Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army											Date: February 2018	
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0604017A / *Robotics Development*							
COST ($ in Millions)	**Prior Years**	**FY 2017**	**FY 2018**	**FY 2019 Base**	**FY 2019 OCO**	**FY 2019 Total**	**FY 2020**	**FY 2021**	**FY 2022**	**FY 2023**	**Cost To Complete**	**Total Cost**
Total Program Element	-	0.000	39.608	95.660	-	95.660	15.677	16.177	10.718	6.321	0.000	184.161
FD2: *Soldier Robotics Systems*	-	0.000	1.512	2.107	-	2.107	2.826	3.328	3.306	3.357	0.000	16.436
FD3: *Battery Modernization & Interface Standardization*	-	0.000	0.847	0.849	-	0.849	0.000	0.000	0.000	0.000	0.000	1.696
FD9: *Robotics Systems*	-	0.000	37.249	92.704	-	92.704	12.851	12.849	7.412	2.964	0.000	166.029

Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE604017A Robotics Development, Project FD9 Robotics Systems.

A. Mission Description and Budget Item Justification

FD2: Soldier Robotics Systems for Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for robotic systems that are transported by vehicle and maneuver under their own power.

FY 2019 RDTE funds enable support to capability development of the Common Robotics System (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), Common Robotic System (Universal Controller) (CRS(UC)), Common Robotic System (Communication Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intelligence) (CRS(MS/AI)), Render Safe - Sets, Kits and Outfits (RS-SKO), Enhanced Robotics Payload (ERP), Chemical, Biological, Radiological, and Nuclear (CBRN); small, pocket sized, airborne sensors, etc. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision).

FY 2019 RDTE funding also supports the Soldier Exoskeleton. The Exoskeleton amplifies the strength, endurance, and mobility of its operator, the Soldier. The Soldier Exoskeleton capabilities provide the Army with a deployable, personal tactical performance enhancer. Soldier Exoskeleton variants will be capable of operating in a wide range of environments, enhancing combat operations.

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army* / BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*

FD3: The Battery Modernization & Interface Standardization (BMIS) program was established to help bring greater power efficiency and effectiveness to the dismounted Soldier, and to reduce the proliferation of proprietary batteries across the Army. BMIS will develop the Army Standard Family of Batteries (SFoB), a central acquisition management authority, and reduce 38 Communications-Electronics (C-E) battery types, currently in use, to just three. Battery standardization and policy enforcement will support Operational Readiness at a reduced cost to the Army while maintaining configuration management, life cycle support, safety standards, and technological upgrades.

FD9: Robotics Systems for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits.

FY 2019 RDTE funds enable support to capability development of Tactical Wheeled Vehicle - Leader Follower (TWV-LF), Automated Convoy Operations (ACO), Dismounted Engineer Mobility System (DEMS), modular mission payloads, Route Clearance & Interrogation System (RCIS) Type II, Robotic Combat Vehicle - Robotic Wingman (RCV-RW), etc. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision).

FY 2019 RDTE Product Manager Applique and Large Unmanned Ground Systems funding supports Leader Follower and Robotic Combat Vehicle program transitions from Technology Demonstrations to Program of Record through Modeling and Simulation (M&S) development and initial prototype testing. This will stress the autonomy systems and ultimately reduce Program of Record testing requirements, technical risks, and costs through studies and validated simulations.

FD9: Tactical Wheeled Vehicle - Leader Follower (TWV-LF) will provide a limited autonomous vehicle capability to the Palletized Load System (PLS) A1. TWV-LF will provide capability for a manned Leader vehicle with up to seven (7) unmanned Follower vehicles. Initial efforts by the United States Army Tank Automotive Research, Development and Engineering Center (TARDEC) will control up to three (3) optionally manned Follower vehicles with a designated Leader vehicle. The manned Leader vehicle wirelessly provides direction and speed guidance to the Follower vehicles to follow the Leader vehicle with no driver input or unmanned. The primary purposes for Leader Follower are to improve Force Protection and increase Logistics Throughput. Funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology.

FY 2019 RDTE Leader Follower funding will continue the fabrication and testing of up to 140 Leader Follower PLS A1 vehicles for user operational assessment in FORSCOM identified units. Systems will go through an Army Test and Evaluation Command (ATEC) safety assessment and plan for Urgent Materiel Release based on

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
Appropriation/Budget Activity 2040: *Research, Development, Test & Evaluation, Army I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0604017A *I Robotics Development*

the signed Leader Follower Directed Requirement. The issued Leader Follower systems will go through a 12 month Operational Technology Demonstration on CONUS installations to provide user feedback and assessment on the truck performance to inform a future milestone decision for a follow on Leader Follower program of record.

B. Program Change Summary ($ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.000	39.608	69.070	-	69.070
Current President's Budget	0.000	39.608	95.660	-	95.660
Total Adjustments	0.000	0.000	26.590	-	26.590
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	26.590	-	26.590

Change Summary Explanation

FY2019 increase in the amount of $26.6 million supports efforts related to Tactical Wheeled Vehicle - Leader Follower and Robotic Combat Vehicle Experimental Unit Prototypes.

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems. Funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE604017A Robotics Development, Project FD9 Robotics Systems.

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / *Robotics Development*	Project (Number/Name) FD2 / *Soldier Robotics Systems*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FD2: *Soldier Robotics Systems*	-	0.000	1.512	2.107	-	2.107	2.826	3.328	3.306	3.357	0.000	16.436
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE604017A Robotics Development, Project FD9 Robotics Systems.

A. Mission Description and Budget Item Justification

Soldier Robotics Systems for Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for robotic systems that are transported by vehicle and maneuver under their own power.

FY 2019 RDTE funds enable support to capability development of the Common Robotics System (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), Common Robotic System (Universal Controller) (CRS(UC)), Common Robotic System (Communication Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intelligence) (CRS(MS/AI)), Render Safe - Sets, Kits and Outfits (RS-SKO), Enhanced Robotics Payload (ERP), Chemical, Biological, Radiological, and Nuclear (CBRN); small, pocket sized, airborne sensors, etc. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision).

FY 2019 RDTE funding also supports the Soldier Exoskeleton. The Exoskeleton amplifies the strength, endurance, and mobility of its operator, the Soldier. The Soldier Exoskeleton capabilities provide the Army with a deployable, personal tactical performance enhancer. Soldier Exoskeleton variants will be capable of operating in a wide range of environments, enhancing combat operations.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Soldier Borne Sensor (SBS) / Exoskeleton	-	0.344	1.534

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD2 / *Soldier Robotics Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: The SBS provides the small unit a "quick look" capability with improved Situational Awareness of routes, buildings, tunnels, obstacles blocking line of sight, and similar concealed threat locations. The budget activity enables payload improvements including camera enhancements, target identification algorithms, display/controller improvements and user notifications for specific items of interest. ***FY 2018 Plans:*** Develop initial program cost estimates, conduct market surveys, perform Analyses of Alternatives (AoA), and initiate Request for Proposal (RFP) work for incorporation in the CDD/CPD. ***FY 2019 Plans:*** Provide for the capability of transitioning and continuing development of Industry and DoD Exoskeleton efforts to augment the warfighter strengths and human performance to reduce Soldier load. Provide for the integration and evaluation of potential exoskeleton solutions and completion of initial technical and programmatic data to inform capability requirement generation and subsequent materiel development decision. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Reduced funding cost in FY 2019 from FY 2018 requirements.			
Title: UGV Soldier Robotics Development	-	1.168	0.573
Description: Soldier Robotics Development is designed to facilitate the transition of robotics and autonomous systems technology into Programs of Record. It informs the acquisition process beforehand allowing the Maneuver Center of Excellence, Sustainment Center of Excellence, Maneuver Support Center of Excellence, and the Cyber Center of Excellence the ability to make integration decisions and affordability trades while writing requirements. UGV Robotics Development will fund Common Robotics System (Vehicle), Common Robotic System (Light Reconnaissance) Robot (LRR) (CRS(LR)), Common Robotic System (Universal Controller) (CRS(UC)), Common Robotic System (Communication Link) (CRS(CL)), Common Robotic System (Mission Command/Artificial Intelligence) (CRS(MS/AI)), Render Safe - Sets, Kits and Outfits (RS-SKO), Enhanced Robotics Payload (ERP), Chemical, Biological, Radiological, and Nuclear (CBRN); small, pocket sized, airborne sensors, etc. ***FY 2018 Plans:*** Develop initial program cost estimates, conduct market surveys, perform Analyses of Alternatives (AoA), and initiate Request for Proposal (RFP) work for incorporation into the CDD/CPD. incorporation into the CDD/CPD. ***FY 2019 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD2 / *Soldier Robotics Systems*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Develop initial program cost estimates, conduct market surveys, perform/update Analysis of Alternatives (AoA) or letter of sufficiency, perform risk reduction activities and maturation technology efforts, initiate milestone documentation and prepare Request for Proposal (RFP). ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Reduced funding due to requirements for CRS(H) being moved to alternate funding line, 655053 FB9.			
Accomplishments/Planned Programs Subtotals	-	1.512	2.107

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• FB8: *FB8 - Soldier Borne Sensor (SBS) (PE 06050553A)*	-	2.289	3.506	-	3.506	1.530	1.227	2.266	3.591	Continuing	Continuing
• W63798: *Soldier Borne Sensor (SBS) (SSN W63798)*	-	3.000	11.824	-	11.824	15.531	18.454	3.823	11.866	Continuing	Continuing

Remarks

Pre-acquisition program activities funded by this line transition to a separate Program Element and Project prior to their first program acquisition Milestone (B or C).

D. Acquisition Strategy

Soldier Robotics Systems will utilize a Robotics Development funding for internal systems engineering, requirements and architecture analysis, AoAs and Technology Readiness Assessments with the PM's S&T partners, and studies & analysis in support of program initiation with industry.

Initial Exoskeleton efforts will focus on prototyping emerging Industry and DoD Exoskeleton initiatives, assessing their performance through demonstrations and Soldier feedback that will inform capability requirement definition and subsequent materiel develop decision. These initiatives may range from Commercial-Off-The Shelf (COTS) solutions to developmental efforts.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / *Robotics Development*	Project (Number/Name) FD2 / *Soldier Robotics Systems*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UGV Program Management Support	MIPR	Multiple : Multiple	-	-		0.644	Mar 2018	0.045	Oct 2018	-		0.045	0.000	0.689	Continuing
SBS and Exoskeleton Program Management Support	Various	Various : Multiple	-	-		0.344	Mar 2018	1.534	Mar 2019	-		1.534	0.000	1.878	Continuing
		Subtotal	-	-		0.988		1.579		-		1.579	0.000	2.567	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
AoA CRS(H)	MIPR	Multiple : Various	-	-		0.175	Jun 2018	-		-		-	0.000	0.175	-
AoA ERP	MIPR	Multiple : Various	-	-		0.175	Jun 2018	0.176	Oct 2018	-		0.176	0.000	0.351	-
AoA CBRN	MIPR	Multiple : Various	-	-		0.174	Jun 2018	0.176	Oct 2018	-		0.176	0.000	0.350	-
AoA CRS(LR)	MIPR	Multiple : Various	-	-		-		0.176	Oct 2018	-		0.176	0.000	0.176	-
		Subtotal	-	-		0.524		0.528		-		0.528	0.000	1.052	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		1.512		2.107		-		2.107	0.000	3.619	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD2 / *Soldier Robotics Systems*

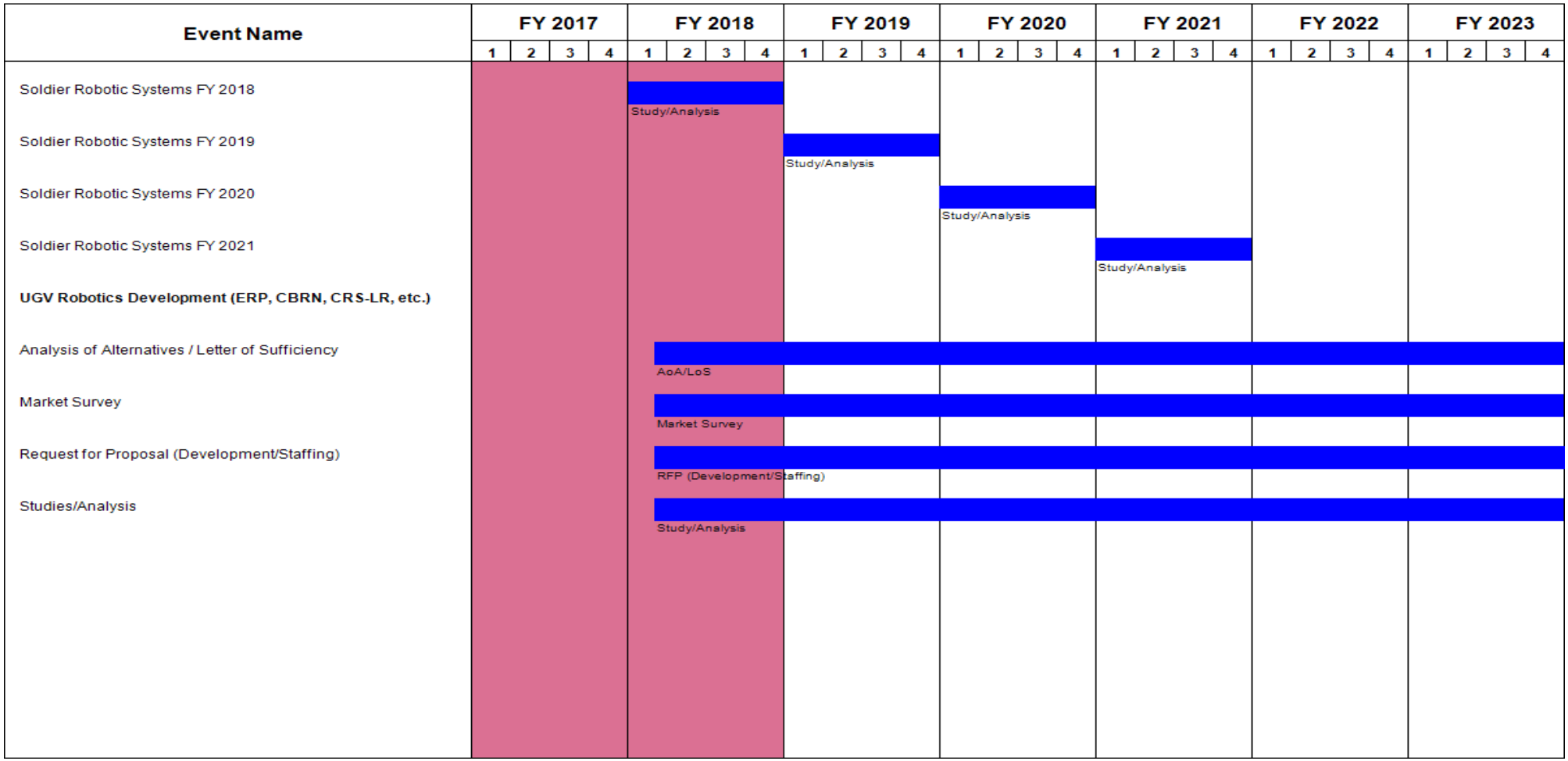

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD2 / *Soldier Robotics Systems*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Soldier Robotic Systems FY 2018	1	2018	4	2018
Soldier Robotic Systems FY 2019	1	2019	4	2019
Soldier Robotic Systems FY 2020	1	2020	4	2020
Soldier Robotic Systems FY 2021	1	2021	4	2021
UGV Robotics Development (ERP, CBRN, CRS-LR, etc.)	1	2018	4	2023
Analysis of Alternatives / Letter of Sufficiency	1	2018	4	2023
Market Survey	1	2018	4	2023
Request for Proposal (Development/Staffing)	1	2018	2	2024
Studies/Analysis	1	2018	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604017A / *Robotics Development*	Project (Number/Name) FD3 / *Battery Modernization & Interface Standardization*	

COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FD3: *Battery Modernization & Interface Standardization*	-	0.000	0.847	0.849	-	0.849	0.000	0.000	0.000	0.000	0.000	1.696
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE604017A Robotics Development, Project FD9 Robotics Systems.

A. Mission Description and Budget Item Justification

The Battery Modernization & Interface Standardization (BMIS) program was established to help bring greater power efficiency and effectiveness to the dismounted Soldier, and to reduce the proliferation of proprietary batteries across the Army. BMIS will develop the Army Standard Family of Batteries (SFoB), a central acquisition management authority, and reduce 38 Communications-Electronics (C-E) battery types, currently in use, to just three. Expand to include batteries for generators and hybrids, robotics, vehicles, and low density/usage systems. Battery standardization and policy enforcement will support Operational Readiness at a reduced cost to the Army while maintaining configuration management, life cycle support, safety standards, and technological upgrades.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Acquisition Strategy	-	0.212	0.210
Description: Complete advanced development pre-milestone B assessments and analysis. ***FY 2018 Plans:*** Complete advanced development pre-milestone B technology assessments and analysis. Conduct C-E battery market research/ Requests for Information (RFI). Develop Acquisition Strategy and Requests for Proposals (RFPs). ***FY 2019 Plans:*** Finalize advanced development technology assessments and analysis. Conduct C-E battery analysis of market research/ Requests for Information (RFI). Develop Acquisition Strategy for the BMIS program. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY19 funding to finalize advanced development technology assessments and analysis in support of the Acquisition Strategy for the BMIS program increased slightly from FY18.			
Title: BMIS Standard Family of Batteries (SFoB) Design	-	0.635	0.639

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD3 / *Battery Modernization & Interface Standardization*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: Finalize research and complete assessment of technology and portfolios. Once the SFoB has been established, maintenance and updates will be made as technology advances. ***FY 2018 Plans:*** Assess the current C-E Battery Portfolio. Complete the C-E Battery technology assessment. Determine a solid and integrated core Standard Family of Batteries that will align with the BMIS mission. Prepare solicitation for development of advanced prototype requirements for C-E batteries. ***FY 2019 Plans:*** Finalize the C-E Battery technology assessment. Determine a solid and integrated core Standard Family of Batteries to include batteries for generators and hybrids, robotics, vehicles, and low density/usage systems. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY19 funding to finalize the C-E Battery technology assessment and determine a solid and integrated core Standard Family of Batteries to include batteries for generators and hybrids, robotics, vehicles, and low density/usage systems increased slightly over FY18. .			
Accomplishments/Planned Programs Subtotals	-	0.847	0.849

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

BMIS will expand the Army Standard Family of Batteries to include C-E, batteries for generators and hybrids, robotics, vehicles, and low density/usage systems. BMIS will continue to investigate technology advancements of batteries for these systems, and provide information and recommendations to applicable Program Managers.

E. Performance Metrics

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD3 / *Battery Modernization & Interface Standardization*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
BMIS Design	Various	Various : Fort Belvoir	-	-		0.269		0.272		-		0.272	0.000	0.541	-
		Subtotal	-	-		0.269		0.272		-		0.272	0.000	0.541	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
BMIS SFoB Prototype Development	Various	Various : Fort Belvoir, VA	-	-		0.366		0.371		-		0.371	0.000	0.737	-
		Subtotal	-	-		0.366		0.371		-		0.371	0.000	0.737	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
BMIS Program Support	Various	Various : Fort Belvoir	-	-		0.212		0.206		-		0.206	0.000	0.418	-
		Subtotal	-	-		0.212		0.206		-		0.206	0.000	0.418	N/A

	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		0.847		0.849		-		0.849	0.000	1.696	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD3 / *Battery Modernization & Interface Standardization*

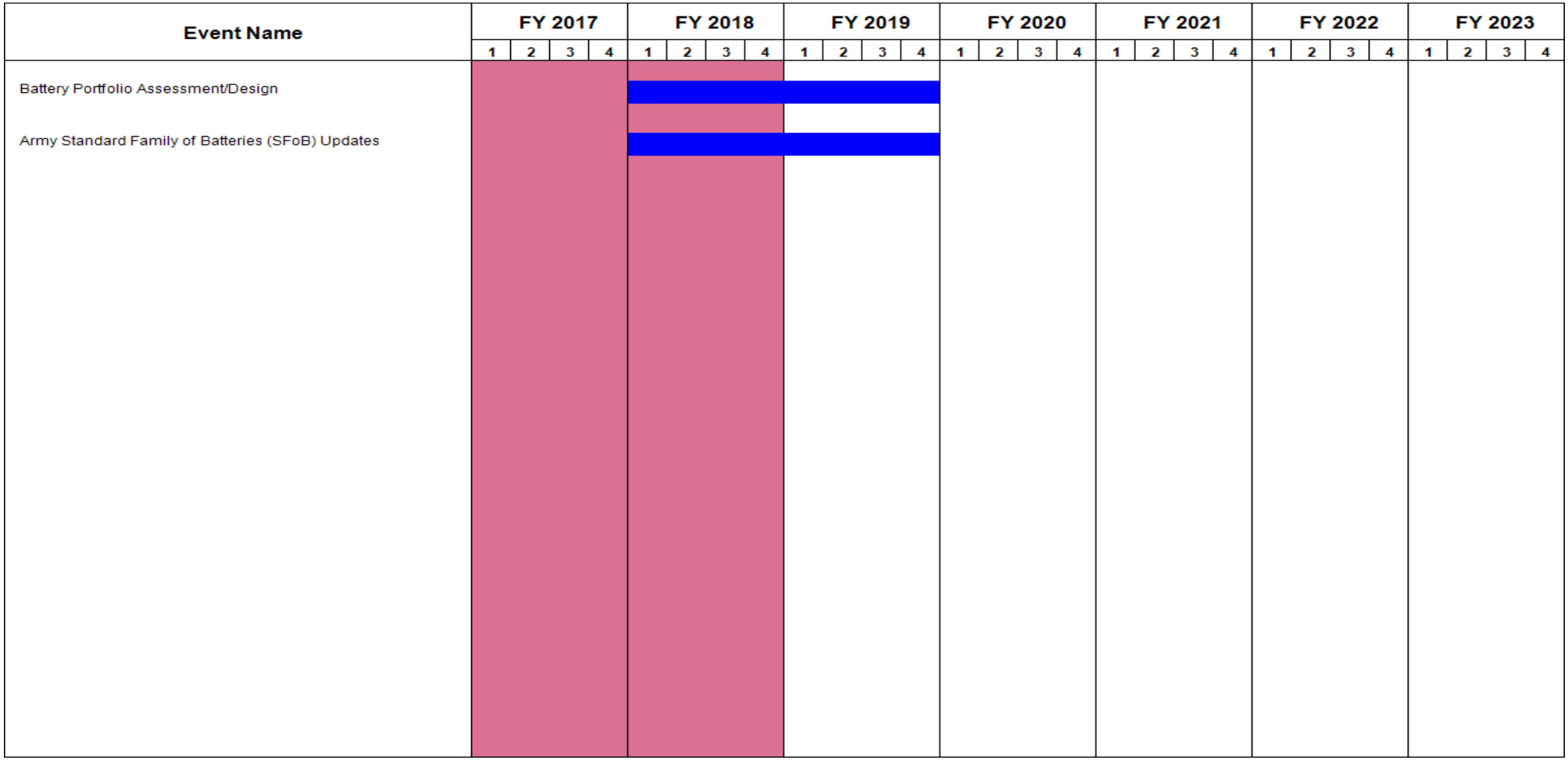

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD3 / *Battery Modernization & Interface Standardization*

Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
Battery Portfolio Assessment/Design	1	2018	4	2019
Army Standard Family of Batteries (SFoB) Updates	1	2018	4	2019

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army			Date: February 2018
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COST ($ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
FD9: *Robotics Systems*	-	0.000	37.249	92.704	-	92.704	12.851	12.849	7.412	2.964	0.000	166.029
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

In FY 2018 funding for Unmanned Ground Vehicles (UGV) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicle, Project DV7 Small Unmanned Ground Vehicle to PE 0604017A Robotics Development, Project FD2 Soldier Robotics Systems, and funding for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) transitioned from PE 0604641A Tactical Unmanned Ground Vehicles, Project DV7 Small Unmanned Ground Vehicle to PE604017A Robotics Development, Project FD9 Robotics Systems.

A. Mission Description and Budget Item Justification

Robotics Systems for Applique and Large Unmanned Ground Systems (ALUGS) Robotics Development (RD) improves robotic and autonomous program acquisition schedules by supporting the development of integrated and synchronized capability documents (e.g. JCIDS, Department Directed, etc.) and by maturing / transitioning technology. Activities include studies, assessments, and document development such as Technology Readiness Levels, Manufacturing Readiness Levels, Analysis of Alternatives / Letter of Sufficiency determinations, draft acquisition documents, and draft contract documents. Efforts include robotics and autonomous systems technology maturation / transition from Science & Technology (S&T) projects and Robotic Enhancement Program (REP) initiatives, Milestone Decision Documentation (MDD), and activities leading up to formal program initiation at Milestone B or C. The pre-acquisition activities conducted under this line intend to reduce acquisition cost, schedule, and performance risk by conducting market surveys, technical risk assessments, developing performance specifications, scopes of work, acquisition strategies, systems engineering plans, test and evaluation master plans, lifecycle sustainment plans, engaging in early test planning, and prototype development activities. This line is for large robotic systems that are transported by vehicle, maneuver under their own power, or are installed as robotic applique kits.

FY 2019 RDTE funds enable support to capability development of Tactical Wheeled Vehicle - Leader Follower (TWV-LF), Automated Convoy Operations (ACO), Dismounted Engineer Mobility System (DEMS), modular mission payloads, Route Clearance & Interrogation System (RCIS) Type II, Robotic Combat Vehicle - Robotic Wingman (RCV-RW), etc. Funds prepare these capabilities for entrance into the Defense Acquisition System (i.e. Milestone decision).

FY 2019 RDTE Product Manager Applique and Large Unmanned Ground Systems funding supports Leader Follower and Robotic Combat Vehicle program transitions from Technology Demonstrations to Program of Record through Modeling and Simulation (M&S) development and initial prototype testing. This will stress the autonomy systems and ultimately reduce Program of Record testing requirements, technical risks, and costs through studies and validated simulations.

Tactical Wheeled Vehicle - Leader Follower (TWV-LF) will provide a limited autonomous vehicle capability to the Palletized Load System (PLS) A1. TWV-LF will provide capability for a manned Leader vehicle with up to seven (7) unmanned Follower vehicles. Initial efforts by the United States Army Tank Automotive Research, Development and Engineering Center (TARDEC) will control up to three (3) optionally manned Follower vehicles with a designated Leader vehicle. The manned Leader vehicle wirelessly provides direction and speed guidance to the Follower vehicles to follow the Leader vehicle with no driver input or unmanned. The primary purposes for Leader Follower are to improve Force Protection and increase Logistics Throughput. Funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology.

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FY 2019 Leader Follower funding will continue the fabrication and testing of up to 140 Leader Follower PLS A1 vehicles for user operational assessment in FORSCOM identified units. Systems will go through an Army Test and Evaluation Command (ATEC) safety assessment and plan for Urgent Materiel Release based on the signed Leader Follower Directed Requirement. The issued Leader Follower systems will go through a 12 month Operational Technology Demonstration on CONUS installations to provide user feedback and assessment on the truck performance to inform a future milestone decision for a follow on Leader Follower program of record.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Title: Tactical Wheeled Vehicle - Leader Follower (TWV-LF) - RD for PdM Applique & Large Unmanned Ground Systems (ALUGS) and RCIS Type II	-	6.264	7.002

Description: Tactical Wheeled Vehicle (TWV) Leader Follower (LF) Program in PdM Applique & Large Unmanned Ground Systems (ALUGS) builds upon the Tank Automotive Research Development & Engineering Center (TARDEC) Expedient Leader Follower (ELF) Operational Technology Demonstration (OTD) to provide a limited automation capability to the Palletized Load System (PLS) A1. Current PdM efforts will lay the groundwork for future Program of Record (PoR) capability, expanding the TARDEC efforts to include up to seven (7) unmanned Follower vehicles. Funding will support cost, schedule and performance risk reduction efforts to include Capabilities Document input, close monitoring of ELF OTD activities that feed cost estimates, capture technical and test data, provide test support, develop Modeling and Simulation (M&S) use cases, and develop a Software Integration Lab (SIL).

FY 2018 Plans:
Funding supports attaining Recapitalized Palletized Load System (PLS) vehicles in an A1 configuration for test assets in support of the TARDEC Tactical Wheeled Vehicle - Leader Follower (TWV LF) Excursion applique kit purchase and install on these test vehicles; plus it funds follow on Program of Record technology insertions, technology transition and testing.

M&S development and Initial prototype testing will refine the system performance to meet required leader follower system capabilities. Development of a Software Integration Lab (SIL), in addition to Modeling and Simulation (M&S) efforts that will stress the TWV-LF systems and ultimately reduce program of record testing requirements and costs through validated simulations.

FY 2019 Plans:
FY19 funding will support the capability development of incremental technology insertions for Program of Records (PoR), technology transitions, testing, and milestone document preparation. Modeling and Simulation (M&S) development and initial prototype testing will refine the system performance to meet required Tactical Wheeled Vehicle- Leader Follower (TWV-LF) system capabilities. Development of a TWV-LF Software Integration Lab (SIL), in addition to M&S efforts, will stress the TWV-LF systems and ultimately reduce Program of Record testing requirements, technical risks and costs through validated simulations.

Supports capability development of RCIS Type II, Dismounted Engineer Mobility System (DEMS), and other emerging programs.

FY 2018 to FY 2019 Increase/Decrease Statement:

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
FY19 funding increase supports continued Modeling and Simulation and RCIS Type II efforts.			
Title: Tactical Wheeled Vehicle - Leader Follower - Tank Automotive Research Development & Engineering Center (TARDEC) Tech Demo	-	30.000	44.500
Description: Tactical Wheeled Vehicle - Leader Follower (TWV-LF) provides a limited autonomous vehicle software and applique kit to ten (10) ALUGS test Palletized Load System (PLS) A1s. For the TARDEC Tech Demo, the applique kit provides a designated manned Leader vehicle which leads a line of three (3) optionally manned Follower vehicles. The Leader vehicle wirelessly provides directional and speed guidance to the Follower vehicles to follow the Leader vehicle with no driver input or unmanned. The primary purposes for Leader Follower is to improve Force Protection and increase logistics throughput. Funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology. The Army will build, and test prototype systems for safety release, Soldier use, and further technology maturation. ***FY 2018 Plans:*** FY 2018 funding allows the maturation and build of ten (10) Applique initial prototype Tactical Wheeled Vehicle - Leader Follower systems for testing and safety assessment, applied to the ALUGS acquired ten (10) PLS A1 test vehicles. The prototypes will integrate a by-wire kit to the existing tactical vehicle to enable remote operation of steering, braking, throttle control and other functions. An autonomy kit will also enable the platforms to operate in leader/follower mode by providing sensor information and control algorithms to control the by-wire kit. M&S development and Initial prototype testing will refine the system performance to meet required Tactical Wheeled Vehicle Leader Follower system capabilities. In addition, the funding initiates long lead item purchases for up to one hundred and forty (140) Applique systems for user operational assessment, testing, and development planned in FY19 and FY20 on additional PLS trucks in FORSCOM identified units. ***FY 2019 Plans:*** FY 2019 funding will continue the fabrication and testing of up to 140 Leader Follower PLS A1 vehicles for user operational assessment in FORSCOM identified units. Systems will go through an Army Test and Evaluation Command (ATEC) safety assessment and plan for Urgent Materiel Release based on the signed Leader Follower Directed Requirement. The issued Leader Follower systems will go through a 12 month Operational Technology Demonstration on CONUS installations to provide user feedback and assessment on the truck performance to inform a future milestone decision for a follow on Leader Follower program of record. Funding supports Robotic Combat Vehicle - Robotic Wingman (RCV-RW) Joint Capabilities Technology Demonstration (JCTD). ***FY 2018 to FY 2019 Increase/Decrease Statement:*** FY19 increase in funding supports the installation of Leader Follower (LF) capability into additional trucks, provides for safety testing of the original 10 system installations and funds 12 months of Operational Technology Demonstration.			
Title: Robotic Combat Vehicle - Robotic Wingman (RCV-RW)/Automated Convoy Operations (ACO)	-	0.985	2.298

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B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
Description: Robotic Combat Vehicle (RCV) Robotic Wingman (RW)/ Automated Convoy Operations (ACO). RCV-RW is an automated ground combat vehicle system controlled by a command and control vehicle in close proximity and has a three year Science and Technology (S&T) sponsored Joint Capabilities Technology Demonstration (JCTD) starting in FY17. Automated Convoy Operations (ACO) is an advanced modular kit made of sensors and vehicle by-wire control hardware and software, designed to retrofit robotic capabilities onto both medium and heavy legacy Tactical Wheeled Vehicle Fleets. Robotics Development funding helps transition RCV-RW/ACO from S&T projects/demonstrations into program of record phases. ***FY 2018 Plans:*** FY 2018 funding supports Systems Engineering, Requirements, Cost Analysis, and Technology Transition Plans. ***FY 2019 Plans:*** Funding continues to support Systems Engineering, Requirements, Cost Analysis and Technology Transition Plans, Software Integration Lab (SIL), and Robotic Combat Vehicle - Robotic Wingman (RCV-RW) Joint Capabilities Technology Demonstration (JCTD) transition to Program of Record. This will include cost, schedule and performance risk reduction efforts (e.g. M&S environment development). Funding also supports Squad Multipurpose Equipment Transport (SMET) Modular Mission Payloads (MMP) and Automation Concept Development. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding increased in FY19 to support increased M&S environment capability and support for Robotic Combat Vehicle-Robotic Wingman Joint Capability Technical Demonstration (JCTD).			
Title: Robotic Combat Vehicle ? Experimental Unit Prototypes	-	-	38.904
Description: Robotic Combat Vehicle (RCV) Experimental Unit Prototyping effort will produce purpose built unmanned combat vehicle prototypes with the purpose of creating an experimental unit that Soldiers will use to create new Concepts of Operations (CONOPS), and new requirements for unmanned combat vehicles to support Army Modernization priorities. Effort will leverage a parallel approach to promote multiple industry partners to provide innovative, purpose built unmanned platforms and lethality solutions and conduct a technology rodeo in FY20 of available options. Most promising options will be down-selected to one or potentially more solutions to create a company?s worth (14 RCV platforms with 7 control vehicles) for a 12 month long user evaluation and experimentation starting at the end of FY22. In order to accelerate user involvement with RCV platform capabilities, a parallel risk reduction effort will rapidly prototype surrogate RCV platform using M113 platforms to start initial user evaluations on the surrogate platforms through an Advanced Technology Demonstration (ATD) starting at the end of FY20. Lessons learned from the risk reduction effort will inform development of the purpose built RCV platforms as well as inform the S&T investment to help close gaps identified in unmanned vehicle performance. ***FY 2019 Plans:***			

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018
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B. Accomplishments/Planned Programs ($ in Millions)	FY 2017	FY 2018	FY 2019
RCV Risk Reduction effort will install by-wire kits onto M113 vehicles to enable them to be operated remotely. Platforms will be completed by the end of FY19 for integration with autonomy package and follow on shake out testing. The RCV Experimental Unit Prototyping effort will award multiple contracts to industry partners to develop mobility platform demonstrators, remote lethality systems and aided target recognition systems that are high risk subsystems for the RCV prototypes. Contractors will have approximately 18 months to get their systems ready for a system evaluation at the end of FY20. Virtual assessment tools will be used throughout the development process to get contractor designs into a gaming environment for early soldier evaluations and feedback. ***FY 2018 to FY 2019 Increase/Decrease Statement:*** Funding increased in FY19 to initiate both the RCV Risk Reduction effort and the Experimental Unit Prototyping effort.			
Accomplishments/Planned Programs Subtotals	-	37.249	92.704

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Pre-acquisition program activities funded by this line transition to a separate Program Element and Project prior to their first program acquisition Milestone (B or C).

D. Acquisition Strategy

Robotics Development (RD) is designed to facilitate the transition of robotics and autonomous systems technology from Science and Technology (S&T) projects into emerging programs of record. It informs the acquisition process early in the development cycle allowing key stakeholders the ability to make integration decisions and affordability trades while writing requirements.

Tank Automotive Armaments Research Development & Engineering Center (TARDEC) funding allows the Army to demonstrate and operationally assess an unmanned vehicle capability with operational units and users to validate the technology. The Army will build, and test prototype systems for safety release, Soldier use, and further technology maturation.

Product Manager Applique and Large Unmanned Ground Systems (PdM ALUGS) builds upon the TARDEC Expedient Leader Follower (ELF) Operational Technology Demonstration (OTD) to provide a limited autonomous vehicle capability to the Palletized Load System (PLS) A1. Efforts include Capabilities Document input, close monitoring of OTD activities that feed cost estimates, capture technical and test data, provide test support, develop Modeling and Simulation (M&S) capabilities, and develop a Software Integration Lab (SIL).

Automated Convoy Operations (ACO)/ Robotic Combat Vehicle - Robotic Wingman (RCV-RW) funding supports Systems Engineering, Requirements, Cost Analysis, Joint Capabilities Technology Demonstration (JCTD) support, and technology transition plans.

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Robotic Combat Vehicle (RCV) Experimental Unit Prototyping will provide purpose built unmanned combat vehicles to enable users to assess the capability of the platforms and created new CONOPS and doctrine for manned/unmanned teaming based operations. Efforts will inform new CONOPS, identified system limitations and benefits and provide an achievable, analytically backed basis for future RCV requirements documents to drive future acquisition programs.

E. Performance Metrics

N/A

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

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PM FP PdM ALUGS	MIPR	PM FP : Warren, MI	-	-		-		1.025	Nov 2018	-		1.025	0.000	1.025	-
RCIS Type II ALUGS	MIPR	PdM ALUGS : Warren, MI	-	-		-		0.725	Oct 2018	-		0.725	0.000	0.725	-
		Subtotal	-	-		-		1.750		-		1.750	0.000	1.750	N/A

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Leader Follower Test Assets ALUGS	MIPR	PdM HTV : Warren, MI	-	-		4.874		-		-		-	0.000	4.874	-
RCV-RW M&S SIL ALUGS	MIPR	TARDEC : Warren, MI	-	-		-		1.100	Dec 2018	-		1.100	0.000	1.100	-
SMET Modular Mission Payloads ALUGS	TBD	TBD : TBD	-	-		-		1.000	Dec 2018	-		1.000	0.000	1.000	-
Leader Follower (TARDEC) Tech Demo A Kit	C/CPFF	Robotic Research : Baltimore, MD	-	-		11.000		11.000	Oct 2018	-		11.000	0.000	22.000	-
Leader Follower (TARDEC) Tech Demo B Kit	C/CPFF	Oshkosh : Oshkosh, WI	-	-		10.000		12.500	Dec 2018	-		12.500	0.000	22.500	-
Leader Follower (TARDEC) Integrated System Integrator	C/CPFF	Lockheed Martin : Dallas, TX	-	-		4.500		4.500	Oct 2018	-		4.500	0.000	9.000	-
Leader Follower (TARDEC) Warfighter Machine Interface	C/CPFF	DCS Corp : Boston, MA	-	-		2.500		3.000	Nov 2018	-		3.000	0.000	5.500	-
RCV Risk Reduction Platform Development	TBD	To Be Determined : To Be Determined	-	-		-		11.500	Nov 2018	-		11.500	0.000	11.500	-
RCV Experimental Unit Prototyping Mobility Demonstrators	TBD	To Be Determined : To Be Determined	-	-		-		11.904	Nov 2018	-		11.904	0.000	11.904	-

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

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
RCV Experimental Unit Prototyping Lethality Demonstrators	TBD	To Be Determined : To Be Determined	-	-		-		10.000	Nov 2018	-		10.000	0.000	10.000	-
RCV Experimental Unit Prototyping Aided Target Recognition Demonstrators	TBD	To Be Determined : To Be Determined	-	-		-		5.500	Nov 2018	-		5.500	0.000	5.500	-
		Subtotal	-	-		32.874		72.004		-		72.004	0.000	104.878	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
PdM ALUGS Support	MIPR	Various : Multiple locations	-	-		2.375		4.750	Oct 2018	-		4.750	0.000	7.125	-
SMET Modular Mission Payloads ALUGS	MIPR	PdM ALUGS : Warren, MI	-	-		-		0.550	Oct 2018	-		0.550	0.000	0.550	-
Technology Demo support (TARDEC)	MIPR	TARDEC : Warren, MI	-	-		1.000		2.100	Oct 2018	-		2.100	0.000	3.100	-
		Subtotal	-	-		3.375		7.400		-		7.400	0.000	10.775	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Leader Follower (TARDEC) Tech Demo Testing	MIPR	ATEC : Aberdeen, MD	-	-		0.500		0.200	Oct 2018	-		0.200	0.000	0.700	-
Leader Follower (TARDEC) Tech Demo Data Logger	MIPR	ATEC : Aberdeen, MD	-	-		0.500		0.200	Oct 2018	-		0.200	0.000	0.700	-
Leader Follower (TARDEC) Testing	MIPR	Army Test and Evaluation	-	-		-		10.000	Dec 2018	-		10.000	0.000	10.000	-

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

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2017 Cost	FY 2017 Award Date	FY 2018 Cost	FY 2018 Award Date	FY 2019 Base Cost	FY 2019 Base Award Date	FY 2019 OCO Cost	FY 2019 OCO Award Date	FY 2019 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Command (ATEC) : Aberdeen Proving Ground, MD													
Leader Follower (TARDEC) Data Logger	MIPR	Army Test and Evaluation Command (ATEC) : Aberdeen Proving Ground, MD	-	-		-		1.000	Dec 2018	-		1.000	0.000	1.000	-
PdM ALUGS RD ATEC support	MIPR	ATEC : Aberdeen, MD	-	-		-		0.150	Nov 2018	-		0.150	0.000	0.150	-
		Subtotal	-	-		1.000		11.550		-		11.550	0.000	12.550	N/A

	Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	-	-		37.249		92.704		-		92.704	0.000	129.953	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
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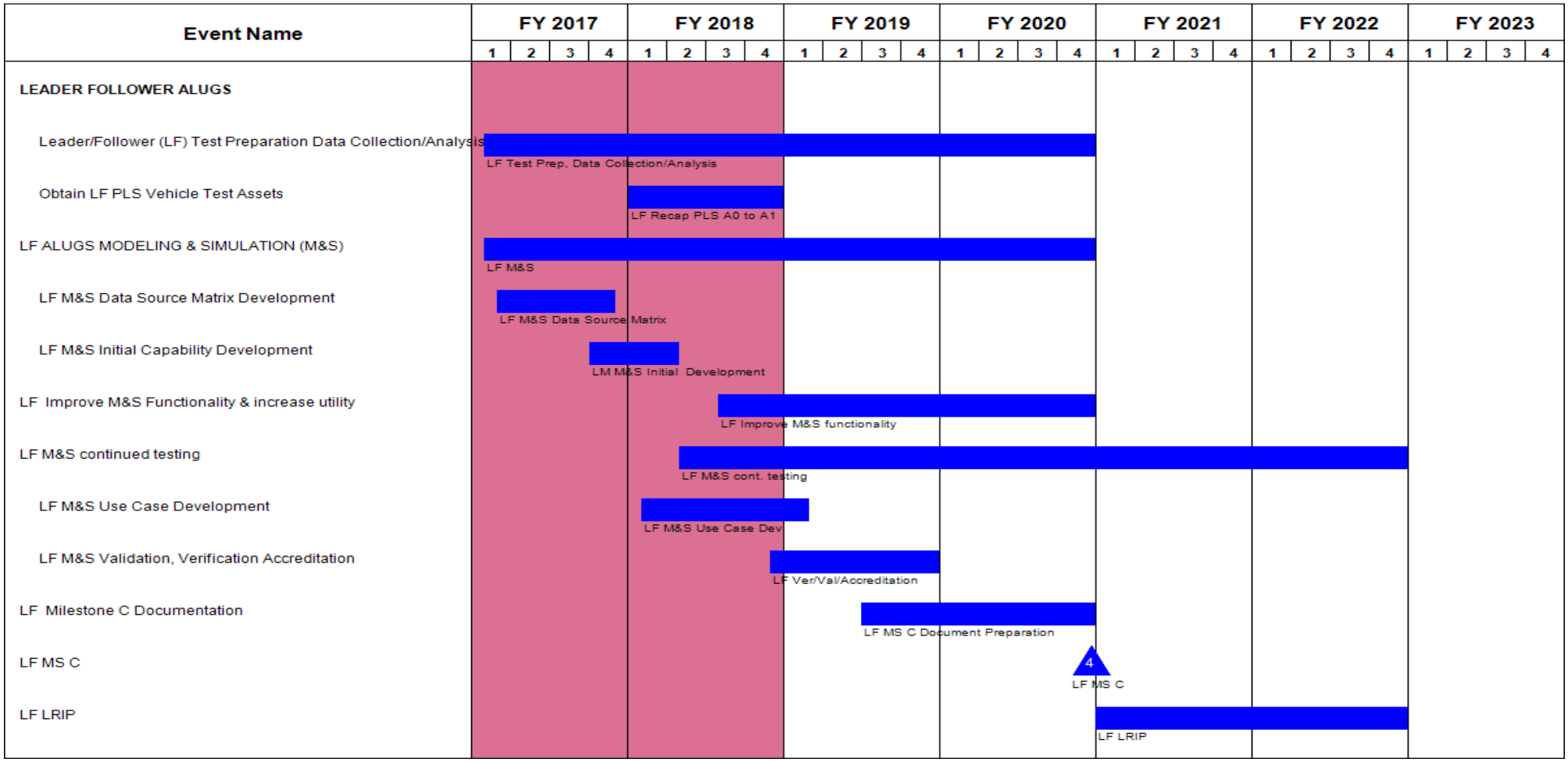

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD9 / *Robotics Systems*

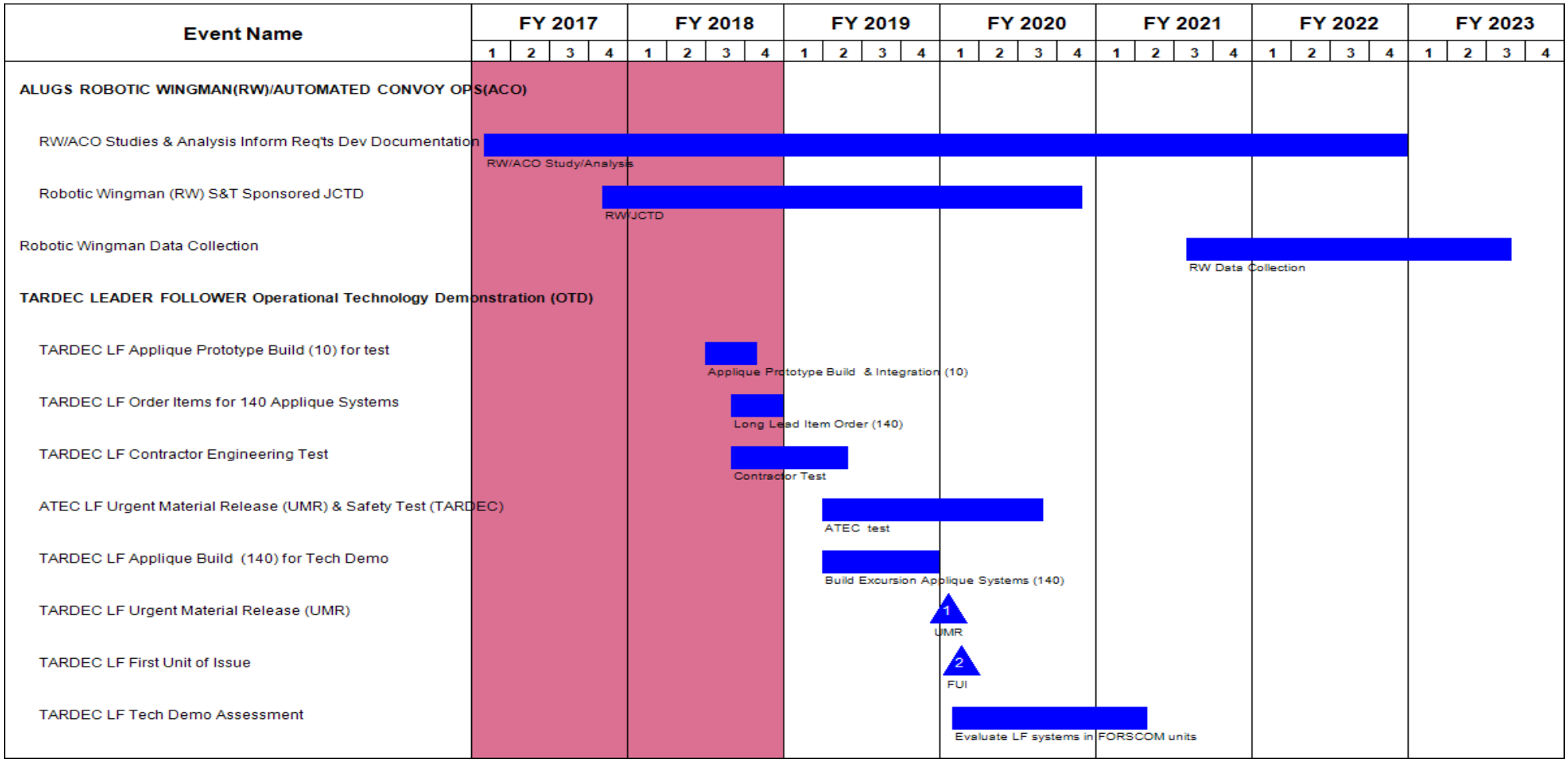

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
Appropriation/Budget Activity 2040 / 4	**R-1 Program Element (Number/Name)** PE 0604017A / *Robotics Development*	**Project (Number/Name)** FD9 / *Robotics Systems*

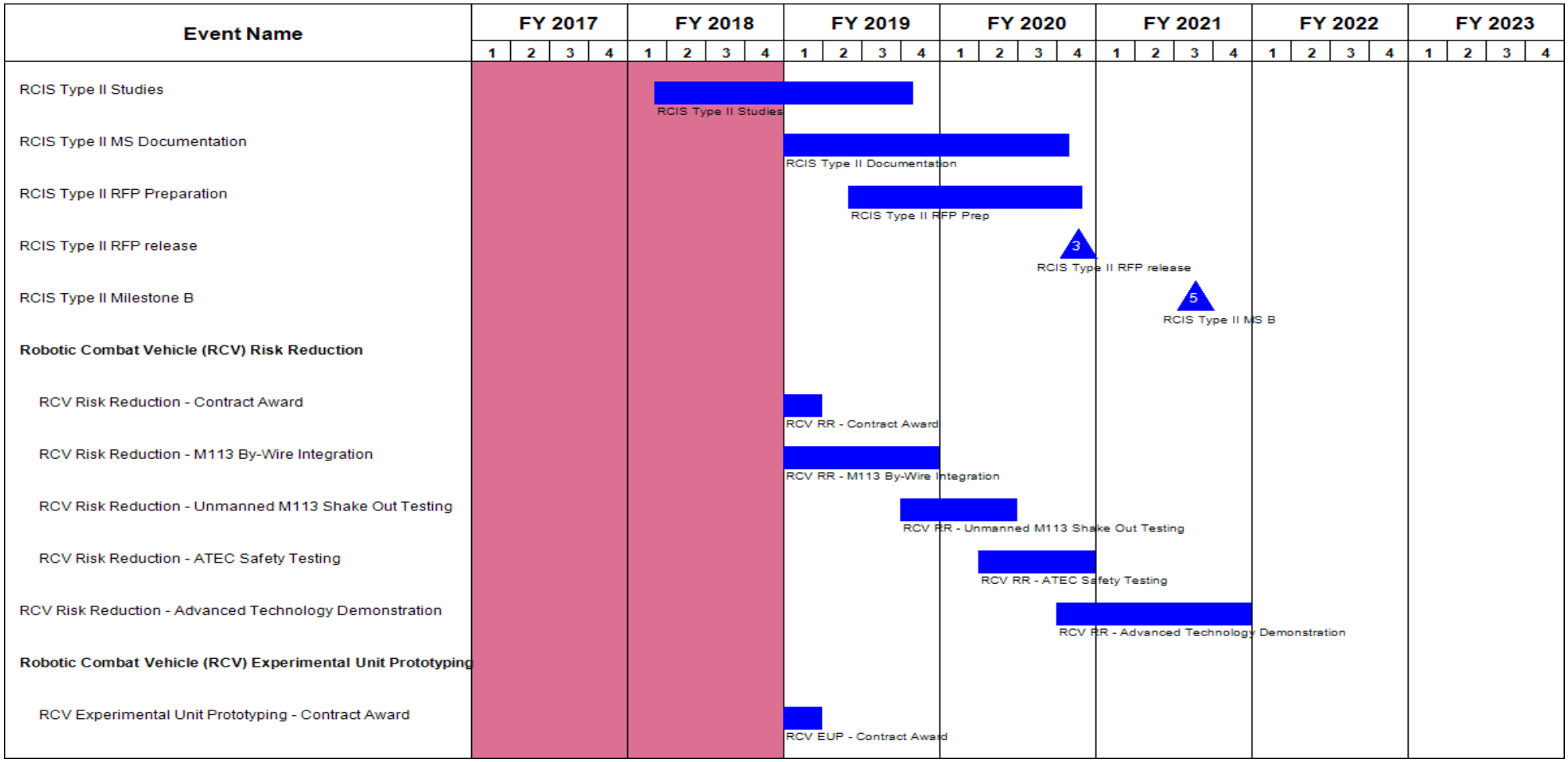

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army		Date: February 2018
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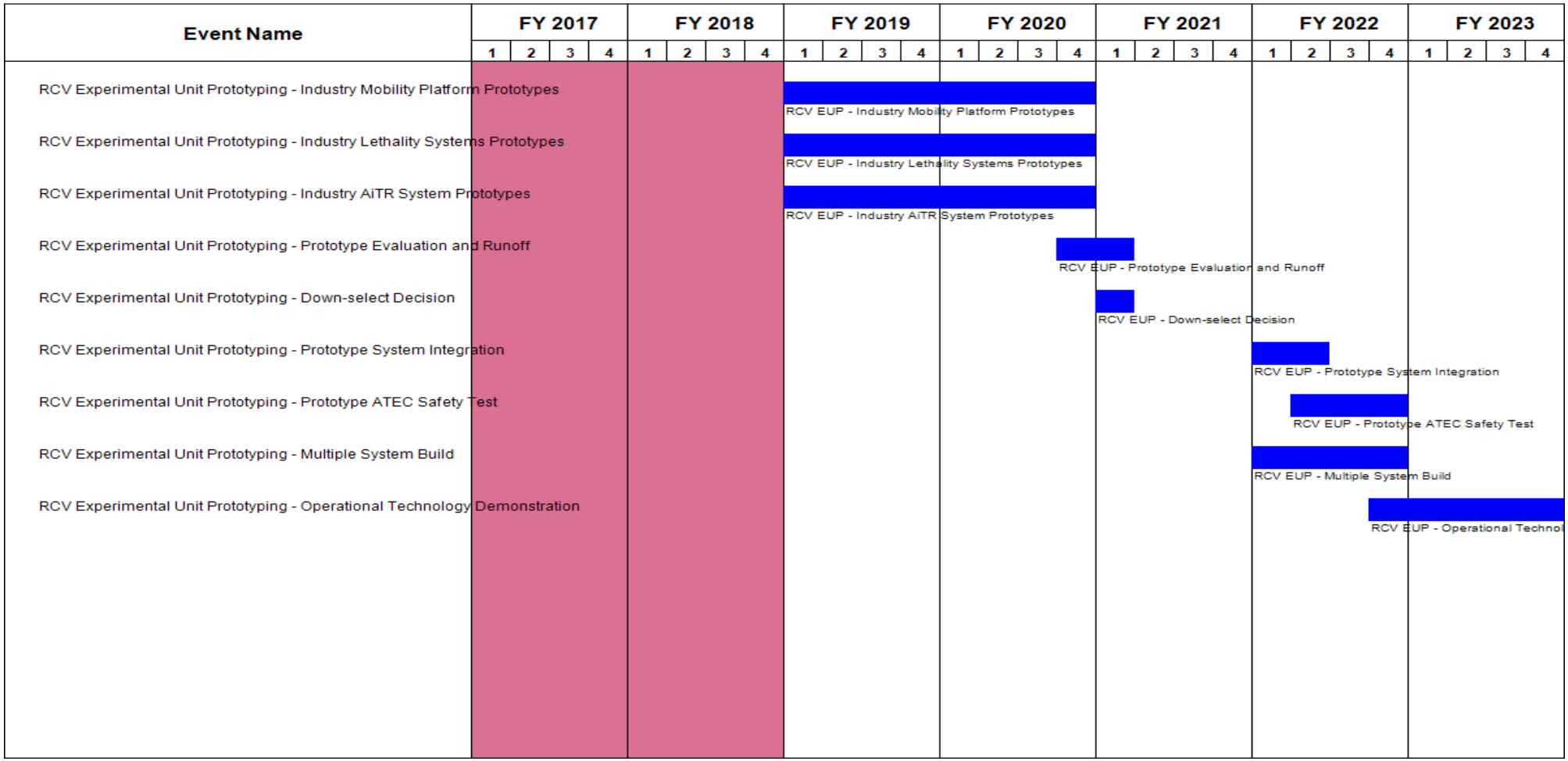

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
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Schedule Details

	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
LEADER FOLLOWER ALUGS	1	2017	4	2022
Leader/Follower (LF) Test Preparation Data Collection/Analysis	1	2017	4	2020
Obtain LF PLS Vehicle Test Assets	1	2018	4	2018
LF ALUGS MODELING & SIMULATION (M&S)	1	2017	4	2020
LF M&S Data Source Matrix Development	1	2017	4	2017
LF M&S Initial Capability Development	4	2017	2	2018
LF Improve M&S Functionality & increase utility	3	2018	4	2020
LF M&S continued testing	2	2018	4	2022
LF M&S Use Case Development	1	2018	1	2019
LF M&S Validation, Verification Accreditation	4	2018	4	2019
LF Milestone C Documentation	3	2019	4	2020
LF MS C	4	2020	4	2020
LF LRIP	1	2021	4	2022
ALUGS ROBOTIC WINGMAN(RW)/AUTOMATED CONVOY OPS(ACO)	1	2017	4	2022
RW/ACO Studies & Analysis Inform Req'ts Dev Documentation	1	2017	4	2022
Robotic Wingman (RW) S&T Sponsored JCTD	4	2017	4	2020
Robotic Wingman Data Collection	3	2021	3	2023
TARDEC LEADER FOLLOWER Operational Technology Demonstration (OTD)	3	2018	3	2022
TARDEC LF Applique Prototype Build (10) for test	3	2018	4	2018
TARDEC LF Order Items for 140 Applique Systems	3	2018	4	2018
TARDEC LF Contractor Engineering Test	3	2018	2	2019
ATEC LF Urgent Material Release (UMR) & Safety Test (TARDEC)	2	2019	3	2020
TARDEC LF Applique Build (140) for Tech Demo	2	2019	4	2019

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army		Date: February 2018
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	Start		End	
Events	**Quarter**	**Year**	**Quarter**	**Year**
TARDEC LF Urgent Material Release (UMR)	1	2020	1	2020
TARDEC LF First Unit of Issue	1	2020	1	2020
TARDEC LF Tech Demo Assessment	1	2020	2	2021
RCIS Type II Studies	1	2018	4	2019
RCIS Type II MS Documentation	1	2019	4	2020
RCIS Type II RFP Preparation	2	2019	4	2020
RCIS Type II RFP release	4	2020	4	2020
RCIS Type II Milestone B	3	2021	3	2021
Robotic Combat Vehicle (RCV) Risk Reduction	1	2020	4	2021
RCV Risk Reduction - Contract Award	1	2019	1	2019
RCV Risk Reduction - M113 By-Wire Integration	1	2019	4	2019
RCV Risk Reduction - Unmanned M113 Shake Out Testing	4	2019	2	2020
RCV Risk Reduction - ATEC Safety Testing	2	2020	4	2020
RCV Risk Reduction - Advanced Technology Demonstration	4	2020	4	2021
Robotic Combat Vehicle (RCV) Experimental Unit Prototyping	1	2019	4	2023
RCV Experimental Unit Prototyping - Contract Award	1	2019	1	2019
RCV Experimental Unit Prototyping - Industry Mobility Platform Prototypes	1	2019	4	2020
RCV Experimental Unit Prototyping - Industry Lethality Systems Prototypes	1	2019	4	2020
RCV Experimental Unit Prototyping - Industry AiTR System Prototypes	1	2019	4	2020
RCV Experimental Unit Prototyping - Prototype Evaluation and Runoff	4	2020	1	2021
RCV Experimental Unit Prototyping - Down-select Decision	1	2021	1	2021
RCV Experimental Unit Prototyping - Prototype System Integration	1	2022	2	2022
RCV Experimental Unit Prototyping - Prototype ATEC Safety Test	2	2022	4	2022
RCV Experimental Unit Prototyping - Multiple System Build	1	2022	4	2022
RCV Experimental Unit Prototyping - Operational Technology Demonstration	4	2022	4	2023