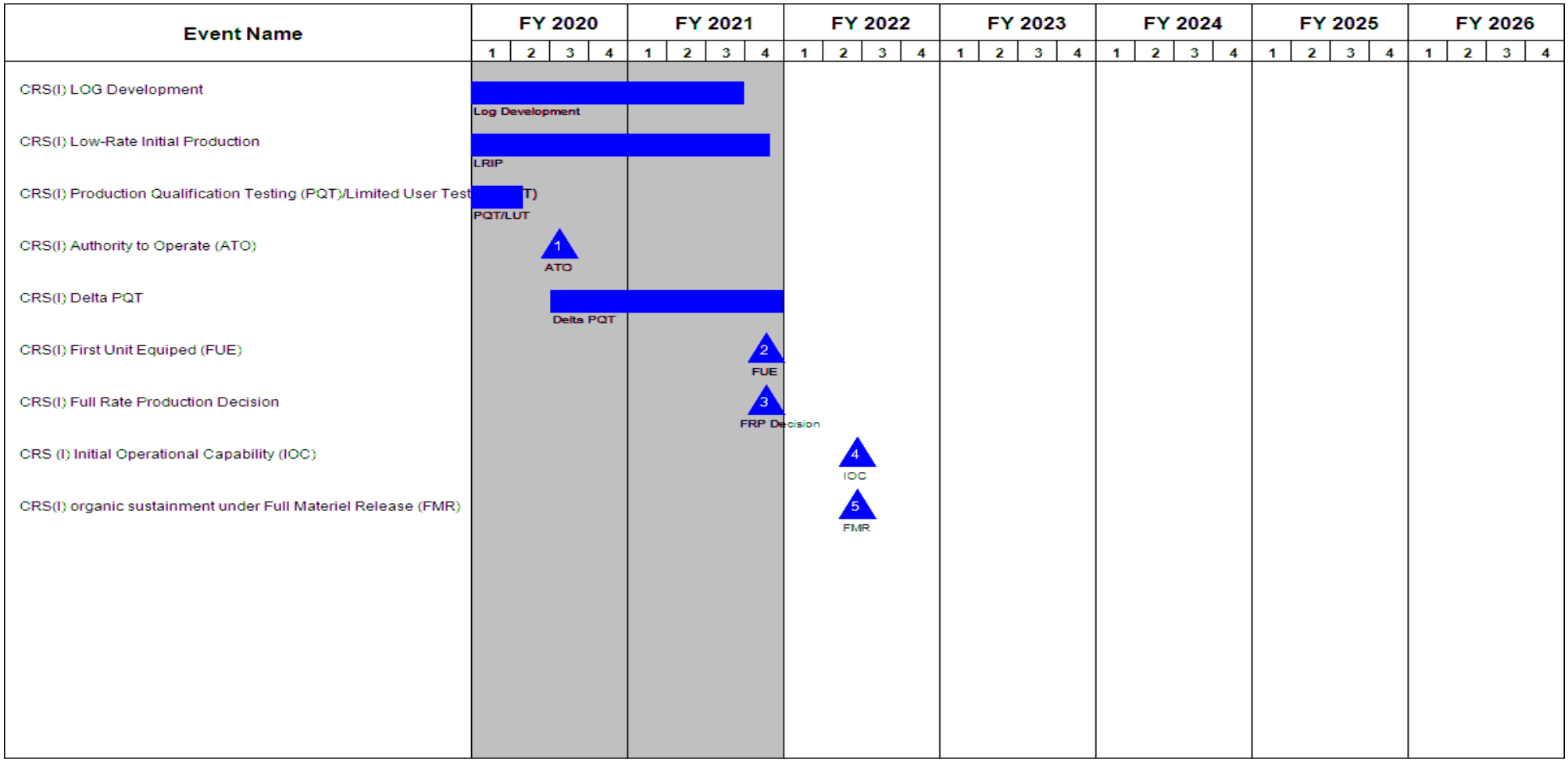

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB4 / *Common Robotic Systems*

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	4	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	4	2021
CRS(I) First Unit Equiped (FUE)	4	2021	4	2021
CRS(I) Full Rate Production Decision	4	2021	4	2021
CRS (I) Initial Operational Capability (IOC)	2	2022	2	2022
CRS(I) organic sustainment under Full Materiel Release (FMR)	2	2022	2	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FB6: *Squad Multipurpose Equipment Transport (SMET)*	-	4.794	4.125	3.763	-	3.763	-	-	-	-	-	-
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 2022 RDTE funding in the amount of $3.763 million supports the development, integration, and procurement of Technical Insertions, Engineering Change Proposals, and Modular Mission Payloads (MMP) to increase mission capabilities and address requirements in the Abbreviated Capability Development Document (A-CDD). FY2022 RDTE funding supports procurement of MMPs, integration to the SMET platform, testing, and development of logistics material required to support MMP efforts. Program support to include labor, travel and miscellaneous expenses in support of these RDTE efforts will also be funded.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: S-MET	4.794	4.125	3.763
Description: Small Multipurpose Equipment Transport (S-MET)			
FY 2021 Plans: FY 2021 RDTE funding supports the production of test and logistic assets and the development, integration, test and procurement of Technical Insertions, Engineering Change Proposals (ECP) and Modular Mission Payloads (MMP) to increase mission capabilities to requirements in the Abbreviated Capability Development Document (A-CDD). FY 2021 RDTE funding supports the testing and 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 2022 Plans: FY 2022 RDTE funding in the amount of $3.763 million supports the development, integration, and procurement of Technical Insertions, Engineering Change Proposals, and Modular Mission Payloads (MMP) to increase mission capabilities and address requirements in the Abbreviated Capability Development Document (A-CDD). FY2022 RDTE funds testing and development of			

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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 2020	FY 2021	FY 2022
logistics material required to support MMP efforts. Program support to include labor, travel and miscellaneous expenses in support of these RDTE efforts will also be funded. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** RDTE funding has decreased in FY 2022 due to completion of system design and test, shifting focus to development integration test of ECPs and MMPs to base platform.			
Accomplishments/Planned Programs Subtotals	4.794	4.125	3.763

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• R12154: *Squad Multipurpose Equipment Transport (SMET)*	8.768	28.555	29.448	-	29.448	-	-	-	-	-	-

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 down selected to one of the four prototypes and awarded refurbishment of Phase II systems, completion of safety testing, completion of logistics development to provide for an organic support strategy, and to proceed into production.

The 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 - Detroit Arsenal received a Government Accountability Office (GAO) level protest on 14 Nov 2019. In response to the protest, the Government took corrective action and resolicited the requirement. The Request for Proposal (RFP) was released on 14 Feb 2020. The follow on contract was awarded on 15 Jul 2020. General Dynamic Land Systems is performing satisfactory under awarded contract. Critical Design Review (CDR) has been completed. Production of test and logistic assets has been initiated with delivery anticipated 01 Apr 2021. First Unit Equipped (FUE) will be in 1QFY22.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

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. Data collected up to and during the Phase III Production Effort will be utilized to reduce development efforts and provide cost savings for future technical insertions, Engineering Change Proposals (ECP), 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 2022 Army		Date: May 2021
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 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Costs	MIPR	PM FP : Warren, MI	2.461	1.584	Oct 2019	1.408	Oct 2020	1.463	Oct 2021	-		1.463	0.000	6.916	-
		Subtotal	2.461	1.584		1.408		1.463		-		1.463	0.000	6.916	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Directed Requirement Technology Demonstration	C/FFP	Year Long Excursion : TBD	12.528	-		-		-		-		-	0.000	12.528	-
Technical Insertions	C/FFP	TBD : TBD	3.000	0.162	Nov 2019	1.100	Feb 2021	1.000	Feb 2022	-		1.000	0.000	5.262	-
Modular Mission Payloads (MMP)	MIPR	Ft Benning : Ft Benning, GA	0.800	0.462	Jan 2020	0.600	Nov 2020	1.000	Jan 2022	-		1.000	0.000	2.862	-
Test / Logistic Assets	SS/FFP	General Dynamic Land Systems : London, ON	-	-		0.917	Jan 2021	-		-		-	0.000	0.917	-
		Subtotal	16.328	0.624		2.617		2.000		-		2.000	0.000	21.569	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Cyber / Integration	MIPR	TBD : TBD	2.000	0.962	Oct 2019	-		0.050	Oct 2021	-		0.050	0.000	3.012	-
DOTMLPF Support / Analysis	MIPR	TBD : TBD	-	-		-		0.050	May 2022	-		0.050	0.000	0.050	-
		Subtotal	2.000	0.962		-		0.100		-		0.100	0.000	3.062	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army		Date: May 2021
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 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
ATEC Test Support	MIPR	Army Test Engineering Center : Various	5.402	0.862	Nov 2019	0.100	Nov 2020	0.200	Nov 2021	-		0.200	0.000	6.564	-
Air Drop Testing	MIPR	NATICK : Various	0.400	0.762	Oct 2019	-		-		-		-	0.000	1.162	-
		Subtotal	5.802	1.624		0.100		0.200		-		0.200	0.000	7.726	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	26.591	4.794		4.125		3.763		-		3.763	0.000	39.273	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

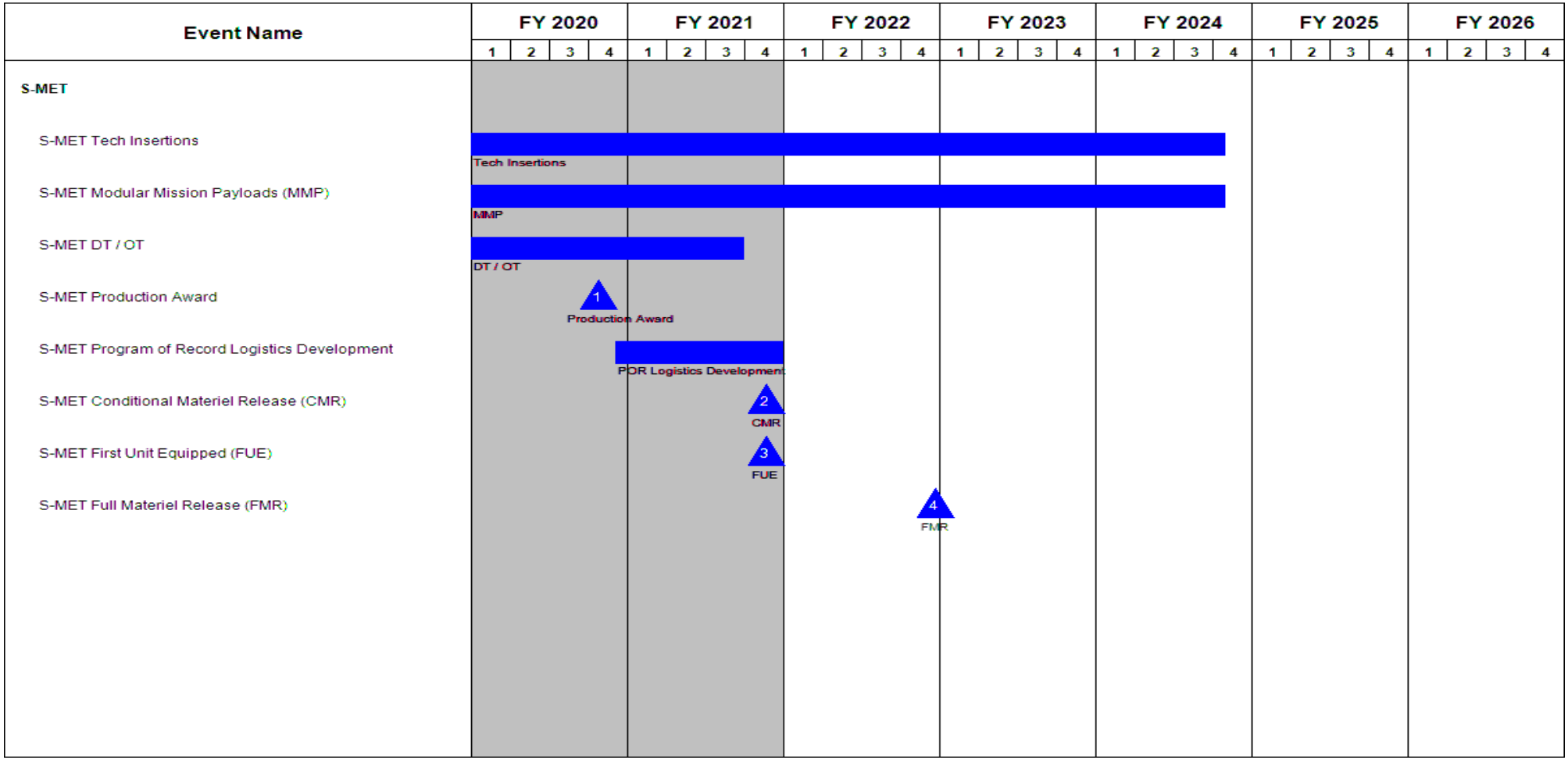

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB6 / *Squad Multipurpose Equipment Transport (SMET)*

Schedule Details

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

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army			Date: May 2021
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FB9: *MTRS Standardization*	-	7.412	-	-	-	-	-	-	-	-	-	-
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.

0605053A FB9 has no FY22 funding request.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
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.	0.936	-	-
Title: CRS(H) Testing ***Description:*** CRS(H) cyber security and performance testing efforts.	1.937	-	-
Title: CRS(H) Test Article Refurbishment ***Description:*** CRS(H) test article refurbishment for payloads.	0.336	-	-
Title: CRS(H) Contract Data ***Description:*** CRS(H) data required to support Materiel Release.	2.937	-	-
Title: CRS(H) Payload Development ***Description:*** CRS(H) payload development, integration, and testing activities.	0.679	-	-
Title: CRS(H) Test Article	0.587	-	-
Accomplishments/Planned Programs Subtotals	7.412	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army		Date: May 2021
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 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• W12001: *EOD Robotics Systems Recapitalization*	23.115	36.584	-	-	-	-	-	-	-	-	-

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 1QFY20 and will field under a Conditional Materiel Release (CMR) utilizing Interim Logistics Support (ILS) in FY 2020. Full Rate Production (FRP) decision is also scheduled for FY20. The CRS-H program will complete all required engineering and logistics activities to support Full Materiel Release (FMR) under organic sustainment in FY 2021.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) Program Management costs	Various	Various : Multiple	-	0.936	Oct 2019	-		-		-		-	0.000	0.936	-
		Subtotal	-	0.936		-		-		-		-	0.000	0.936	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) Payload Development	Various	Various : Multiple	-	0.679	Dec 2019	-		-		-		-	0.000	0.679	-
		Subtotal	-	0.679		-		-		-		-	0.000	0.679	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) Contract data	C/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 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
CRS(H) System Evaluation	Various	Various : Multiple	-	1.937	Nov 2019	-		-		-		-	0.000	1.937	-
CRS(H) Test Article refurbishment	SS/FFP	TBD : TBD	-	0.336	Nov 2019	-		-		-		-	0.000	0.336	-
CRS(H) Test Article	C/FP	FLIR : Chelmsford, MA	-	0.587	Jan 2020	-		-		-		-	0.000	0.587	-
		Subtotal	-	2.860		-		-		-		-	0.000	2.860	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FB9 / *MTRS Standardization*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	7.412		0.000		-		-		-	0.000	7.412	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

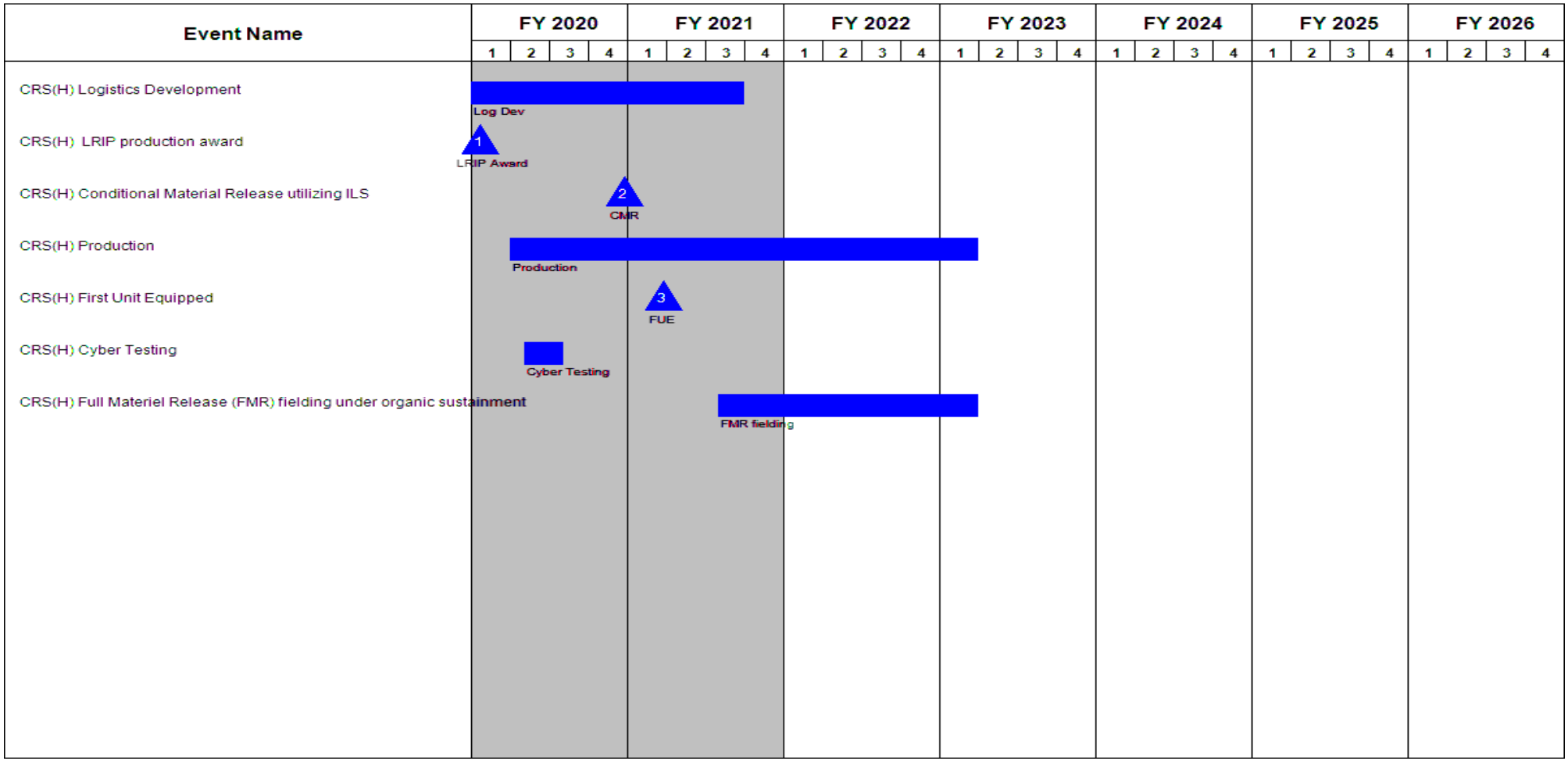

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FB9 / *MTRS Standardization*

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	3	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	4	2020	4	2020
CRS(H) Production	1	2020	1	2023
CRS(H) First Unit Equipped	1	2021	1	2021
CRS(H) Cyber Testing	2	2020	3	2020
CRS(H) Full Materiel Release (FMR) fielding under organic sustainment	3	2021	1	2023

Exhibit R-2A, RDT&E Project Justification: PB 2022 Army									Date: May 2021			
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 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
FG8: *Common Robotic Controller*	-	1.137	3.515	3.601	-	3.601	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Universal Robotics Control (URC) will provide the common operational software to run specific applications (Apps) for all battalion and below Robotic and Autonomous Systems (RAS). URC will provide multiple layers of situational awareness while reducing the Soldier's physical and cognitive load as well as the training burden. URC is both backwards compatible with existing Army RAS and forward compatible with emerging Army and Joint RAS. URC will integrate across all RAS programs for interoperability, network transport (radio wave forms), and the larger common Network. URC is a critical enabling capability for NGCV OMFV and RCV programs.

PEO Aviation will assess the technology readiness level of Universal Robotics Control (URC) in FY 21 and determine via analysis or prototype the acquisition pathway to fulfill the Capability Requirements outlined in the RAS ICD. The Prototype Demonstration and Data Analysis Framework will help determine if the URC should be a hardware-based program requiring a Capability Development Document (CDD), a software-based program requiring an Information System Capability Development Document (IS-CDD), or a Capability Needs Statement and User Agreement associated with a Software Acquisition Pathway. Will leverage RAS ICD, Navy Common Control System IS ICD, FUAS ICDs, RPUAS CPD, CRS-I CDD, OMFV, etc., will also be used in the analysis.

FY 2022 RDTE funding in the amount of $3.614 million will be utilized for Systems Engineering and Program Management (SEPM) support in preparing the Contracts Requirements Package (CRP) for URC. This includes Statement of Work and System Specification preparation, as well as follow up from the FY22 prototype/ demonstration and analysis to further shape the acquisition strategy. FY22 funding will also be utilized for risk reduction activities to include using a government or contractor provider to further enhance the prototype product and inform the CRP process.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021	FY 2022
Title: URC improves Soldier situational awareness while reducing cognitive load on Soldiers and the robotics portfolio logistics footprint	1.137	3.515	3.601
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 2022 Army		Date: May 2021
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 2020	FY 2021	FY 2022
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 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 2022 Plans:*** FY 2022 RDTE funding in the amount of $3.614 million will be utilized for Systems Engineering and Program Management (SEPM) support in preparing the Contracts Requirements Package (CRP) for URC. This includes Statement of Work and System Specification preparation, as well as follow up from the FY22 prototype/demonstration and analysis to further shape the acquisition strategy. FY22 funding will also be utilized for risk reduction activities to include using a government or contractor provider to further enhance the prototype product and inform the CRP process. ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Inflation rate adjustment.			
Accomplishments/Planned Programs Subtotals	1.137	3.515	3.601

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• G99595: *Common Robotic System-Individual (CRS-I)*	2.285	1.154	1.141	-	1.141	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
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 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management support	C/TBD	Various : Multiple	0.187	0.537	Oct 2019	1.658	Mar 2021	2.871	Nov 2021	-		2.871	0.000	5.253	-
		Subtotal	0.187	0.537		1.658		2.871		-		2.871	0.000	5.253	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Manufacturing & Development	C/CPFF	TBD : TBD	-	0.517	Feb 2020	-		-		-		-	0.000	0.517	-
Software support	Various	Various : Various	1.284	-		-		-		-		-	0.000	1.284	-
Prototyping	TBD	Various : Multiple	-	-		1.765	Mar 2021	-		-		-	0.000	1.765	-
Risk Reduction/ Engineering Studies	TBD	TBS : TBD	-	-		-		0.730	Feb 2022	-		0.730	0.000	0.730	-
		Subtotal	1.284	0.517		1.765		0.730		-		0.730	0.000	4.296	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Log Manuals	Various	Various : Multiple	0.738	-		-		-		-		-	0.000	0.738	-
		Subtotal	0.738	-		-		-		-		-	0.000	0.738	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor PQT	Various	Endeavor & QinetiQ : Massachusetts	0.660	-		-		-		-		-	0.000	0.660	-
Analysis of Alternatives	TBD	TBS : TBD	-	0.083		0.092	Mar 2021	-		-		-	0.000	0.175	-
		Subtotal	0.660	0.083		0.092		-		-		-	0.000	0.835	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army			Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605053A / *Ground Robotics*	Project (Number/Name) FG8 / *Common Robotic Controller*	

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	2.869	1.137		3.515		3.601		-		3.601	0.000	11.122	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

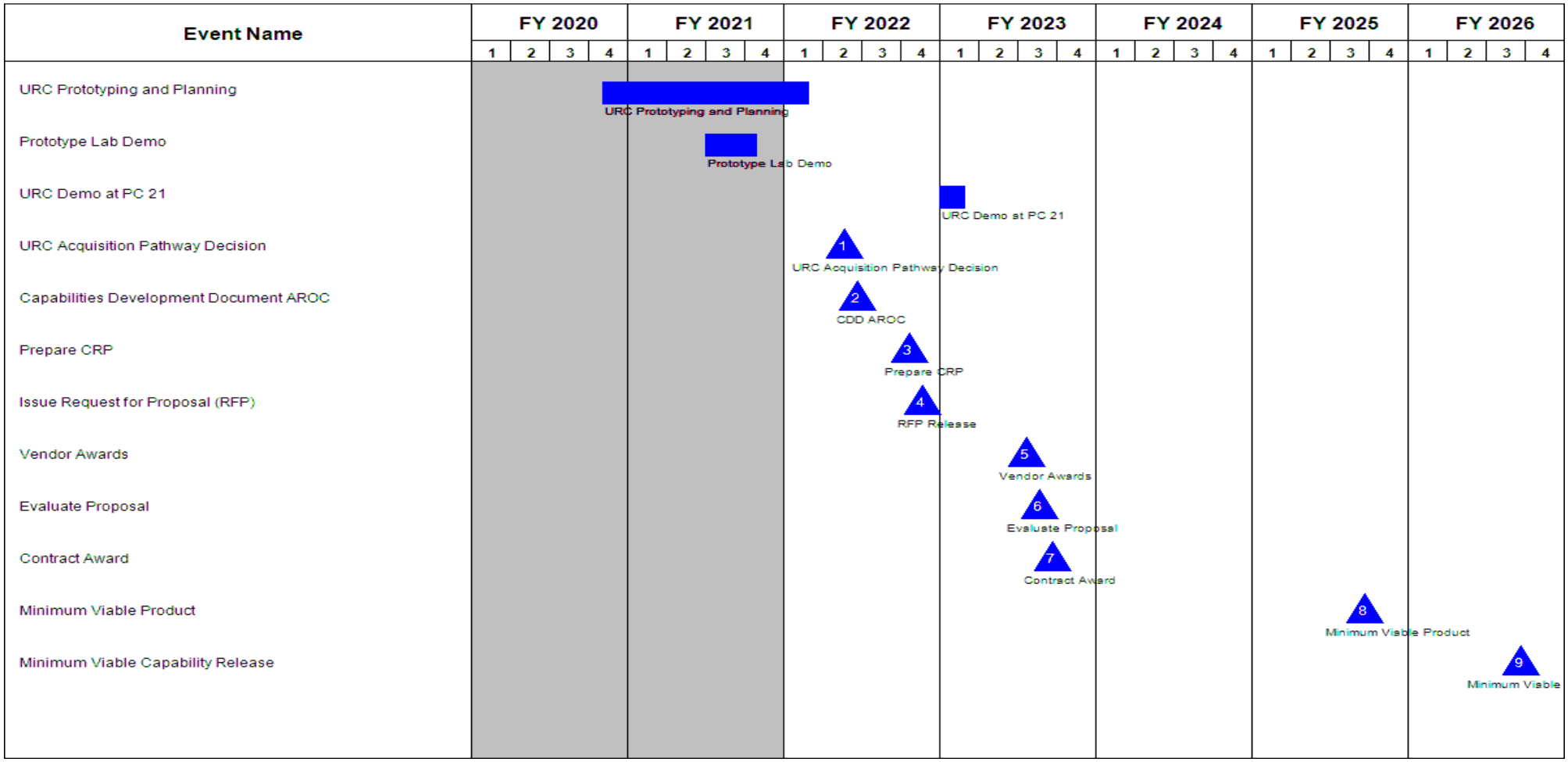

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0605053A / *Ground Robotics*	**Project (Number/Name)** FG8 / *Common Robotic Controller*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
URC Prototyping and Planning	4	2020	1	2022
Prototype Lab Demo	3	2021	4	2021
URC Demo at PC 21	1	2023	1	2023
URC Acquisition Pathway Decision	2	2022	2	2022
Capabilities Development Document AROC	2	2022	2	2022
Prepare CRP	4	2022	4	2022
Issue Request for Proposal (RFP)	4	2022	4	2022
Vendor Awards	3	2023	3	2023
Evaluate Proposal	3	2023	3	2023
Contract Award	3	2023	3	2023
Minimum Viable Product	3	2025	3	2025
Minimum Viable Capability Release	3	2026	3	2026