Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army	Date: March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	-	-	109.849	142.125	-	142.125	142.354	142.518	144.039	145.645	0.000	826.530
CF5: *Robotic Combat Vehicle (BA5) NGCV-CFT*	-	-	109.849	142.125	-	142.125	142.354	142.518	144.039	145.645	0.000	826.530

A. Mission Description and Budget Item Justification

The Robotic Combat Vehicle (RCV) development program will produce unmanned ground combat vehicle prototypes to aid Concepts of Operations (CONOPS) and Tactics, Techniques, and Procedures (TTP) development, integrate and secure advanced autonomy and artificial intelligence algorithms, and inform follow-on production and fielding decisions. RCV development will include a RCV Light (L) Middle-Tier Acquisition (MTA) Rapid Prototyping program as well as a Software Acquisition Pathway (SWP) program.

To solicit early Soldier feedback, the RCV(L) MTA Rapid Prototyping program will be accomplished through two complimentary lines of effort (LOE) - Surrogate Prototypes (SP) and Full System Prototypes (FSP).

The RCV(L) Surrogate Prototypes (SP) LOE utilizes updated RCV experimental prototypes and new build SPs in an iterative design-upgrade-test approach that includes integration of a Minimum Viable Capability Release (MVCR) and follow-on Capability Releases (CR) from the RCV Software Acquisition Pathway (SWP). The SP LOE includes three design-upgrade-test cycles that include FORSCOM operational pilots to collect Soldier feedback and demonstrate improved capabilities related to autonomous software, system safety, and cyber and spectrum resiliency. Each design-upgrade-test cycle will culminate in a Knowledge Point (KP) to review program process and determine SP capabilities ready for incorporation into the FSP LOE. The SP LOE will also serve to validate user requirements and assist in finalization of the RCV(L) Capabilities Development Document (CDD).

The RCV(L) Full System Prototypes (FSP) LOE will leverage mature capabilities from previous RCV experimentation and SP development efforts and integrate additional embedded software, perception sensors, user control interfaces, and communication links that will permit autonomous movement, tele-op movement, and increased battlefield situational awareness. The FSP acquisition strategy includes a full and open competition that will select up to four vendors to deliver demonstrators to inform down select to a single vendor for prototype build. Developmental testing of prototypes will include safety, Reliability, Availability and Maintainability (RAM), lethality, survivability, and Electromagnetic Environmental Effects (E3) testing. Additionally, Operational Testing (OT) in the form of Limited User Tests (LUT) will be executed to evaluate system suitability and effectiveness.

The Robotic Combat Vehicle (RCV) Software Acquisition Pathway (SWP) focuses on embedded software development and sustainment activities including RCV autonomy software, control station software, and payload control software. A system integration laboratory (SIL) will be used in conjunction with RCV systems to verify and validate software capabilities in both virtual and live test environments. The RCV SWP will provide software capabilities to the Surrogate Prototypes (SP) and Full System Prototype (FSP) LOEs for integration. The RCV SWP will incorporate Soldier and integrator feedback into product roadmaps to guide the development and maturation of critical software capabilities.

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army	Date: March 2023
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604641A *I Tactical Unmanned Ground Vehicle (TUGV)*

This program directly aligns with the Next Generation Combat Vehicle (NGCV) Army Modernization Priority.

The total cost of the RCV(L) MTA Rapid Prototyping program is $508.3 million (then-year dollars) RDT&E from FY 2022 to FY 2027. The RCV(L) MTA Rapid Prototyping program is fully funded across the Future Years Defense Program.

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	0.000	115.986	145.128	-	145.128
Current President's Budget	0.000	109.849	142.125	-	142.125
Total Adjustments	0.000	-6.137	-3.003	-	-3.003
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-6.137			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-3.003	-	-3.003

Change Summary Explanation

Decreased funding to support higher Army priorities.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	Project (Number/Name) CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
CF5: *Robotic Combat Vehicle (BA5) NGCV-CFT*	-	-	109.849	142.125	-	142.125	142.354	142.518	144.039	145.645	0.000	826.530
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Robotic Combat Vehicle (RCV) development programs, which include an RCV Light (L) Middle-Tier Acquisition Rapid Prototyping (MTA-RP) and an RCV Software Acquisition Pathway (SWP) program, will produce unmanned ground combat vehicle prototypes to inform Concepts of Operations (CONOPS) and Tactics, Techniques, and Procedures (TTP) maturation, Capabilities Development Document (CDD) development, acquisition and integration of secure advanced autonomy and artificial intelligence algorithms, and follow-on production and fielding decisions.

To solicit early Soldier feedback, the RCV(L) MTA Rapid Prototyping program will be accomplished through two complimentary lines of effort (LOE) - Surrogate Prototypes (SP) and Full System Prototypes (FSP).

The RCV(L) Surrogate Prototypes (SP) LOE utilizes RCV experimental prototypes and new build SPs in an iterative design-upgrade-test approach that includes integration of software updates from the RCV SWP and follow-on Capability Releases (CR) from the RCV Software Acquisition Pathway (SWP). The SP LOE includes recurring design-upgrade-test cycles from FY 2023-2026 that include FORSCOM operational pilots to collect Soldier feedback and demonstrate improved capabilities related to demonstrate improved capabilities to sensors, autonomous software, system safety and cyber and spectrum resiliency. Each design-upgrade-test cycle will culminate in a Knowledge Point (KP) to review program process and determine SP capabilities ready for incorporation into the FSP LOE. The SP LOE will also serve to validate user requirements, assist in finalization of the RCV(L) Capabilities Development Document (CDD) and inform DOTMLPF-P and force design considerations.

The RCV(L) Full System Prototypes (FSP) LOE will leverage mature capabilities from previous RCV experimentation and SP development efforts and integrate additional embedded software, perception sensors, user control interfaces, and communication links that will permit autonomous movement, tele-op movement, and increased battlefield situational awareness. The FSP acquisition strategy includes a full and open competition that will select up to four vendors to deliver demonstrators to inform down select to a single vendor for prototype build. Developmental testing of prototypes will include safety, Reliability, Availability and Maintainability (RAM), lethality, survivability, and Electromagnetic Environmental Effects (E3) testing. Additionally, Operational Testing (OT) in the form of Limited User Tests (LUT) will be executed to evaluate system suitability and effectiveness.

The Robotic Combat Vehicle (RCV) Software Acquisition Pathway (SWP) focuses on embedded software development and sustainment activities including RCV autonomy software, control station software, and payload control software. A system integration laboratory (SIL) will be used in conjunction with RCV systems to verify and validate software capabilities in both virtual and live test environments. The RCV SWP will provide software capabilities to the Surrogate Prototypes (SP) and Full System Prototype (FSP) LOEs for integration. The RCV SWP will incorporate Soldier and integrator feedback into product roadmaps to guide the development and maturation of critical software capabilities.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

This program directly aligns with the Next Generation Combat Vehicle (NGCV) Army Modernization Priority.

The total cost of the RCV(L) MTA Rapid Prototyping program is $508.3 million (then-year dollars) RDT&E from FY 2022 to FY 2027. The RCV(L) MTA Rapid Prototyping program is fully funded across the Future Years Defense Program.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Title: RCV (L) Surrogate Prototypes (SP) - Product Development	-	19.950	31.781
Description: Engineering design and development of the Surrogate Prototypes (SPs), to include integration of software capability updates from the Software Acquisition Pathway (SWP) program. SP Product development also includes the design and integration of improvements for safety, cybersecurity, perception sensors, and reliability to support the Soldier Operational Pilots and modeling and simulation (M&S) efforts. Additionally, SP Product Development includes engineering support to Surrogate Prototype build, in addition to on-site Field Service Representative (FSR) support, New Equipment Training (NET) for all phases of SP testing, and spare parts needed to execution the United States Army Forces Command (FORSCOM) Pilots. ***FY 2023 Plans:*** FY 2023 SP Product Development includes engineering efforts to design and integrate autonomy, safety and perception upgrades into SPs. Engineering efforts will be provided by both Government Development Centers, to include Ground Vehicle Systems Center (GVSC), Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center, and Armaments Center (AC), as well as by the SP vehicle prime contractors, QinetiQ and Textron. FY 2023 SP Product Development all include GVSC engineering support and spare parts to execute a three-month 2023 FORSCOM Pilot that will solicit Soldier feedback, inform new doctrine for manned/unmanned teaming based operations, validate user requirements, and aid in determination of SP capabilities ready for incorporation into the FSP LOE. ***FY 2024 Plans:*** FY 2024 SP Product Development includes engineering efforts to design and integrate additional mobility autonomy software from the RCV SWP, improved safety and perception upgrades, continued and safety advancements into SPs. Engineering efforts will be provided by both Government Development Centers, to include Ground Vehicle Systems Center (GVSC), Command, Control, Computers, Communications, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center, and Armaments Center (AC), as well as by the SP vehicle prime contractors, QinetiQ and Textron. FY 2024 SP Product Development also includes GVSC engineering support and spare parts necessary to conduct a six-month 2024 FORSCOM Pilot that will solicit additional Soldier feedback, inform new doctrine for manned/unmanned teaming based operations, validate user requirements, and aid in determination of further SP capabilities ready for incorporation into the FSP LOE. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase in FY 2024 is due to further increased testing in the FORSCOM Pilot from 3 months to 6 months.			
Title: RCV (L) Surrogate Prototypes (SP) - Refurbishment	-	5.100	1.244

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Description: Refurbishment of Experimental Prototypes or Surrogate Prototypes at the conclusion of testing to be utilized in future FORSCOM Pilots aimed at soliciting Soldier feedback, informing new doctrine for manned/unmanned teaming based operations, validate user requirements, and aiding determination of SP capabilities ready for incorporation into the FSP LOE. ***FY 2023 Plans:*** Refurbishment/Reset of ten (10) RCV (L) Experimental Prototypes used in the Soldier Operational Experiment II. Includes all labor, parts and transportation necessary to refurbish SPs. ***FY 2024 Plans:*** Refurbishment/Reset of four (4) RCV (L) Surrogate Prototypes. Includes all labor, parts and transportation necessary to refurbish SPs. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Decrease in FY 2024 is due to reduced quantities and estimated levels of repair for assets for subsequent use in the 2025 FORSCOM Pilot.			
Title: RCV (L) Surrogate Prototypes (SP) - Government Test & Evaluation (T&E)	-	11.948	13.719
Description: Government Test and Evaluation (T&E) includes Surrogate Prototype (SP) safety testing, operational testing, shakeout testing and execution of FORSCOM operational pilots to solicit Soldier feedback, inform new doctrine for manned/unmanned teaming based operations, validate user requirements, and aid in determination of SP capabilities ready for incorporation into the FSP LOE. Additionally, Government T&E includes Modeling and Simulation (M&S) efforts to enhance test design, predict results for comparison with field results, and provide simulation or stimulation of systems and organizations that cannot be fully tested. ***FY 2023 Plans:*** FY 2023 Government T&E executes an initial three-month FORSCOM operational pilot utilizing Surrogate Prototypes. Includes support from the Combat Capabilities Development Command - Armaments Center (CCDC-AC) and the Command, Control, Communication, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR) Center, Ground Vehicle Systems Center (GVSC), safety testing and instrumentation at Army Test and Evaluation Command (ATEC) test sites and supporting data collection with Data Analytics Center (DAC) and The Research and Analysis Center (TRAC). ***FY 2024 Plans:*** FY 2024 Government T&E includes support from the Combat Capabilities Development Command - Armaments Center (CCDC-AC) and the Command, Control, Communication, Computers, Cyber, Intelligence, Surveillance and Reconnaissance (C5ISR)			

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Center, Ground Vehicle Systems Center (GVSC),and Army Test and Evaluation Command (ATEC) test sites for six months of operational testing, shakeout testing, operator training, safety testing, and execution of 2024 FORSCOM Pilot activities. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase in FY 2024 is due to further increased testing in the FORSCOM Pilot from 3 months to 6 months.			
Title: RCV (L) Full System Prototypes (FSP) - Product Development ***Description:*** Engineering design and development of Full System Prototypes (FSPs), to include integration of safety, cyber security, autonomy, and Aided Target Detection and Recognition (AiTDR) software updates from the Software Acquisition Pathway (SWP), incorporation of capabilities transitioned from the Surrogate Prototype (SP) Line of Effort (LOE), and integration of dismounted controllers and mounted control stations. Additionally, FSP Product Development includes the integration of Government Furnished Equipment (GFE) and Government Furnished Software (GFS), architecture development to support integration of vehicle software payloads, early assessments to guide product development, and technical support to Government Test and Evaluation (T&E) activities. ***FY 2023 Plans:*** FY 2023 product development support the award of FSP Demonstrator contract awards to up to four (4) vendors. Initial efforts include Start of Work, design review through Technical Readiness Review (TRR). The Government will test and evaluate vendor demonstrators with aim of selecting a single vendor for FSP Prototype builds in 1st Quarter, FY 2025. ***FY 2024 Plans:*** FY 2024 product development includes contractor development engineering for additional capabilities to be integrated into RCV(L) FSPs, to include Mounted Mission Command-Transport (MMC- T), platform hardware and software architecture updates to enable integration of Government Furnished Software from the RCV Software Acquisition Pathway (SWP), platform design updates to support safety critical system requirements, integration of Modular Assured Position, Navigation, and Timing System (MAPS), Producibility Engineering Planning (PEP), and new equipment training in support of demonstrator testing. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Decrease in FY 2024 is due to FSP demonstrator design, TRR, delivery, and test being resourced with FY 2023 funding.	-	24.870	2.246
Title: RCV (L) Full System Prototypes (FSP) - Government Test & Evaluation (T&E) ***Description:*** Full System Prototype (FSP) Government Test and Evaluation (T&E) includes all test activities performed at Army Test and Evaluation Center (ATEC) test sites to evaluate FSP system safety, performance, effectiveness, and suitability. Initial T&E will be executed on vendor demonstrators, while further T&E, to include safety, Reliability, Availability and Maintainability (RAM), lethality, survivability, cybersecurity, and Electromagnetic Environmental Effects (E3) testing, will be conducted on FSPs.	-	-	3.069

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
Additionally, Operational Testing (OT) in the form of Limited User Tests (LUT) will be completed to evaluate system suitability and effectiveness. ***FY 2024 Plans:*** In FY 2024, T&E of demonstrators from up to four (4) vendors will be completed to inform down select to a single vendor for FSP builds. The scope of prototype demonstrators T&E includes safety testing, automotive performance testing, lethality testing, vibration testing, and a soldier evaluation. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase in FY 2024 is due to demonstrator testing initiating in FY 2024			
Title: RCV (L) Full System Prototypes (FSP) - Source Selection Evaluation Board (SSEB) ***Description:*** Engineering, logistics, product assurance and test, financial management, acquisition, legal, and operations support Source Selection Evaluation Board (SSEB) activities to both select up to four (4) vendors for demonstrator build, and down select to a single vendor for FSP prototype builds. SSEB expenditures include salaries, training, travel, supplies, facilities, and equipment. ***FY 2023 Plans:*** In FY 2023, a SSEB will be convened to select up to four (4) vendors for prototype demonstrator build for initial participation. SSEB membership will include Government experts in engineering, logistics, product assurance and test, financial management, acquisition, contracting, operations, and law. SSEB expenses include salaries, training, travel, supplies, facilities, and equipment. ***FY 2024 Plans:*** In FY 2024, a Source Selection Evaluation Board (SSEB) will be completed to down select from up to four (4) vendors participating in the initial effort to a single vendor for continued development and FSP prototype builds. SSEB membership will include Government experts in engineering, logistics, product assurance and test, financial management, acquisition, contracting, operations, and law. SSEB expenses include salaries, training, travel, supplies, facilities, and equipment. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase in FY 2024 is due to expanded SSEB efforts, progressing from assessment of design concepts to an assessment of demonstrator performance and proposed Full System Prototype design.	-	0.600	1.724
Title: Software Acquisition Pathway (SWP) - Capability Release (CR) Development and Integration ***Description:*** Software Acquisition Pathway (SWP) Capability Release Development and Integration focuses on Robotic Combat Vehicle embedded software development, to include developing and integrating autonomous mobility software, control station software, payload control software, and cybersecurity hardening. The SWP program will deliver annual software CRs to both	-	5.169	11.724

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
the Surrogate Prototype (SP) and Full System Prototype (FSP) lines of effort within the RCV(L) Middle Tier Acquisition - Rapid Prototyping (MTA-RP) program. Developed software will also be delivered to the SWP systems integration laboratory (SIL) for live and virtual software testing. ***FY 2023 Plans:*** FY 2023 activities include Government and contractor development of the RCV Minimum Viable Capability Release (MVCR). The MVCR will incorporate embedded software capabilities lessons learned from the 4th Quarter, FY 2022 RCV Phase II Soldier Operational Experimentation (SOE), and integrate leader-follower, guarded teleoperation, multi-role control station, and Network Coverage Overlay (NeCO) mission planning capabilities. The MVCR is targeted for completion and release to the RCV(L) MTA-RP program in 2nd Quarter, FY 2024. ***FY 2024 Plans:*** FY 2024 activities include completion of the MVCR development and testing, and MVCR release to the RCV(L) MTA Rapid Prototyping program for assessment during an FY 2024 FORSCOM Operational Pilot. Additionally, development of the RCV SWP Capability Release (CR 2) will be initiated. CR 2 will incorporate feedback from the FY 2023 FORSCOM Operational Pilot, improved safety and cyber resiliency, and contain expanded autonomous capabilities developed by the Government and Industry, to include autonomous mobility across multiple environments and terrains. Further, CR2 will begin to incorporate refactor and re-architecture recommendations from Industry analysis. CR 2 is targeted for completion and release to the RCV(L) Middle Tier Acquisition - Rapid Prototyping program in 2nd Quarter, FY 2025. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase is due to the integration of expanded autonomous mobility capabilities during CR 2 development in FY 2024.			
Title: Software Acquisition Pathway (SWP) - Autonomous Mobility Development ***Description:*** Development of software and hardware to enable RCV autonomous mobility across a spectrum of use cases, to include marked, on-road surfaces, unmarked surfaces, and multiple off-road terrains. RCV Autonomous Mobility software and hardware capabilities will be successively integrated into future SWP Capability Releases for evaluation within the RCV(L) MTA Rapid Prototyping Surrogate Prototyping (SP) and Full System Prototyping (FSP) lines of effort. ***FY 2023 Plans:*** Development of Autonomous Mobility software and hardware, focusing on autonomous navigation of marked and unmarked roads and surfaces, and initial off-road use cases. Efforts include procurement of demonstration vehicles, development of a demonstrator system Interface Control Document (ICD), and installation of existing, commercially-available autonomous mobility software and hardware solutions to assess software portability and aid autonomous mobility system development. In addition to developing autonomous navigation capabilities, existing autonomous mobility system performance will be enhanced, specifically	-	19.481	44.206

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
system safety, cyber resiliency, and teleoperation assist and control capabilities. Lastly, Autonomous Mobility system cyber vulnerability testing and simulation and on-road testing of unmarked road use cases will be conducted. ***FY 2024 Plans:*** Continued Autonomous Mobility software and hardware development, focusing on the development of autonomous mobility capabilities for multiple off-road use cases to ensure system utility in diverse military environments. Efforts include development of RCV off-road autonomous mobility software and hardware and integration into comercially-available demonstration vehicles to assess autonomous system development against multiple military off-road use cases. In addition to developing autonomous mobility navigation capabilities, safety and cyber resiliency will continue to be improved, and teleoperations capabilities will be expanded from to off-road use cases. Lastly, autonomous mobility system simulations and off-road testing will be conducted. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase is due to additional effort in FY 2024 associated with the development of expanded autonomous mobility capabilities to enable off-road navigation.			
Title: Software Acquisition Pathway (SWP) - DevSecOps Pipeline Development, Software Integration Lab (SIL) Support, and Data Management Support ***Description:*** The RCV Software Acquisition Pathway Program will develop and mature a DevSecOps pipeline to enable simulation and evaluation of the performance and security of both expanding RCV autonomous capabilities and existing Government and Commercial autonomous software. The DevSecOps Pipeline, will assess software performance across a spectrum of relevant military use cases and will inform the development of new autonomous capabilities and refactoring and re-architecting of the existing code base. Additionally, the RCV SWP program will build and operate a SIL to augment testing of autonomous software and hardware and reduce technical risk. Finally, the RCV SWP program will include class leading pipeline management support to enable effective scaling of data annotation necessary to iteratively incorporate increasing autonomous software capabilities. ***FY 2023 Plans:*** Initiates development of a DevSecOps Data Management Pipeline to enable current and future assessment of RCV autonomous mobility and safety architecture software. The RCV DevSecOps Pipeline will also incorporate relevant military use Operational Design Domain (ODD) descriptions, test cases, and test criteria to effectively enable software performance assessment of increasing autonomous mobility capabilities. Appropriate simulation environments to test RCV software will be developed to support the performance assessment of key features and capabilities. Additionally, class leading industry analysis of existing RCV Experimental autonomous vehicle software and existing commercial autonomous mobility software will be conducted to inform refactoring/re-architecting improvements to be incorporated into future annual Capability Releases (CR). Industry analysis will include assessments of simulated performance of both existing RCV Experimental autonomous vehicle and commercial	-	12.296	22.692

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
autonomous vehicle software stacks, an assessment during a live driving test event, and root cause analysis of any system failures during testing, and recommendations for future improvements. Lastly, industry best data pipeline management support will be provided to RCV autonomous software developers to enable effective scaling of data labeling necessary to iteratively incorporate increasing autonomous software capabilities. ***FY 2024 Plans:*** Continued development of a DevSecOps Data Management Pipeline to enable current and future assessment of RCV autonomous mobility and safety architecture software. The RCV DevSecOps Pipeline will also incorporate relevant military use Operational Design Domain (ODD) descriptions, test cases, and test criteria to effectively enable software performance assessment as autonomous mobility capabilities increase. Appropriate simulation environments to test RCV software will be developed, focusing on enabling performance assessment of off-road capabilities. Additionally, leading class industry analysis of RCV autonomous vehicle stacks (with focus on unmarked road and off-road navigation), to include assessments of simulated performance and live performance on surrogate demonstrators, will be performed to inform improvements to future RCV SWP CRs. Lastly, FY 2024 efforts include SIL operation and data pipeline management support to RCV autonomous software developers to enable effective scaling of data labeling necessary to iteratively incorporate increasing autonomous software capabilities. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase is due to additional effort in FY 2024 associated with the expansion of DevSecOps Pipeline capabilities to support development of RCV autonomous mobility software for off-road use cases.			
Title: RCV Development - Government Program Management ***Description:*** Government project management to RCV development programs. Includes salaries, travel, training, supplies, facilities, and equipment. ***FY 2023 Plans:*** Activities include Government engineering, financial management, acquisition planning, risk assessment and mitigation, contract preparation, and operations support necessary for the RCV development effort, to include oversight of Full System Prototype (FSP) demonstrator testing and oversight of Software Acquisition Pathway (SWP) activities. Includes salaries, training, travel, supplies, facilities, and equipment. ***FY 2024 Plans:*** Activities include Government engineering, financial management, acquisition planning, risk assessment and mitigation, contract preparation, and operations support necessary for the RCV development effort, to include management of build-test and FORSCOM operational pilots for the Surrogate Prototype (SP) Line Of Effort (LOE), oversight of Full System Prototype (FSP)	-	6.426	9.720

Exhibit R-2A, RDT&E Project Justification: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023	FY 2024
demonstrator testing, and oversight of Software Acquisition Pathway (SWP) activities. Includes salaries, training, travel, supplies, facilities, and equipment. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase in FY 2024 is due to Government program management of Surrogate Prototyping efforts transition from program element 0604017A/Robotics Development, Project CF4: Robotic Combat Vehicle (NGCV CFT).			
Title: SBIR/STTR ***FY 2023 Plans:*** Requirements to support Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) Program. ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Funding transferred in accordance with Title 15 USC 638.	-	4.009	-
Accomplishments/Planned Programs Subtotals	-	109.849	142.125

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• 0604017A: *Robotics Development*	78.309	26.555	3.024	-	3.024	3.033	3.037	3.069	3.103	0.000	120.130

Remarks

RCV(L) development and Software Acquisition Pathway (SWP) efforts are continuations of efforts from program element 0604017A/Robotics Development, Project CF4: Robotic Combat Vehicle (RCV). FY 2024-2028 funding in program element 0604017A/Robotics Development is not associated with the RCV program.

D. Acquisition Strategy

RCV development includes an RCV(L) Middle-Tier Acquisition (MTA) Rapid Prototyping program as well as a Software Acquisition Pathway (SWP) program.

RCV(L) Acquisition Strategy:
On 10 February 2022, the Army Acquisition Executive (AAE) approved the execution of RCV(L) Rapid Prototyping program under authorities granted by under authorities granted under Section 804 of the 2016 NDAA (PL 114-92). The RCV(L) MTA Rapid Prototyping program will be accomplished in two complementary lines of effort (LOE), Surrogate Prototypes (SP) and Full System Prototypes (FSP).

The SP LOE will utilize an existing Other Transaction Authority (OTA) task assignment with QinetiQ North America to both update existing RCV experimental prototypes to Surrogate Prototype configuration as well as procure new build Surrogate Prototypes. The Surrogate Prototypes will support recurring design-upgrade-test cycles from FY 2023-2026 that include FORSCOM operational pilots to collect Soldier feedback and demonstrate improved capabilities related to autonomous software, system

safety, demonstrating improved sensor capabilities, and cyber and spectrum resiliency. Each design-upgrade-test cycle will culminate in a Knowledge Point (KP) to review program process and determine SP capabilities ready for incorporation into the FSP LOE.

The FSP acquisition strategy includes a full and open competition that will select up to four vendors, delivering two demonstrators each, to inform down select to a single vendor for prototype build and testing. Developmental testing of FSPs will include safety, Reliability, Availability and Maintainability (RAM), lethality, survivability, and Electromagnetic Environmental Effects (E3) testing. Additionally, Operational Testing (OT) in the form of Limited User Tests (LUT) will be executed to evaluate system suitability and effectiveness.

Upon successful completion of the RCV(L) Rapid Prototyping program, an MTA Outcome Determination (OD) will determine if the program will transition to a MTA Rapid Fielding effort aimed at fielding RCV(L) FSPs to selected unit(s) for Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policies (DOTMLPF-P) analysis and integration of Manned-Unmanned Teaming (MUM-T) operations.

Software Acquisition Pathway (SWP) Acquisition Strategy:
The SWP Acquisition Decision Memorandum (ADM), signed 3 August 2021, directs the use of the draft Cross Functional Team (CFT) Next Generation Combat Vehicle (NGCV) Robotic and Optionally Manned Autonomous (ROMA) Capabilities Needs Statement (CNS) as the base user capabilities document from which to derive capabilities for the RCV SWP. The RCV SWP will provide government furnished software to RCV SP and FSP LOEs. The RCV SWP will implement a Government - Contractor hybrid development approach to mature, integrate, and secure software capabilities from the science and technology base. The RCV SWP will incorporate software contracting best practices to support the transition of software capabilities into secure code base required for the resilient operation of RCVs in contested environments. On 25 January 2023, the AAE approved Software Acquisition Pathway entrance into the Execution Phase.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	Project (Number/Name) CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RCV Program Management	Various	Various : Warren, MI; Various	-	-		6.426	Nov 2022	9.720	Nov 2023	-		9.720	Continuing	Continuing	-
SBIR/STTR	Various	Various : Various	-	-		4.009	Jan 2023	-		-		-	Continuing	Continuing	-
		Subtotal	-	-		10.435		9.720		-		9.720	Continuing	Continuing	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RCV (L) Surrogate Prototypes (SP) - Product Development	Various	GVSC; Various : Warren, MI; Various	-	-		19.950		31.781	Nov 2023	-		31.781	Continuing	Continuing	-
RCV (L) Surrogate Prototypes (SP) - Refurbishment	SS/FFP	QinetiQ North America : Waltham, MA	-	-		5.100	Feb 2023	1.244	Feb 2024	-		1.244	Continuing	Continuing	-
RCV (L) Full System Prototypes (FSP) - Product Development	C/FFP	TBD : TBD	-	-		24.870	Jul 2023	2.246	Apr 2024	-		2.246	Continuing	Continuing	-
Software Acquisition Pathway (SWP) - Capability Release (CR) Development and Integration	Various	GVSC; Various : Warren, MI; Various	-	-		5.169	Mar 2023	11.724	Nov 2023	-		11.724	Continuing	Continuing	-
Software Acquisition Pathway (SWP) - Autonomous Mobility Development	SS/FFP	Kodiak; TBD : Mountain View, CA; TBD	-	-		19.481	May 2023	44.206	May 2024	-		44.206	0.000	63.687	-
Software Acquisition Pathway (SWP) - DecSecOps, SIL Support and Data Management Support	SS/FFP	Applied Intuition; TBD : MountainView, CA; TBD	-	-		12.296	Mar 2023	22.692	May 2024	-		22.692	0.000	34.988	-
		Subtotal	-	-		86.866		113.893		-		113.893	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Army			Date: March 2023
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	Project (Number/Name) CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RCV (L) Full System Prototypes (FSP) - Source Selection Evaluation Board (SSEB)	MIPR	Various : Warren, MI	-	-		0.600	Jul 2023	1.724	Nov 2023	-		1.724	Continuing	Continuing	-
		Subtotal	-	-		0.600		1.724		-		1.724	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RCV (L) Surrogate Prototypes (SP) - Government Test & Evaluation (T&E)	MIPR	Various : Various	-	-		11.948	Jan 2023	13.719	Jan 2024	-		13.719	Continuing	Continuing	-
RCV (L) Full System Prototypes (FSP) - Government Test & Evaluation (T&E)	MIPR	ATEC : Aberdeen, MD	-	-		-		3.069	Oct 2023	-		3.069	Continuing	Continuing	-
		Subtotal	-	-		11.948		16.788		-		16.788	Continuing	Continuing	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		109.849		142.125		-		142.125	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

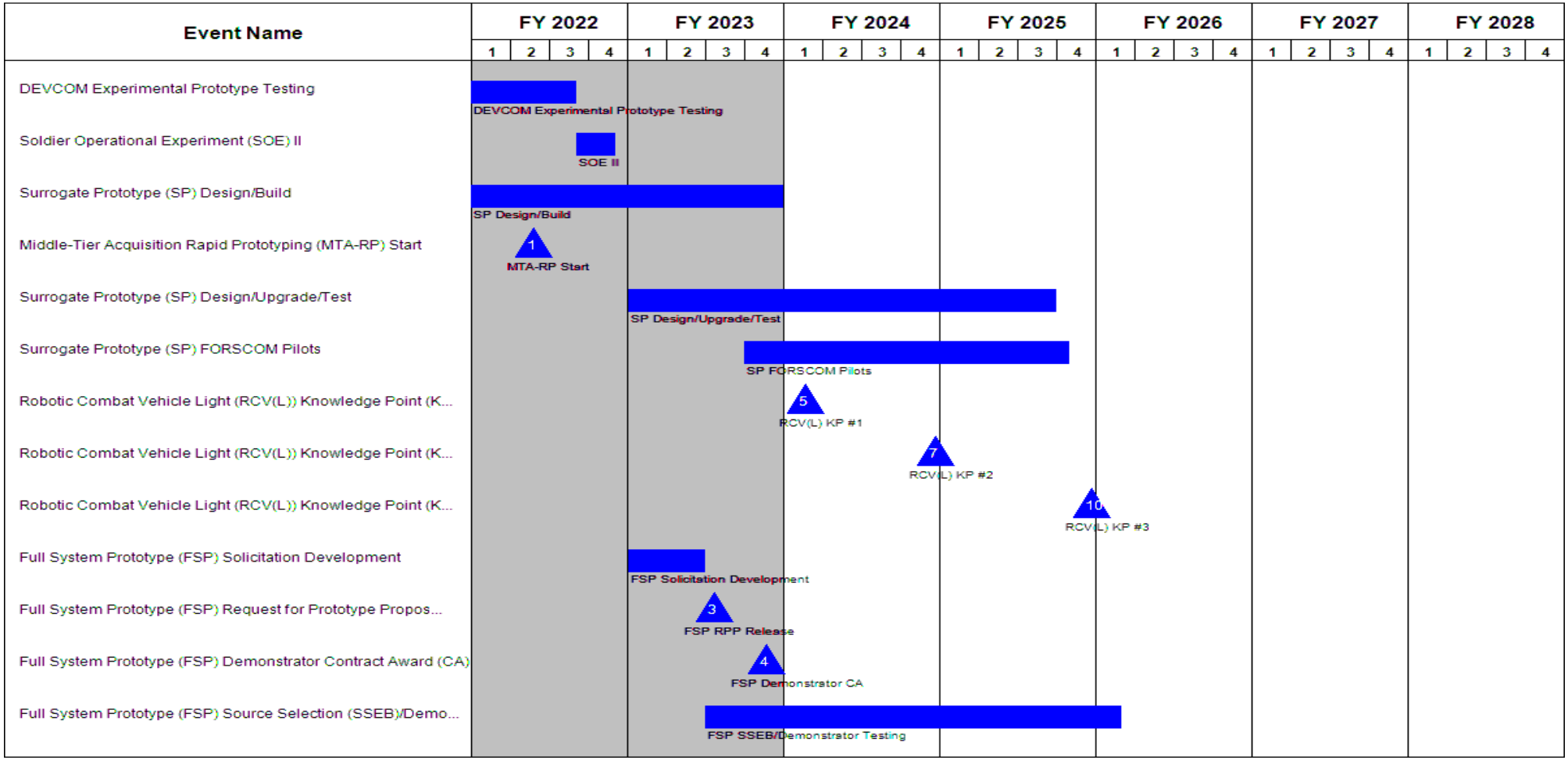

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

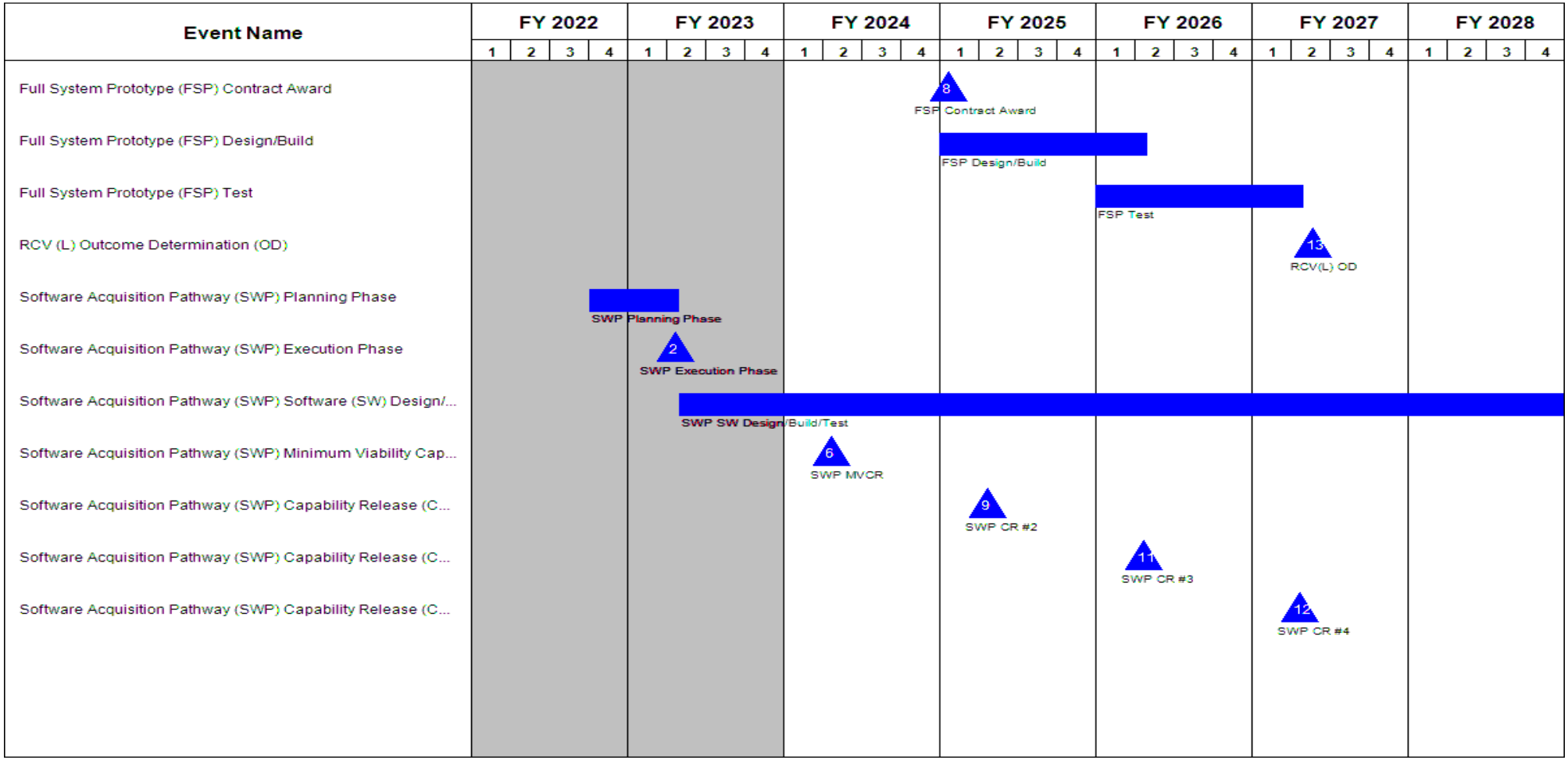

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
DEVCOM Experimental Prototype Build	1	2021	2	2021
DEVCOM Experimental Prototype Testing	3	2021	3	2022
Soldier Operational Experiment (SOE) II	3	2022	4	2022
Surrogate Prototype (SP) OTA Contract Development/Modification	2	2021	4	2021
Surrogate Prototype (SP) Contract Build #1	4	2021	4	2021
Surrogate Prototype (SP) Design/Build	4	2021	4	2023
Middle-Tier Acquisition Rapid Prototyping (MTA-RP) Start	2	2022	2	2022
Surrogate Prototype (SP) Design/Upgrade/Test	1	2023	3	2025
Surrogate Prototype (SP) FORSCOM Pilots	4	2023	4	2025
Robotic Combat Vehicle Light (RCV(L)) Knowledge Point (KP) #1	1	2024	1	2024
Robotic Combat Vehicle Light (RCV(L)) Knowledge Point (KP) #2	4	2024	4	2024
Robotic Combat Vehicle Light (RCV(L)) Knowledge Point (KP) #3	4	2025	4	2025
Full System Prototype (FSP) Solicitation Development	1	2023	2	2023
Full System Prototype (FSP) Request for Prototype Proposal (RPP) Release	3	2023	3	2023
Full System Prototype (FSP) Demonstrator Contract Award (CA)	4	2023	4	2023
Full System Prototype (FSP) Source Selection (SSEB)/Demonstrator Testing	3	2023	1	2026
Full System Prototype (FSP) Contract Award	1	2025	1	2025
Full System Prototype (FSP) Design/Build	1	2025	2	2026
Full System Prototype (FSP) Test	1	2026	2	2027
RCV (L) Outcome Determination (OD)	2	2027	2	2027
Software Acquisition Pathway (SWP) Planning Phase	4	2022	2	2023
Software Acquisition Pathway (SWP) Execution Phase	2	2023	2	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 5	**R-1 Program Element (Number/Name)** PE 0604641A / *Tactical Unmanned Ground Vehicle (TUGV)*	**Project (Number/Name)** CF5 / *Robotic Combat Vehicle (BA5) NGCV-CFT*

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Software Acquisition Pathway (SWP) Software (SW) Design/Build/Test	2	2023	4	2028
Software Acquisition Pathway (SWP) Minimum Viability Capability Release (MVCR)	2	2024	2	2024
Software Acquisition Pathway (SWP) Capability Release (CR) #2	2	2025	2	2025
Software Acquisition Pathway (SWP) Capability Release (CR) #3	2	2026	2	2026
Software Acquisition Pathway (SWP) Capability Release (CR) #4	2	2027	2	2027