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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Army **Date:** March 2024

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604641A / <i>Tactical Unmanned Ground Vehicle (TUGV)</i>
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	-	107.975	142.125	92.540	-	92.540	140.898	136.879	142.311	142.322	0.000	905.050
CF5: <i>Robotic Combat Vehicle (BA5) NGCV-CFT</i>	-	107.975	142.125	92.540	-	92.540	140.898	136.879	142.311	142.322	0.000	905.050

A. Mission Description and Budget Item Justification

The Robotic Combat Vehicle (RCV) has transitioned from a family of light, medium, and heavy variants to a single vehicle approach with a common chassis. The Army has decided to field a common platform that will pair elements of the previous RCV medium concept with the RCV common chassis. The development programs, which include a RCV Middle-Tier Acquisition Rapid Prototyping (MTA-RP) and a 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, force design updates, robotic and autonomous systems (RAS) doctrine development, and follow-on production and fielding decisions.

The RCV program will enhance the Human Machine Integration (HMI) effort by soliciting early Soldier feedback to reduce risk to the MTA-RP and SWP acquisition pathways. The RCV MTA-RP program will perform three complementary lines of effort (LOE): 1) Surrogate Prototypes (SP); 2) Full System Prototypes (FSP); 3) and Manned Control Vehicles (MCV), while leveraging the software developed in the SWP to perform incremental capability releases.

The RCV SP LOE utilizes RCV experimental prototypes and new build SP vehicles 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 SWP. The SP LOE includes recurring design-upgrade-test cycles from FY 2023-2024 that conclude with FORSCOM operational pilots to collect Soldier feedback and demonstrate improved capabilities related to demonstrate improved capabilities to sensors, autonomous software, system safety, control architecture, and network resiliency. Each design-upgrade-test cycle will culminate in a Knowledge Point (KP) to review program progress and determine SP architectures or capabilities ready for incorporation into the FSP LOE. The SP LOE will also serve to validate user requirements, assist in finalization of the RCV Capabilities Development Document (CDD) and inform DOTMLPF-P and force design considerations.

The RCV 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 robust competition through Other Transaction Authority (OTA) that selected four vendors to deliver platform prototypes 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 Prototype Operational Demonstration (POD) will be executed to evaluate system suitability and effectiveness.

The MCV focuses on Control Station hardware and Human Systems Integration into host platforms for RCV operations.

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604641A / <i>Tactical Unmanned Ground Vehicle (TUGV)</i>
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The RCV 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 SP and 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.

The Robotic Combat Vehicle (RCV) development program directly aligns with the Next Generation Combat Vehicle (NGCV) Army Modernization Priority and includes the RCV Middle-Tier Acquisition Rapid Prototyping and a RCV Software Pathway.

The projected total cost of the RCV MTA Rapid Prototyping program is \$497.81 million (then-year dollars) RDT&E from FY 2022 to FY 2027. The remainder of the RCV MTA Rapid Prototyping program is fully funded across the Future Years Defense Program.

B. Program Change Summary (\$ in Millions)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	109.849	142.125	142.354	-	142.354
Current President's Budget	107.975	142.125	92.540	-	92.540
Total Adjustments	-1.874	0.000	-49.814	-	-49.814
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	2.135	-			
• SBIR/STTR Transfer	-4.009	-			
• Adjustments to Budget Years	-	-	-49.814	-	-49.814

Change Summary Explanation

Decreased funding associated with a reduction of planned activities for FY25 RCV Surrogate Prototypes FORSCOM Operational Pilot.

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Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0604641A / <i>Tactical Unmanned Ground Vehicle (TUGV)</i>				Project (Number/Name) CF5 / <i>Robotic Combat Vehicle (BA5) NGCV-CFT</i>			
COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
CF5: <i>Robotic Combat Vehicle (BA5) NGCV-CFT</i>	-	107.975	142.125	92.540	-	92.540	140.898	136.879	142.311	142.322	0.000	905.050
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Robotic Combat Vehicle (RCV) has transitioned from a family of light, medium, and heavy variants to a single vehicle approach with a common chassis. The Army has decided to field a common platform that will pair elements of the previous RCV medium concept with the RCV common chassis. The development programs, which include a RCV Middle-Tier Acquisition Rapid Prototyping (MTA-RP) and a 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, force design updates, robotic and autonomous systems (RAS) doctrine development, and follow-on production and fielding decisions.

The RCV program will enhance the Human Machine Integration (HMI) effort by soliciting early Soldier feedback to reduce risk to the MTA-RP and SWP acquisition pathways. The RCV MTA-RP program will perform three complementary lines of effort (LOE): 1) Surrogate Prototypes (SP); 2) Full System Prototypes (FSP); 3) and Manned Control Vehicles (MCV), while leveraging the software developed in the SWP to perform incremental capability releases.

The RCV SP LOE utilizes RCV experimental prototypes and new build SP vehicles 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 SWP. The SP LOE includes recurring design-upgrade-test cycles from FY 2023-2024 that conclude with FORSCOM operational pilots to collect Soldier feedback and demonstrate improved capabilities related to demonstrate improved capabilities to sensors, autonomous software, system safety, control architecture, and network resiliency. Each design-upgrade-test cycle will culminate in a Knowledge Point (KP) to review program progress and determine SP architectures or capabilities ready for incorporation into the FSP LOE. The SP LOE will also serve to validate user requirements, assist in finalization of the RCV Capabilities Development Document (CDD) and inform DOTMLPF-P and force design considerations.

The RCV 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 robust competition through Other Transaction Authority (OTA) that selected four vendors to deliver platform prototypes 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 Prototype Operational Demonstration (POD) will be executed to evaluate system suitability and effectiveness.

The MCV focuses on Control Station hardware and Human Systems Integration into host platforms for RCV operations.

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The RCV 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 SP and 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.

The Robotic Combat Vehicle (RCV) development program directly aligns with the Next Generation Combat Vehicle (NGCV) Army Modernization Priority and includes the RCV Middle-Tier Acquisition Rapid Prototyping and a RCV Software Pathway.

The projected total cost of the RCV MTA Rapid Prototyping program is \$497.81 million (then-year dollars) RDT&E from FY 2022 to FY 2027. The remainder of the RCV MTA Rapid Prototyping program is fully funded across the Future Years Defense Program.

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

	FY 2023	FY 2024	FY 2025
<p>Title: RCV (L) Surrogate Prototypes (SP) - Product Development</p> <p>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, perception sensors, and reliability to support the FORSCOM Operational Pilots and modeling and simulation (M&S) efforts. Additionally, SP Product Development includes engineering support to SP vehicle hardware and software updates, 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 execute the United States Army Forces Command (FORSCOM) Pilots.</p> <p>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.</p> <p>FY 2025 Plans: FY 2025 SP Product Development supports the termination and close out of RCV surrogate prototyping activities. This includes recovering equipment following FY 2024 FORSCOM Pilot Soldier experimentation, preparing equipment for divestiture from the RCV program, and completing close out activities such as contract closeout, product development transition to the Full System Prototype line of effort, and completing any final activities necessary to conclude SP line of effort objectives and risk reduction efforts. Engineering efforts will be provided by both Government Development Centers, to include Ground Vehicle Systems</p>	26.190	31.781	1.500

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2023	FY 2024	FY 2025
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 to FY 2025 Increase/Decrease Statement: Decrease is due to the conclusion of the SP line of effort including Soldier experimentation, developmental testing and evaluation, and risk reduction activities using legacy surrogate prototype platforms. SP efforts will transition to Rapid Capabilities and Critical Technologies Office (RCCTO) in FY25 to support the HMI effort.				
Title: RCV (L) Surrogate Prototypes (SP) - Refurbishment Description: Refurbishment of Experimental Prototypes or Surrogate Prototypes at the conclusion of developmental testing and Soldier experimentation. Vehicle refurbishment includes scheduled and deferred maintenance as well as prepares the platforms for reliability and capability upgrades needed to support additional developmental testing and Soldier experimentation to solicit feedback on new capabilities, inform doctrine and tactics, techniques, and procedures (TTP) refinement for robotic and autonomous systems (RAS), inform a force design decision, validate user requirements, and aid in determination of SP architectures and technologies ready for incorporation into the FSP LOE. FY 2024 Plans: Refurbishment/Reset of four (4) RCV (L) Surrogate Prototypes. Includes all labor, parts and transportation necessary to refurbish SPs. FY 2024 to FY 2025 Increase/Decrease Statement: Decrease is due to the conclusion of the SP line of effort including Soldier experimentation, developmental testing and evaluation, and risk reduction activities.		5.100	1.244	-
Title: RCV (L) Surrogate Prototypes (SP) - Government Test & Evaluation (T&E) Description: Government Test and Evaluation (T&E) includes Surrogate Prototype (SP) safety testing, developmental testing, and execution of FORSCOM operational pilots to solicit feedback on new capabilities, inform doctrine and tactics, techniques, and procedures (TTP) refinement for robotic and autonomous systems (RAS), inform a force design decision, validate user requirements, and aid in determination of SP architectures and technologies 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 capabilities that are not practical or capable of being fully tested using SP platforms or test facility capabilities. 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)		5.315	13.719	0.300

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>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.</p> <p>FY 2025 Plans: FY 2025 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) Center, Ground Vehicle Systems Center (GVSC), and Army Test and Evaluation Command (ATEC) to complete the FORSCOM Pilot test report and support the completion of developmental test activities for FY 2024 SP product development.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Decrease is due to the conclusion of the SP line of effort, including Soldier experimentation, developmental testing and evaluation, and risk reduction activities. SP efforts will transition to RCCTO in FY25 to support the HMI effort.</p>			
<p>Title: RCV (L) Full System Prototypes (FSP) - Product Development</p> <p>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.</p> <p>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.</p> <p>FY 2025 Plans: FY 2025 Product Development includes contractor development engineering for additional capabilities to be integrated into RCV 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 prototype testing. FY 2025 Product</p>	26.272	2.246	74.058

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2023	FY 2024	FY 2025
<p>Development also includes the conclusion of the full and open competition and the FSP contract award for Phase II where the Government down selects to a single vendor for the prototype build, delivering nine (9) RCV FSPs with options to procure more.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Increase in FY 2025 is due to the award for Phase II in which the Government will select one (1) contractor to develop, produce, and deliver nine (9) RCV Production Representative Prototypes (PRPs) for developmental testing and a POD.</p>				
<p>Title: RCV (L) Full System Prototypes (FSP) - Government Test & Evaluation (T&E)</p> <p>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 platform prototypes, 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 PRPs. Additionally, OT in the form of POD will be completed to evaluate system suitability and effectiveness.</p> <p>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.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Decrease is due to T&E not being planned for FY 2025. T&E is currently scheduled in FY 2024 for test activities evaluating vendors' Phase I Platform Prototypes. T&E is next scheduled for FY 2026 for test activities evaluating the Phase II PRPs.</p>		-	3.069	-
<p>Title: RCV (L) Full System Prototypes (FSP) - Source Selection Evaluation Board (SSEB)</p> <p>Description: Engineering, logistics, product assurance and test, financial management, acquisition, legal, and operations support Selection Evaluation Board (SEB) activities to both select four (4) vendors for prototype build, and down select to a single vendor for PRP prototype builds. SEB expenditures include salaries, training, travel, supplies, facilities, and equipment.</p> <p>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.</p> <p>FY 2025 Plans:</p>		0.600	1.724	0.449

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2023	FY 2024	FY 2025
<p>In FY 2025, a Selection Evaluation Board (SEB) will conclude to down select from the four (4) vendors to a single vendor for continued development and PRP prototype builds. SEB membership will include Government experts in engineering, logistics, product assurance and test, financial management, acquisition, contracting, operations, and law. SEB expenses include salaries, training, travel, supplies, facilities, and equipment.</p> <p>Any mention of SSEB in FY 2024 Plans or prior should be considered SEB.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Decrease in FY2025 is due to decreased efforts from twelve months in FY 2024 to three months in FY 2025. The down select and contract award is planned for Q2 FY 2025.</p>				
<p>Title: Software Acquisition Pathway (SWP) - Capability Release (CR) Development and Integration</p> <p>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, software reliability, and cyber and spectrum resiliency. The SWP program will deliver annual software CRs through the Software System Integrator (SWSI) to both the Surrogate Prototype (SP) and Full System Prototype (FSP) lines of effort within the RCV 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.</p> <p>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.</p> <p>FY 2025 Plans: Deliver CR1 for integration into the ongoing hardware efforts. CR1 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, CR1 will begin to incorporate refactor and re-architecture recommendations from Industry analysis. The SWSI will integrate autonomy software, payload control software, and control station software on the FSP platform prototypes. Development of the RCV SWP CR2 will</p>		5.119	11.724	4.020

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2023	FY 2024	FY 2025
<p>initiate. CR2 will focus on adding additional User Representative prioritized capabilities to further refine DOTMLPF-P and support further Autonomy Vehicle (AV) experimentation.</p> <p>Any mention of CR2 in FY 2024 Plans should be considered CR1.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Decrease due to expected costs of CR1 being less than Minimum Viable Capability Release (MVCR) costs.</p>				
<p>Title: Software Acquisition Pathway (SWP) - Autonomous Mobility Development</p> <p>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 on and off-road terrains. RCV Autonomous Mobility software and hardware capabilities will be successively integrated into future SWP Capability Releases for evaluation within the RCV MTA Rapid Prototyping Surrogate Prototyping (SP) and Full System Prototyping (FSP) lines of effort.</p> <p>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 commercially-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.</p> <p>FY 2025 Plans: Continuing to develop hardware and software in support of autonomous mobility with emphasis on the development of multiple on and off-road use cases that allows for system utility in diverse military environments. The RCV on and off-road autonomous mobility software and hardware will be integrated into commercially-available demonstration vehicles to evaluate the autonomous system development against diverse military on and off-road use cases. Continuous improvement will be made upon safety and cyber resiliency, teleoperations abilities as well as continued development of autonomous mobility navigation. Autonomous mobility system simulations and on and off-road testing will be conducted.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Decrease due to a down select to fewer autonomy vendors and the reduction of scope following an evaluation of commercial autonomy efforts in FY 2024.</p>		18.717	44.206	2.348
<p>Title: Software Acquisition Pathway (SWP) - DevSecOps Pipeline Development, Software Integration Lab (SIL) Support, and Data Management Support</p>		12.120	22.692	1.342

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
<p>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.</p> <p>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.</p> <p>FY 2025 Plans: Continued development of a DevSecOps Data Management Pipeline to enable current and future assessment of RCV Autonomous Mobility and safety architecture software. Military use Operational Design Domain (ODD) descriptions, test cases and test criteria will be incorporated into the RCV DevSecOps Pipeline to allow successful software performance assessment as autonomous mobility capabilities increase. Simulated environments will be developed to test the RCV software, concentrating on performance assessment of off-road capabilities. Leading class industry analysis of RCV autonomous vehicle stacks (focusing 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. 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.</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement:</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604641A / <i>Tactical Unmanned Ground Vehicle (TUGV)</i>	Project (Number/Name) CF5 / <i>Robotic Combat Vehicle (BA5) NGCV-CFT</i>

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2023	FY 2024	FY 2025
Decrease due to existing Other Transaction Authority (OTAs) completing in the beginning of FY 2025 with potential for limited follow-on development.			
Title: RCV Development - Government Program Management	8.542	9.720	8.523
Description: Government Program Management to RCV development programs. Includes salaries, travel, training, 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) demonstrator testing, and oversight of Software Acquisition Pathway (SWP) activities. Includes salaries, training, travel, supplies, facilities, and equipment.			
FY 2025 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 conclusion of the Surrogate Prototype (SP) Line Of Effort (LOE), oversight of Full System Prototype (FSP) prototype testing, and oversight of Software Acquisition Pathway (SWP) activities. Includes salaries, training, travel, supplies, facilities, and equipment.			
FY 2024 to FY 2025 Increase/Decrease Statement: Decrease due to manpower requirement reduction related to the conclusion of the Surrogate Prototype level of effort.			
Accomplishments/Planned Programs Subtotals	107.975	142.125	92.540

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u> <u>Base</u>	<u>FY 2025</u> <u>OCO</u>	<u>FY 2025</u> <u>Total</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>FY 2029</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0604017A: <i>Robotics Development</i>	27.444	3.024	3.039	-	3.039	3.043	3.075	3.109	3.140	0.000	45.874

Remarks
RCV development and Software Acquisition Pathway (SWP) efforts are continuations of efforts from program element 0604017A/Robotics Development, Project CF4: Robotic Combat Vehicle (RCV). FY 2024-2029 funding in program element 0604017A/Robotics Development is not associated with the RCV program.

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

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604641A / <i>Tactical Unmanned Ground Vehicle (TUGV)</i>	Project (Number/Name) CF5 / <i>Robotic Combat Vehicle (BA5) NGCV-CFT</i>
<p>RCV Acquisition Strategy: On 10 February 2022, the Army Acquisition Executive (AAE) approved the execution of RCV Rapid Prototyping program under authorities granted under Section 804 of the 2016 NDAA (PL 114-92). The RCV MTA Rapid Prototyping program will be accomplished in two complementary lines of effort (LOE), Surrogate Prototypes (SP), and Full System Prototypes (FSP).</p> <p>The SP LOE will utilize existing Other Transaction Authority (OTA) task assignment with QinetiQ North America and Textron Systems 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 2023-2024 that include FORSCOM operational pilots to collect Soldier feedback and demonstrate improved capabilities related to autonomous software, system safety, and network capabilities, and integrated architecture validation. 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. SP efforts will transition to RCCTO in FY25 to support the HMI effort. The lessons learned from the HMI effort will feed into FSP development in future years.</p> <p>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 Prototype Operational Demonstration (POD) will be executed to evaluate system suitability and effectiveness.</p> <p>Upon successful completion of the RCV 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 FSPs to selected unit(s) for Doctrine, Organization, Training, Materiel, Leadership and Education, Personnel, Facilities, and Policies (DOTMLPF-P) analysis and integration of Human-Machine Integration formations.</p> <p>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.</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Army												Date: March 2024			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604641A / Tactical Unmanned Ground Vehicle (TUGV)				CF5 / Robotic Combat Vehicle (BA5) NGCV-CFT							
Management Services (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
RCV Program Management	Various	Various : Warren, MI; Various	-	8.542	Nov 2022	9.720	Nov 2023	8.523	Nov 2024	-		8.523	Continuing	Continuing	-
Subtotal			-	8.542		9.720		8.523		-		8.523	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
RCV Surrogate Prototypes (SP) - Product Development	Various	GVSC; Various : Warren, MI; Various	-	26.190	Nov 2022	31.781	Nov 2023	1.500	Oct 2024	-		1.500	0.000	59.471	-
RCV Surrogate Prototypes (SP) - Refurbishment	SS/FFP	QinetiQ North America : Waltham, MA	-	5.100	Feb 2023	1.244	Feb 2024	-		-		-	0.000	6.344	-
RCV Full System Prototypes (FSP) - Product Development	C/FFP	Oshkosh Defense, LLC; General Dynamics Land Systems; Textron Systems Corporation; McQ Inc : Various	-	26.272	Sep 2023	2.246	Apr 2024	74.058	Feb 2025	-		74.058	Continuing	Continuing	-
Software Acquisition Pathway (SWP) - Capability Release (CR) Development and Integration	Various	GVSC; Various, TBD : Warren, MI; Various, TBD	-	5.119	Mar 2023	11.724	Nov 2023	4.020	May 2025	-		4.020	Continuing	Continuing	-
Software Acquisition Pathway (SWP) - Autonomous Mobility Development	SS/FFP	Kodiak; Overland AI; RRAI : Mountain View, CA; TBD	-	18.717	May 2023	44.206	May 2024	2.348	Jan 2025	-		2.348	Continuing	Continuing	-
Software Acquisition Pathway (SWP) - DevSecOps, SIL Support	SS/FFP	Applied Intuition, Scale AI : MountainView, CA; San Fransisco, CA	-	12.120	Mar 2023	22.692	May 2024	1.342	Jan 2025	-		1.342	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Army												Date: March 2024				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 5				PE 0604641A / Tactical Unmanned Ground Vehicle (TUGV)				CF5 / Robotic Combat Vehicle (BA5) NGCV-CFT								
Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
and Data Management Support																
Subtotal			-	93.518		113.893		83.268		-		83.268	Continuing	Continuing	N/A	
Support (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
RCV Full System Prototypes (FSP) - Selection Evaluation Board (SEB)	MIPR	Various : Warren, MI	-	0.600	Jul 2023	1.724	Nov 2023	0.449	Oct 2024	-		0.449	0.000	2.773	-	
Subtotal			-	0.600		1.724		0.449		-		0.449	0.000	2.773	N/A	
Test and Evaluation (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total				
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract	
RCV Surrogate Prototypes (SP) - Government Test & Evaluation (T&E)	MIPR	Various : Various	-	5.315	Jan 2023	13.719	Jan 2024	0.300	Oct 2024	-		0.300	0.000	19.334	-	
RCV Full System Prototypes (FSP) - Government Test & Evaluation (T&E)	MIPR	ATEC : Aberdeen, MD	-	-		3.069	Oct 2023	-		-		-	Continuing	Continuing	-	
Subtotal			-	5.315		16.788		0.300		-		0.300	Continuing	Continuing	N/A	
Project Cost Totals			-	107.975		142.125		92.540		-		92.540	Continuing	Continuing	N/A	
Remarks																

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Army			Date: March 2024		
Appropriation/Budget Activity 2040 / 5		R-1 Program Element (Number/Name) PE 0604641A / <i>Tactical Unmanned Ground Vehicle (TUGV)</i>		Project (Number/Name) CF5 / <i>Robotic Combat Vehicle (BA5) NGCV-CFT</i>	

Event Name	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Surrogate Prototype (SP) Design/Build	[Bar]																											
	SP Design/Build																											
Surrogate Prototype (SP) Design/Upgrade/Test #2					[Bar]																							
					SP Design/Upgrade/Test #2																							
Surrogate Prototype (SP) FORSCOM Pilots					[Bar]																							
					SP FORSCOM Pilots																							
Robotic Combat Vehicle (RCV) Knowledge Point (KP) #1					▲ 3																							
					RCV(L) KP #1																							
Robotic Combat Vehicle (RCV) Knowledge Point (KP) #2									▲ 7																			
									RCV(L) KP #2																			
Full System Prototype (FSP) Solicitation Development	[Bar]																											
	FSP Solicitation Development																											
Full System Prototype (FSP) Request for Prototype Propos...	▲ 2																											
	FSP RPP Release Phase I																											
Full System Prototype (FSP) Selection Evaluation Board (...)	[Bar]																											
	FSP SEB Phase I																											
Full System Prototype (FSP) Prototype Contract Award (CA...					▲ 4																							
					FSP Prototype CA Phase I																							
Full System Prototype (FSP) Design/Build Phase I					[Bar]																							
					FSP Design/Build Phase I																							
Full System Prototype (FSP) Test Phase I									[Bar]																			
									FSP Test Phase I																			
Full System Prototype (FSP) Request for Prototype Propos...					▲ 6																							
					FSP RPP Release Phase II																							
Full System Prototype (FSP) Selection Evaluation Board (...)					[Bar]																							
					FSP SEB Phase II																							

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604641A / <i>Tactical Unmanned Ground Vehicle (TUGV)</i>	Project (Number/Name) CF5 / <i>Robotic Combat Vehicle (BA5) NGCV-CFT</i>

Event Name	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029					
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4		
Full System Prototype (FSP) Contract Award Phase II									8 ▲ FSP CA Phase II																					
Full System Prototype (FSP) Design/Build Phase II									FSP Design/Build Phase II																					
Full System Prototype (FSP) Test Phase II									FSP Test Phase II																					
RCV Outcome Determination (OD)																	11 ▲ RCV(L) OD													
Software Acquisition Pathway (SWP) Planning Phase																	SWP Planning Phase													
Software Acquisition Pathway (SWP) Execution Phase																	1 ▲ SWP Execution Phase													
Software Acquisition Pathway (SWP) Software (SW) Design/...																														
Software Acquisition Pathway (SWP) Minimum Viability Cap...					5 ▲ SWP MVCR					9 ▲ SWP CR #1					10 ▲ SWP CR #2					12 ▲ SWP CR #3					13 ▲ SWP CR #4					14 ▲ SWP CR #5
Software Acquisition Pathway (SWP) Capability Release (C...																														
Software Acquisition Pathway (SWP) Capability Release (C...																														
Software Acquisition Pathway (SWP) Capability Release (C...																														
Software Acquisition Pathway (SWP) Capability Release (C...																														

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Army		Date: March 2024
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604641A / <i>Tactical Unmanned Ground Vehicle (TUGV)</i>	Project (Number/Name) CF5 / <i>Robotic Combat Vehicle (BA5) NGCV-CFT</i>

Schedule Details

Events	Start		End	
	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 #2	2	2023	4	2024
Surrogate Prototype (SP) FORSCOM Pilots	4	2023	4	2024
Robotic Combat Vehicle (RCV) Knowledge Point (KP) #1	4	2023	4	2023
Robotic Combat Vehicle (RCV) Knowledge Point (KP) #2	4	2024	4	2024
Full System Prototype (FSP) Solicitation Development	1	2023	3	2023
Full System Prototype (FSP) Request for Prototype Proposal (RPP) Release Phase I	2	2023	2	2023
Full System Prototype (FSP) Selection Evaluation Board (SEB) Phase I	3	2023	4	2023
Full System Prototype (FSP) Prototype Contract Award (CA) Phase I	4	2023	4	2023
Full System Prototype (FSP) Design/Build Phase I	1	2024	4	2024
Full System Prototype (FSP) Test Phase I	4	2024	1	2025
Full System Prototype (FSP) Request for Prototype Proposal (RPP) Release Phase II	3	2024	3	2024
Full System Prototype (FSP) Selection Evaluation Board (SEB) Phase II	4	2024	1	2025
Full System Prototype (FSP) Contract Award Phase II	2	2025	2	2025
Full System Prototype (FSP) Design/Build Phase II	2	2025	2	2026
Full System Prototype (FSP) Test Phase II	2	2026	2	2027

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Army			Date: March 2024	
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Events	Start		End	
	Quarter	Year	Quarter	Year
RCV Outcome Determination (OD)	2	2027	2	2027
Software Acquisition Pathway (SWP) Planning Phase	3	2021	2	2023
Software Acquisition Pathway (SWP) Execution Phase	2	2023	2	2023
Software Acquisition Pathway (SWP) Software (SW) Design/Build/Test	4	2022	4	2029
Software Acquisition Pathway (SWP) Minimum Viability Capability Release (MVCR)	3	2024	3	2024
Software Acquisition Pathway (SWP) Capability Release (CR) #1	3	2025	3	2025
Software Acquisition Pathway (SWP) Capability Release (CR) #2	1	2026	1	2026
Software Acquisition Pathway (SWP) Capability Release (CR) #3	3	2027	3	2027
Software Acquisition Pathway (SWP) Capability Release (CR) #4	3	2028	3	2028
Software Acquisition Pathway (SWP) Capability Release (CR) #5	3	2029	3	2029