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

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604852A / <i>Suite of Survivability Enhancement Systems - EMD</i>
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	-	81.899	62.012	106.354	-	106.354	-	-	-	-	-	-
FE8: <i>Vehicle Protection Suite</i>	-	45.941	62.012	106.354	-	106.354	-	-	-	-	-	-
XU9: <i>Active Protection System</i>	-	35.958	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Note: Soft Kill Acquisition Program under "Survivability Improvements" is a new start program in FY2022.

Current ground combat vehicle platforms and tactical wheeled vehicles within Army Brigade Combat Teams (BCTs) lack the ability to effectively detect, track, divert, disrupt, neutralize, or destroy incoming direct or indirect fired threat munitions. Current solutions to defeat these threats, Explosive Reactive Armor (ERA) and Slat armor, do not provide preemptive or active protection and impose secondary blast hazards to crew, dismounted soldiers, and adjacent vehicles and equipment. The Suite of Vehicle Protection Systems - EMD PE 0604852A will develop and mature solutions to increase the protection of the Army's ground systems from both current and next generation direct or indirect fired threat munitions.

The Active Protection System will install and characterize Non-Developmental Item (NDI) Active Protection Systems on Abrams, Bradley, and Stryker demonstrator vehicles. The Active Protection System effort will assess the maturity, performance, and integration risk of NDI Active Protection Systems, develop and refine Abrams, Bradley, and Stryker Active Protection System installation kit designs, and build prototypes necessary to conduct performance and safety testing to obtain an Active Protection System Urgent Materiel Release (UMR). Active Protection System effort will execute installation design refinement and required testing to meet urgent fielding of NDI APS on Abrams, Bradley and Stryker pending Army leadership approval. The Active Protection System NDI effort served to inform the Vehicle Protection Suite Trade Study.

The Vehicle Protection Suite (VPS) Project (FE8) will design, mature, and evaluate combinations of active, reactive, and passive solutions and leverage both Horizontal Technology Integration (HTI) principles and the Army's Modular Active protection system Controller (MAC) to develop tailored vehicle Survivability Sets that will mitigate existing protection gaps, allow for future technology insertion to meet evolving threats, and minimize the impact to the current capabilities hosted on Army ground system platforms.

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B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	85.198	82.459	99.934	-	99.934
Current President's Budget	81.899	62.012	106.354	-	106.354
Total Adjustments	-3.299	-20.447	6.420	-	6.420
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-33.437			
• Congressional Rescissions	-	-			
• Congressional Adds	-	16.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-3.299	-3.010			
• Adjustments to Budget Years	-	-	6.420	-	6.420

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: FE8: *Vehicle Protection Suite*

Congressional Add: *Radar Sensor Technology*

Congressional Add: *Bradley Family of Vehicles (BFV) Active Protection System*

	FY 2020	FY 2021
	5.000	-
	-	16.000
Congressional Add Subtotals for Project: FE8	5.000	16.000
Congressional Add Totals for all Projects	5.000	16.000

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) FE8 / Vehicle Protection Suite
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
FE8: <i>Vehicle Protection Suite</i>	-	45.941	62.012	106.354	-	106.354	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

Current ground combat vehicle platforms and tactical wheeled vehicles within Army Brigade Combat Teams (BCTs) lack the ability to effectively detect, track, divert, disrupt, neutralize, or destroy incoming direct or indirect fired threat munitions. Current solutions to defeat these threats, Explosive Reactive Armor (ERA) and Slat armor, do not provide preemptive or active protection and impose secondary blast hazards to crew, dismounted soldiers, and adjacent vehicles and equipment.

Vehicle Protection Suite (VPS) will design, mature, integrate, evaluate, and field combinations of active, reactive, and passive solutions and leverage both Horizontal Technology Integration (HTI) principles and the Army's Modular Active Protection System Controller (MAC) to develop configurable vehicle Survivability Sets that will mitigate existing protection gaps, allow for future technology insertion to meet evolving threats, and minimize the impact to the current capabilities hosted on Army ground combat and tactical vehicle platforms.

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

	FY 2020	FY 2021	FY 2022
<p>Title: Modular Active protection system Controller (MAC) Framework Integration of Non-Developmental Items (NDI) and Developmental Technologies</p> <p>Description: Modular Active Protection System Controller (MAC) with Laser Warning Receiver (LWR) effort to incorporate on to the ground combat vehicle platforms the LWR through the Vehicle Protection System (VPS) Base Kit based on the Modular APS Framework (MAF). The maturation and integration effort will include qualification testing, integration design development, prototype build, and platform testing and logistics products.</p> <p>FY 2021 Plans: Continue LWR with the MAC integration design efforts, to include design development, prototype build, component and platform qualification testing and logistics products onto the Abrams, Bradley, AMPV, Stryker, and other identified ground combat vehicle platforms.</p> <p>FY 2022 Plans: Continue LWR with the MAC integration design efforts, to include integration design development, platform prototype build, vehicle level testing and logistics products development for the Bradley and AMPV, and begin integration efforts on Stryker variants. Start the VPS base kit product enhancements maturation efforts.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>	25.593	33.008	61.251

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) FE8 / Vehicle Protection Suite		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Increase is due to the Platform integration, Vehicle level testing and logistic product development of multiple combat platforms in FY2022. The increase is also due to the transition of the Soft Kill acquisition program from S&T to PdM VPS office to initiate the continued maturation and qualification testing of Soft Kill capabilities.				
<p>Title: Survivability Improvements</p> <p>Description: Funding for the continued maturation of Science and Technology (S&T) funded protection technologies, continued maturation, design development of the platform integration, test, logistic product development, and fielding of active, reactive, and passive survivability improvements onto ground combat vehicle platforms.</p> <p>FY 2021 Plans: Continue qualification testing and logistic product development of passive and reactive armor tiles and top protection on ground combat vehicle platforms. Continue Signature Management vehicle integration and vehicle Camouflage, Concealment, Deception, and Obscuration (CCDO) engineering development, testing, and transportation onto ground combat vehicles. Continuation of Tranche II technology integration and testing onto ground combat platforms identified via the VPS trade study or as they emerge from industry or government S&T efforts. Continued trade studies and engineering assessments of technology integration on existing and emerging ground vehicles. Technologies include but are not limited to: counter improvised explosive devices technologies, soft kill and hard kill active protection system technologies, top attack defense, radar system upgrades, signature management, vehicle Camouflage, Concealment, Deception, and Obscuration (CCDO), and other emerging vehicle protection technologies.</p> <p>FY 2022 Plans: Will continue qualification testing and logistic product development of passive and reactive armor tiles on ground combat vehicle platforms. Continue Signature Management vehicle integration; top attack, and vehicle Camouflage, Concealment, Deception, and Obscuration (CCDO) engineering development, testing, and transportation onto ground combat vehicles. Continuation of Tranche II technology integration and testing onto ground combat platforms identified via the VPS trade study or as they emerge from industry or government S&T efforts. Procure threats to support the continued maturation and testing of VPS technologies. Initiation of the Soft Kill acquisition program for system development, platform integration planning and OT&E on ground combat platforms. Continued engineering studies, improvement assessments, testing, and characterization/demonstrations of Active Protection systems (hard kill, soft kill, and threat detection), top attack protection, radar system upgrades, CCDO, and other emerging vehicle protection technologies for integration onto ground combat platforms. Maturation efforts continue for feasibility of passive and reactive armor solutions for PEO GCS combat platforms. Planned activities include engineering development, testing, platform integration and transportation onto ground combat vehicles.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>		10.834	7.098	33.922

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) FE8 / Vehicle Protection Suite		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2020	FY 2021	FY 2022
Increase due to the transition of the Soft Kill acquisition program from S&T to PdM VPS office to initiate the continued maturation and qualification testing of Soft Kill capabilities. Continued maturation of passive protection capabilities, improvement, Assessments, and testing of existing active, passive, and reactive protection systems for integration on ground combat platforms.				
<p>Title: Vehicle Protection Suite Government Engineering and Program Management</p> <p>Description: Government program management support and program oversight.</p> <p>FY 2021 Plans: Continuing government program management support to provide VPS program planning, to include the oversight of: MAC characterization and development of MAC-compliant, active, reactive, and passive VPS survivability set protection solutions and continuation of Survivability Improvement projects.</p> <p>FY 2022 Plans: Will continue government program management support to provide VPS program planning, to include the oversight of: MAC Characterization and development of MAC compliant, active, reactive and passive VPS survivability set protection solutions, Active Protection System development, CCDO program development and continuation of Survivability Improvement projects.</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: Increase due to the initiation of the Soft Kill, acquisition program active, reactive, and passive VPS survivability set protection solutions, Camouflage, Concealment, Deception, and Obscuration (CCDO) program development and continuation of Survivability Improvement projects.</p>		4.514	5.906	8.231
<p>Title: VPS Trade Study</p> <p>Description: VPS will execute a trade study/feasibility assessment to identify capabilities for active, reactive and passive protection solutions, to pursue in the next phase of the program (Tranche III). A Trade Study/feasibility assessment will provide the data deemed sufficient for the identification of capabilities to pursue in Tranche III. This Trade Study/feasibility assessment will build off previous studies to identify the benefit of adding capabilities to current set. The trade study/feasibility assessment will also look at emerging threats to identify capabilities used to protect against those threats.</p> <p>FY 2022 Plans: VPS will identify preemptive, active, reactive, passive (or a combination thereof) vehicle defense capabilities that are mature. The trade study/feasibility assessment will look at capabilities that are able to detect, track, divert, disrupt, neutralize, and/or destroy incoming threats, non-lethal/lethal unmanned aircraft systems (UAS), air to ground missiles, Improvised Explosive Device (IEDs)/mines, as well as prevent, mitigate and recover from Electronic Warfare (EW) and Cyber threats. These capabilities will be analyzed via a Trade Study/feasibility assessment and/or characterization/demonstration to understand the benefit the capability or combination of capabilities provide. This analysis will identify capabilities to pursue in future tranches. Continued limited</p>		-	-	2.950

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2020	FY 2021	FY 2022
characterizations of APS solutions are planned to better understand their functionality, generate performance data, and determine suitability to be integrated onto a Stryker platform as well as other ground combat platforms. FY 2021 to FY 2022 Increase/Decrease Statement: An increase to VPS Trade Study is due to the need to execute a VPS trade study/feasibility assessment to identify capabilities for active, reactive and passive protection solutions, to pursue in the next phase of the program (Tranche III).			
Accomplishments/Planned Programs Subtotals	40.941	46.012	106.354

	FY 2020	FY 2021
Congressional Add: Radar Sensor Technology FY 2020 Accomplishments: Development efforts completed to evaluate and perform limited characterizations of radar sensor technologies for vehicle protection systems application. New start, congressional add program to create an upgraded, multimode version of the Hard Kill radar system and transition to a US-manufactured source for the radar. A secure supply chain will address the Army's near-term VPS strategy and inform future capabilities. The contract award occurred September of 2020. Prototype development, integration, and testing will occur during 2021.	5.000	-
Congressional Add: Bradley Family of Vehicles (BFV) Active Protection System FY 2021 Plans: Conducting government testing of the Iron Fist-Light Decoupled (IFLD) phase 2 system on a Bradley vehicle in support of the urgent material release. Testing will begin in 3Q21 and complete 4Q22. Contractor test support will be required.	-	16.000
Congressional Adds Subtotals	5.000	16.000

C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

On 21 SEPT 2016 - Directed Requirement for Reactive Armor Tiles and Installation Kits received and on 17 NOV 2017 Army Requirements Oversight Council (AROC) approved VPS ICD as the requirements to move forward with production of reactive armor tiles for the Armored Multi-Purpose Vehicle (AMPV) in Fiscal Year (FY) 2022, \$17.755 million APPN: 2034A; BA 1; Line Item Number: 9847E97900; Title: Reactive Armor Tiles.

NOV 2020 Army Requirements Oversight Council (AROC) approved VPS Capability Development Document (CDD) and on 16 DEC 2020 AROCM 20-27 approved the CDD for protection improvements to include VPS Base Kit, Softkill, Hardkill, LWR, Signature Management and Obscuration as the requirements to procure MAPS with

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C. Other Program Funding Summary (\$ in Millions)

LWR for the Bradley A4 platform and procure Signature Management Paint for AMPV and Stryker In FY 2022, \$29.102 million APPN: 2033A: Procurement of W&TCV, Army; BA 1: Tracked Combat Vehicles; Line Item Number: 6652GM1900; Title: Vehicle Protection Systems (VPS).

D. Acquisition Strategy

VPS Trade Studies/Feasibility Assessments will assess the cost, maturity, complexity, performance, and physical properties of enhanced survivability technologies to determine the optimal application of VPS capabilities onto the Army's ground combat platforms. In FY 2018, the VPS program initiated the initial VPS Trade Study/Feasibility Assessment to confirm survivability capabilities for focus in Tranche I and II, to include integration with the Modular Active Protection System (MAC). Focus of Tranche I was with Reactive Armor Tiles, laser threat detection with a common controller and signature management reduction. Support of Tranche efforts will be achieved through bailments, Cooperative Research and Development Agreements (CRADA), and Other Transactional Agreements (OTA) with industry and government partners. The VPS Tranche II solutions (soft and hard kill integration with MAC, threat detection, Camouflage, Concealment, Deception and Obscuration (CCDO), top protection, active blast defeat, and other emerging protection technologies) based on the results of the Trade Study will have decision points and program initiations beginning in FY 2020. Along with the Tranche II activities starting in FY 2020, the VPS program will continue, maturation, qualification testing, platform integration, vehicle testing and fielding efforts (i.e. logistics and software development) with Tranche I programs. A Tranche III trade study/feasibility assessment will initiate in FY 2022 to define the next set of VPS technologies, based on evolving enemy threats, to focus on. These capabilities may include counter-unmanned aerial systems and the integration of artificial intelligence into vehicle survivability technologies.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army												Date: May 2021			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604852A / Suite of Survivability Enhancement Systems - EMD				FE8 / Vehicle Protection Suite							
Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
Vehicle Protection Suite Program Management	MIPR	TACOM Warren, Michigan : Various	8.387	4.514	Feb 2020	5.906	Jan 2021	8.231	Oct 2021	-		8.231	24.549	51.587	-
Subtotal			8.387	4.514		5.906		8.231		-		8.231	24.549	51.587	N/A
Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
MAC Framework Integration of Non-Developmental Items (NDI) and Developmental Technologies	TBD	Various : TBD	16.222	23.494	Jun 2020	29.608	Jun 2021	52.277	Jun 2022	-		52.277	32.010	153.611	-
Survivability Improvements	MIPR	Various TACOM Warren : Warren, MI	0.650	10.306	Feb 2020	2.072	Jan 2021	32.099	Jan 2022	-		32.099	230.687	275.814	-
Radar Sensor Technology	TBD	Various TACOM Warren : Warren, MI	-	5.000	Aug 2020	-		-		-		-	0.000	5.000	-
Bradley Family of Vehicles (BFV) Active Protection System	Various	TBD : TBD	-	-		16.000	May 2021	-		-		-	0.000	16.000	-
Subtotal			16.872	38.800		47.680		84.376		-		84.376	262.697	450.425	N/A
Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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
Vehicle Protection Suite Trade Study	MIPR	Various : TACOM Warren Michigan	3.103	-		-		2.950	Mar 2022	-		2.950	0.000	6.053	-
Subtotal			3.103	-		-		2.950		-		2.950	0.000	6.053	N/A

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

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Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Survivability Improvements	MIPR	Various TACOM Warren : Warren, MI	1.792	0.528	Jun 2020	5.026	Jun 2021	1.823	Jun 2022	-		1.823	1.823	10.992	-
MAC Framework Integration of Non-Developmental Items (NDI) and Developmental Technologies	MIPR	Various TACOM Warren : Warren, MI	1.375	2.099	Jun 2020	3.400		8.974	Jun 2022	-		8.974	76.663	92.511	-
Subtotal			3.167	2.627		8.426		10.797		-		10.797	78.486	103.503	N/A

Remarks
N/A

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	31.529	45.941	62.012	106.354	-	106.354	365.732	611.568	N/A

Remarks

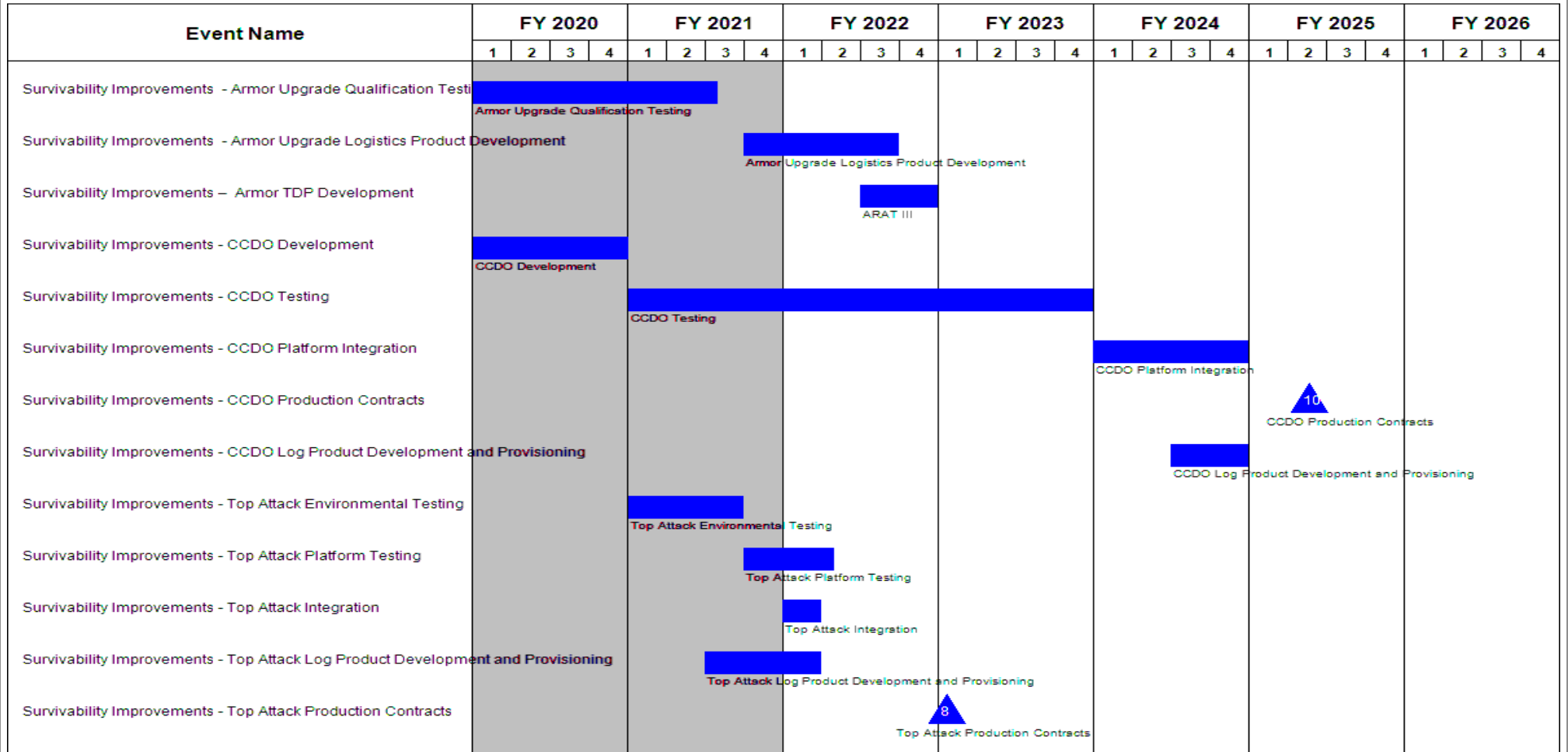
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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) FE8 / Vehicle Protection Suite

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	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
VPS NDI Capability Install/Characterization	[Redacted]				[Redacted]																							
VPS MAC Development Contract Awards	[Redacted]				▲ 1	[Redacted]			[Redacted]																			
(MAC) with (LWR) - MAC and LWR (MAC) with (LWR) - Maturation	[Redacted]				[Redacted]				[Redacted]																			
(MAC) with (LWR) - Software Development	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
(MAC) with (LWR) - Component Qualification Testing	[Redacted]				[Redacted]				[Redacted]																			
(MAC) with (LWR) - Integration Design (Abrams, Bradley, AMPV, Stryker)	[Redacted]				[Redacted]				[Redacted]				[Redacted]															
(MAC) with (LWR) - Logistic Product Development	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]											
(MAC) with (LWR) - Integration Contract Awards	[Redacted]				▲ 3	[Redacted]			[Redacted]																			
(MAC) with (LWR) - Platform Testing	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]											
(MAC) with (LWR) - Base Kit Improvements Maturation	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							
(MAC) with (LWR) - Integration Contract Awards	[Redacted]				[Redacted]				▲ 6	[Redacted]			[Redacted]															
(MAC) with (LWR) - Procurement Contract Award	[Redacted]				[Redacted]				▲ 7	[Redacted]			[Redacted]															
Survivability Improvements Development	[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]				[Redacted]							

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
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Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	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
Survivability Improvements - Tranche II Technology Maturation & Development	[Redacted]																											
Survivability Improvements - Government Energetic Qualification Testing	[Redacted]																											
Survivability Improvements - Soft Kill Platform Integration Contract Award	[Redacted]																											
Survivability Improvements - Soft Kill System Development Contract Award	[Redacted]																											
Survivability Improvements - Soft Kill System Development	[Redacted]																											
Survivability Improvements - Soft Kill Platform Integration and Test Support	[Redacted]																											
Radar Sensor Technology - CONOPS and Requirements Development	[Redacted]																											
Radar Sensor Technology - SRR	[Redacted]																											
Radar Sensor Technology - Integration and Testing	[Redacted]																											
Radar Sensor Technology - Final Design Review/Transition	[Redacted]																											
Vehicle Protection Suite Trade Study	[Redacted]																											
Bradley Iron Fist Light Decoupled (IFLD) Phase 2 Testing	[Redacted]																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Characterization of MAPS with Softkill/Hardkill Solutions	1	2019	4	2019
VPS NDI Capability Install/Characterization	2	2018	3	2021
VPS Trade Study	2	2018	4	2019
VPS MAC Development Contract Awards	1	2021	1	2021
(MAC) with (LWR) - MAC and LWR (MAC) with (LWR) - Maturation and MAF Compliance	4	2019	4	2021
(MAC) with (LWR) - Software Development	4	2019	4	2023
(MAC) with (LWR) -Component Qualification Testing	1	2020	2	2021
(MAC) with (LWR) - Integration Design (Abrams, Bradley, AMPV, Stryker)	1	2021	4	2024
(MAC) with (LWR) - Logistic Product Development	1	2021	1	2026
(MAC) with (LWR) - Integration Contract Awards	3	2021	3	2021
(MAC) with (LWR) - Platform Testing	1	2022	1	2025
(MAC) with (LWR) - Base Kit Improvements Maturation	2	2022	4	2027
(MAC) with (LWR) - Integration Contract Awards	3	2022	3	2022
(MAC) with (LWR) - Procurement Contract Award	4	2022	4	2022
Survivability Improvements Development	1	2020	4	2025
Survivability Improvements - Armor Upgrade Qualification Testing	1	2020	3	2021
Survivability Improvements - Armor Upgrade Logistics Product Development	4	2021	3	2022
Survivability Improvements ? Armor TDP Development	3	2022	4	2022
Survivability Improvements - CCDO Development	1	2020	4	2020
Survivability Improvements - CCDO Testing	1	2021	4	2023
Survivability Improvements - CCDO Platform Integration	1	2024	4	2024
Survivability Improvements - CCDO Production Contracts	2	2025	2	2025

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army **Date:** May 2021

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Events	Start		End	
	Quarter	Year	Quarter	Year
Survivability Improvements - CCDO Log Product Development and Provisioning	3	2024	4	2024
Survivability Improvements - Top Attack Environmental Testing	1	2021	3	2021
Survivability Improvements - Top Attack Platform Testing	4	2021	2	2022
Survivability Improvements - Top Attack Integration	1	2022	1	2022
Survivability Improvements - Top Attack Log Product Development and Provisioning	3	2021	1	2022
Survivability Improvements - Top Attack Production Contracts	1	2023	1	2023
Survivability Improvements - Tranche II Technology Maturation & Development	3	2020	4	2025
Survivability Improvements ? Government Energetic Qualification Testing	1	2021	4	2022
Survivability Improvements - Soft Kill Platform Integration Contract Award	3	2023	3	2023
Survivability Improvements - Soft Kill System Development Contract Award	2	2022	2	2022
Survivability Improvements - Soft Kill System Development	2	2022	3	2024
Survivability Improvements - Soft Kill Platform Integration and Test Support	4	2023	4	2029
Radar Sensor Technology - CONOPS and Requirements Development	4	2020	2	2021
Radar Sensor Technology - SRR	2	2021	2	2021
Radar Sensor Technology - Integration and Testing	2	2021	1	2022
Radar Sensor Technology - Final Design Review/Transition	2	2022	2	2022
Vehicle Protection Suite Trade Study	1	2023	2	2023
Bradley Iron Fist Light Decoupled (IFLD) Phase 2 Testing	4	2021	4	2022

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) XU9 / Active Protection System
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COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
XU9: Active Protection System	-	35.958	-	-	-	-	-	-	-	-	-	-
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Active Protection System effort will install and characterize Non-Developmental Item (NDI) Active Protection Systems on Abrams, Bradley, and Stryker demonstrator vehicles. The Active Protection System effort will assess the maturity, performance, and integration risk of NDI Active Protection Systems, develop and refine Abrams, Bradley, and Stryker Active Protection System installation kit designs, and build prototypes necessary to conduct performance and safety testing to obtain an Active Protection System Urgent Materiel Release (UMR). The Active Protection System NDI effort will also serve to inform the Vehicle Protection Suite Analysis of Alternatives (AoA).

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

	FY 2020	FY 2021	FY 2022
Title: Active Protection System (APS) Installation Kit Refinement and System Test - Abrams	9.599	-	-
Description: Funding provided supports APS test support for the M1A2 SEPv3			
Title: Active Protection System (APS) Installation Kit Refinement and System Test - Bradley	26.359	-	-
Description: Funding provided support APS integration and test support for Bradley			
Accomplishments/Planned Programs Subtotals	35.958	-	-

C. Other Program Funding Summary (\$ in Millions)

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• GA0700: M1 Abrams Tank (MOD)	325.292	375.107	-	-	-	-	-	-	-	-	-
• GZ2400: Bradley Program (MOD)	415.740	277.259	461.385	-	461.385	-	-	-	-	-	-
• GM0100: Stryker (Mod)	397.687	-	-	-	-	-	-	-	-	-	-

Remarks

Stryker is not resourced to procure any active protection systems.

D. Acquisition Strategy

The Active Protection System Project XU9 is a continuation of efforts previously executed under PE 0203735A - Combat Vehicle Improvement Programs.

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Exhibit R-2A, RDT&E Project Justification: PB 2022 Army Date: May 2021

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) XU9 / Active Protection System
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The APS installation and characterization effort will evaluate platform (Abrams, Bradley, Stryker) performance with an NDI APS solution installed. Platform performance evaluation includes APS sensor assessments, minimum live threat characterization, surface danger zone characterization, co-site mitigation (antennas/radiators), electromagnetic interference assessment/characterization, energetic radiation assessment, and a durability assessment. The NDI APS installation and characterization is being executed through a partnership between the US Army, NDI APS solution vendors, and prime contractors for Abrams, Bradley, and Stryker vehicles. NDI APS vendor support, to include procurement of demonstration hardware, is contracted on a Firm-Fixed Price (FFP) basis, while platform prime contractor technical support is provided on a Cost Plus Fixed-Fee (CPFF) basis. The results from the installation and characterization effort has resulted in moving forward with installation design refinement and required testing to meet urgent fielding of NDI APS on Abrams and Bradley. Characterization of APS solutions for Stryker revealed that while they were capable of intercepting threats, no solutions were suitable for Stryker. Continued limited characterizations of APS solutions are planned to better understand their functionality, generate performance data, and determine if future integration onto a Stryker platform is feasible.

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

Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) XU9 / Active Protection System
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Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Active Protection System (APS) Installation Kit Development and Prototype Build - Abrams	SS/ Various	US Army TARDEC; Rafael Advanced Defense Systems; General Dynamics Land Systems (GDLS) : Warren, MI	9.902	-		-		-		-		-	0.000	9.902	-
Active Protection System (APS) Installation Kit Development and Prototype Build - Bradley	SS/ Various	US Army TARDEC; Israeli Military Industries (IMI); BAE Systems : Warren, MI	32.552	26.183	Feb 2020	-		-		-		-	0.000	58.735	-
Active Protection System (APS) Installation Kit Development and Prototype Build - Stryker	SS/ Various	US Army TARDEC; Artis, LLC.; General Dynamics Land Systems (GDLS) : Warren, MI	0.061	-		-		-		-		-	0.000	0.061	-
Active Protection System (APS) Installation Kit Development and Prototype Build - 4th System	C/CPIF	Contract : Texas	25.000	-		-		-		-		-	0.000	25.000	-
Subtotal			67.515	26.183		-		-		-		-	0.000	93.698	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Office (PMO) Support	MIPR	PEO Ground Combat Systems : Warren, MI	3.456	0.176	Jul 2020	-		-		-		-	0.000	3.632	-
Subtotal			3.456	0.176		-		-		-		-	0.000	3.632	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) XU9 / Active Protection System

Event Name	FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026			
	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
Abrams APS Installation Kit (IK) Refinement, Prototype Build, & Test	[Blue bar]				[Grey bar]																							
Abrams IK Refinement/Prototype Build/Test	[Blue bar]				[Grey bar]																							
Abrams APS Production	[Blue bar]				[Grey bar]																							
Abrams Production	[Blue bar]				[Grey bar]																							
Bradley APS Installation Kit (IK) Refinement, Prototype Build, & Test	[Blue bar]				[Grey bar]																							
Bradley IK Refinement/Prototype Build/Test	[Blue bar]				[Grey bar]																							
Bradley APS Production	[Blue bar]				[Grey bar]																							
Bradley Production	[Blue bar]				[Grey bar]																							
Stryker Continued Additional APS Refinement/Prototype Build	[Blue bar]				[Grey bar]																							
Stryker Continued Additional APS Refinement/Prototype Build	[Blue bar]				[Grey bar]																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army		Date: May 2021
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / Suite of Survivability Enhancement Systems - EMD	Project (Number/Name) XU9 / Active Protection System

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Abrams APS Demonstrator Design and Install	3	2016	1	2017
Abrams APS Characterization	1	2017	4	2017
Abrams APS Decision Point (DP) 1 (Production)	1	2018	1	2018
Abrams APS Installation Kit (IK) Refinement, Prototype Build, & Test	1	2018	1	2021
Abrams APS Decision Point (DP) 2 (Production)	2	2018	2	2018
Abrams APS Production	2	2018	1	2020
Bradley APS Demonstrator Design and Install	4	2016	4	2017
Bradley APS Characterization	4	2017	3	2018
Bradley APS Decision Point (DP) 1 (Production)	1	2019	1	2019
Bradley APS Installation Kit (IK) Refinement, Prototype Build, & Test	1	2019	4	2020
Bradley APS Decision Point (DP) 2 (Production)	2	2019	2	2019
Bradley APS Production	1	2019	2	2020
Stryker APS Demonstrator Design and Install	4	2016	3	2017
Stryker APS Characterization	4	2017	2	2018
Stryker APS Decision Point (DP) 1 (Production)	2	2018	2	2018
Stryker APS Installation Kit (IK) Refinement, Prototype Build, & Test	3	2018	2	2019
Stryker APS Decision Point (DP) 2 (Production)	2	2019	2	2019
Stryker Additional APS Demonstration	1	2019	2	2019
Stryker Continued Additional APS Refinement/Prototype Build	4	2019	4	2020