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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army **Date:** February 2020

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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	50.380	85.198	82.459	-	82.459	99.934	96.504	89.756	79.203	0.000	583.434
FE8: <i>Vehicle Protection Suite</i>	-	25.887	47.698	82.459	-	82.459	99.934	96.504	89.756	79.203	0.000	521.441
XU9: <i>Active Protection System</i>	-	24.493	37.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	61.993

Note

There is no funding request for Program Element (PE) 0604852A Suite of Survivability Enhancement Systems - EMD Project XU9 Active Protection System in Fiscal Year (FY) 2021.

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. 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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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Army	Date: February 2020
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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604852A / <i>Suite of Survivability Enhancement Systems - EMD</i>
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B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	52.839	98.698	93.844	-	93.844
Current President's Budget	50.380	85.198	82.459	-	82.459
Total Adjustments	-2.459	-13.500	-11.385	-	-11.385
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-18.500			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-2.459	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-11.385	-	-11.385

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

Project: FE8: *Vehicle Protection Suite*

Congressional Add: *Radar Sensor Technology*

	FY 2019	FY 2020
	-	5.000
Congressional Add Subtotals for Project: FE8	-	5.000
Congressional Add Totals for all Projects	-	5.000

Change Summary Explanation

The decrease in FY 2021 funding is due to the Reimbursable Manpower for this line being realigned from Reimbursable Civilian Funding (\$3.826 million) to Direct Operations and Maintenance and reduced by \$6.367 million to account for the availability of prior year execution balances.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
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			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
FE8: <i>Vehicle Protection Suite</i>	-	25.887	47.698	82.459	-	82.459	99.934	96.504	89.756	79.203	0.000	521.441
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, 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 combat system platforms.

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

	FY 2019	FY 2020	FY 2021
Title: Modular Active protection system Controller (MAC) Framework Integration of Non-Developmental Items (NDI) and Developmental Technologies	12.744	25.594	66.671
Description: (Title Change, previously Modular Active protection system Controller (MAC) Framework Integration of Non-Developmental Items (NDI)) Development effort to incorporate the MAC framework and Non-developmental technologies on to ground combat vehicle platforms. The development effort will include design development, prototype build, component and platform qualification testing and logistics products.			
FY 2020 Plans: Integrated the Laser Warning Receiver (LWR) with the MAC development effort, to include design development, prototype build, component and platform qualification testing and logistics products onto the Abrams, Bradley, AMPV, Stryker, and other identified combat vehicle platforms.			
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.			
FY 2020 to FY 2021 Increase/Decrease Statement:			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020		
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / <i>Suite of Survivability Enhancement Systems - EMD</i>	Project (Number/Name) FE8 / <i>Vehicle Protection Suite</i>		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2019	FY 2020	FY 2021
Increase is due to the continuation of efforts to integrate the MAC onto ground combat vehicle platforms, to initiate ground combat vehicle platform logistics product development, and to initiate software development.				
Title: VPS - Trade Study		2.806	-	-
Description: (Title Change, previously VPS - Trade Study and Analysis of Alternatives (AoA)) A VPS Trade Study identified technologies, active, reactive and passive protection solutions, to pursue in the next phase of the program (Tranche II). A Trade Study was deemed sufficient for the identification of technologies to pursue in Tranche II.				
Title: Survivability Improvements		-	10.995	9.882
Description: Funding for the continued maturation of Science and Technology (S&T) funded protection technologies, design development of the platform integration, test, and logistic products of active, reactive, and passive survivability improvements onto ground combat vehicle platforms.				
FY 2020 Plans: Qualification testing, and logistic products of developed armor tile upgrades on the Army Ground Combat Vehicles. Initiation of Tranche II technology integration and testing on to ground combat platforms identified via the VPS trade study or as they emerge from industry or government Science and Technology efforts. These potential Tranche II technologies include but are not limited to: counter improvised explosive devices technologies, soft kill and hard kill active protection system technologies, top attack defense, signature management, radar system upgrades, and other emerging technologies.				
FY 2021 Plans: 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. 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.				
FY 2020 to FY 2021 Increase/Decrease Statement: Decrease is due to the development delay of pre-emptive technology survivability improvements.				
Title: Vehicle Protection Suite Government Engineering and Program Management		4.423	4.170	5.906
Description: Government program management support and program oversight.				

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
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 2019	FY 2020	FY 2021
<p>FY 2020 Plans: Continued government program management support to support VPS program planning, to include the oversight of MAC characterization and development of MAC-compliant VPS survivability sets and initiation of Survivability Improvement projects.</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 2020 to FY 2021 Increase/Decrease Statement: Increase is due to additional personnel required to support new survivability improvements and LWR with MAC integration onto ground combat vehicle platforms.</p>			
<p>Title: FY 2020 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638</p>	-	1.939	-
<p>Title: FY 2019 Rescission</p>	5.914	-	-
Accomplishments/Planned Programs Subtotals	25.887	42.698	82.459

	FY 2019	FY 2020
Congressional Add: Radar Sensor Technology	-	5.000
FY 2020 Plans: Radar Sensor Technology		
Congressional Adds Subtotals	-	5.000

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

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / <i>Suite of Survivability Enhancement Systems - EMD</i>	Project (Number/Name) FE8 / <i>Vehicle Protection Suite</i>

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

Remarks

In Fiscal Year (FY) 2021, \$3.826 million in Reimbursable Manpower for this line has been realigned from Reimbursable Civilian Funding to Direct Operations and Maintenance. Program support costs have been accurately updated to reflect the realignments.

D. Acquisition Strategy

In FY 2018, the VPS program initiated characterization of the MAC compliant/NDI capabilities (hardware, software, interfaces, etc.) to inform the VPS Trade Study. The MAC compliant/NDI capabilities characterization efforts will be achieved through bailments, Cooperative Research and Development Agreements (CRADA), and Other Transactional Agreements (OTA) with industry partners. The VPS Trade Study will assess the cost, maturity, complexity, performance, and physical properties of alternative survivability sets to determine the optimal application of VPS solutions onto the Army's ground combat platforms. The VPS Tranche II solutions (soft and hard kill integration with MAC, threat detection, passive and active signature management, active blast defeat, and other protection technologies) based on the results of the Trade Study will have a decision point and program initiation in FY 2020. Along with the Tranche II activities starting in FY 2020, the VPS program will initiate MAC with LWR integration onto ground combat vehicle platforms, logistics product development, and software development.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

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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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Vehicle Protection Suite Program Management	MIPR	TACOM Warren, Michigan : Various	0.446	4.423	Oct 2018	4.332	Feb 2020	5.906	Oct 2020	-		5.906	24.549	39.656	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.939		-		-		-	0.000	1.939	-
Subtotal			0.446	4.423		6.271		5.906		-		5.906	24.549	41.595	N/A

Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
MAC Framework Integration of Non-Developmental Items (NDI) and Developmental Technologies	MIPR	Various TACOM Warren : Warren, MI	10.210	12.026	Dec 2018	23.494	Jun 2020	66.671	Jun 2021	-		66.671	32.010	144.411	-
Survivability Improvements	MIPR	Various TACOM Warren : Warren, MI	-	-		10.306	Feb 2020	5.000	Oct 2020	-		5.000	230.687	245.993	-
Radar Sensor Technology	TBD	Various TACOM Warren : Warren, MI	-	-		5.000	Aug 2020	-		-		-	0.000	5.000	-
FY 2019 Rescission	Allot	N/A : N/A	-	5.914		-		-		-		-	0.000	5.914	-
Subtotal			10.210	17.940		38.800		71.671		-		71.671	262.697	401.318	N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Vehicle Protection Suite Trade Study	MIPR	Various : TACOM Warren Michigan	-	2.806	Jan 2019	-		-		-		-	0.000	2.806	-
Subtotal			-	2.806		-		-		-		-	0.000	2.806	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army **Date:** February 2020

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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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	-	-		0.528	Jun 2020	4.882	Jun 2021	-		4.882	1.823	7.233	-
MAC Framework Integration of Non-Developmental Items (NDI) and Developmental Technologies	MIPR	Various TACOM Warren : Warren, MI	-	0.718	Jul 2019	2.099	Jun 2020	-		-		-	76.663	79.480	-
Subtotal			-	0.718		2.627		4.882		-		4.882	78.486	86.713	N/A

Remarks
N/A

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	10.656	25.887	47.698	82.459	-	82.459	365.732	532.432	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
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 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
Characterization of MAPS with Softkill/Hardkill Solutions	[Blue Bar]				[Grey Bar]																							
	MAPS Characterization																											
VPS NDI Capability Install/Characterization	[Blue Bar]				[Blue Bar]																							
	VPS NDI Capability Install/Characterization				[Blue Bar]																							
VPS Trade Study	[Blue Bar]				[Grey Bar]																							
	VPS Trade Study & AoA																											
VPS MAC Development Contract Awards	[Grey Bar]				[Grey Bar]				1																			
									VPS MAC Development Contract Awards																			
MAC and LWR Platform Integration	[Grey Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]															
					MAC and LWR Platform Integration				[Blue Bar]				[Blue Bar]															
MAC and LWR Component Qualification Testing	[Grey Bar]				[Blue Bar]				[Blue Bar]																			
					MAC and LWR Component Qualification Testing				[Blue Bar]																			
MAC and LWR Integration Design (Abrams, Bradley, AMPV, Stryker)	[Grey Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]															
					MAC and LWR Platform Integration Design				[Blue Bar]				[Blue Bar]															
MAC and LWR Software Development	[Grey Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]															
					MAC and LWR Software Development				[Blue Bar]				[Blue Bar]															
MAC and LWR Platform Qualification Testing	[Grey Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]											
					MAC and LWR Platform Qualification Testing				[Blue Bar]				[Blue Bar]				[Blue Bar]											
MAC and LWR Logistic Product Development	[Grey Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]											
					MAC and LWR Logistic Product Development				[Blue Bar]				[Blue Bar]				[Blue Bar]											
Survivability Improvements Development	[Grey Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]							
					Survivability Improvements Development				[Blue Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]							
Survivability Improvements - Armor Upgrade Qualification Testing	[Grey Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]															
					Armor Upgrade Qualification Testing				[Blue Bar]				[Blue Bar]															
Survivability Improvements - Armor Upgrade Logistics Product Development	[Grey Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]				[Blue Bar]											
					Armor Upgrade Logistics Product Development				[Blue Bar]				[Blue Bar]				[Blue Bar]											

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
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 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
Suvivability Improvements - Tranche II Technology Maturation & Development	[Redacted]																											
Suvivability Improvements - Top Attack Environmental Testing	[Redacted]																											
Suvivability Improvements - Top Attack Platform Testing	[Redacted]																											
Suvivability Improvements - Top Attack Integration	[Redacted]																											
Suvivability Improvements - Top Attack Log Product Development and Provisioning	[Redacted]																											
Suvivability Improvements - Top Attack Production Contracts	[Redacted]																											
Suvivability Improvements - CCDO Development	[Redacted]																											
Suvivability Improvements - CCDO Testing	[Redacted]																											
Suvivability Improvements - CCDO Platform Integration	[Redacted]																											
Suvivability Improvements - CCDO Log Product Development and Provisioning	[Redacted]																											
Suvivability Improvements - CCDO Production Contracts	[Redacted]																											
Radar Sensor Technology - Limited Characterization	[Redacted]																											

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
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

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 and LWR Platform Integration	4	2019	2	2023
MAC and LWR Component Qualification Testing	1	2020	2	2020
MAC and LWR Integration Design (Abrams, Bradley, AMPV, Stryker)	1	2021	1	2022
MAC and LWR Software Development	2	2021	4	2022
MAC and LWR Plaform Qualification Testing	1	2022	1	2023
MAC and LWR Logisitic Product Development	1	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
Suvivability Improvements - Tranche II Technology Maturation & Development	3	2020	4	2025
Suvivability Improvements - Top Attack Environmental Testing	3	2020	1	2021
Suvivability Improvements - Top Attack Platform Testing	1	2021	3	2021
Suvivability Improvements - Top Attack Integration	2	2021	3	2021
Suvivability Improvements - Top Attack Log Product Development and Provisioning	3	2021	1	2022
Suvivability Improvements - Top Attack Production Contracts	3	2021	3	2021
Suvivability Improvements - CCDO Development	1	2020	4	2020
Suvivability Improvements - CCDO Testing	1	2021	4	2023
Suvivability Improvements - CCDO Platform Integration	1	2024	4	2024

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
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

Events	Start		End	
	Quarter	Year	Quarter	Year
Suvivability Improvements - CCDO Log Product Development and Provisioning	3	2024	4	2024
Suvivability Improvements - CCDO Production Contracts	2	2025	2	2025
Radar Sensor Technology - Limited Characterization	4	2020	4	2021

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army **Date:** February 2020

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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
XU9: Active Protection System	-	24.493	37.500	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	61.993
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

There is no funding request for Program Element (PE) 0604852A Suite of Survivability Enhancement Systems - EMD Project XU9 Active Protection System in Fiscal Year (FY) 2021.

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 2019	FY 2020	FY 2021
<p>Title: Active Protection System (APS) Installation Kit Refinement and System Test - Abrams</p> <p>Description: Funding provided supports APS test support for the M1A2 SEPv3</p> <p>FY 2020 Plans: The Abrams APS effort completed the necessary characterization and government, contractor and safety testing of the modified Abrams APS A-Kit with the existing B-Kit on an M1A2 SEPv3 to obtain an Abrams APS Urgent Material Release.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Abrams APS complete: There is no funding request for PE 0604852A Suite of Survivability Enhancement Systems - EMD Project XU9 Active Protection System in FY 2021.</p>	-	9.148	-
<p>Title: Active Protection System (APS) Installation Kit Refinement and System Test - Bradley</p> <p>Description: Funding provided support APS integration and test support for Bradley</p> <p>FY 2020 Plans:</p>	24.493	26.649	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2021 Army **Date:** February 2020

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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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021
Completed engineering, logistics, and program management to mature the Bradley APS integration kit design, developed software releases across Bradley vehicle variants to operate the APS, and executed contractor testing of the vehicle software version updates prior to the execution of system performance and safety testing necessary to obtain a Bradley APS UMR. FY 2020 to FY 2021 Increase/Decrease Statement: Bradley APS: There is no funding request for PE 0604852A Suite of Survivability Enhancement Systems - EMD Project XU9 Active Protection System in FY 2021.			
Title: FY 2020 SBIR/STTR Transfer Description: Funding transferred in accordance with Title 15 USC ?638 FY 2020 Plans: Funding transferred in accordance with Title 15 USC ?638 FY 2020 to FY 2021 Increase/Decrease Statement: Funding transferred in accordance with Title 15 USC ?638	-	1.703	-
Accomplishments/Planned Programs Subtotals	24.493	37.500	-

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• GA0700: M1 Abrams Tank (MOD)	959.041	353.292	392.013	-	392.013	374.060	387.201	389.299	497.035	Continuing	Continuing
• GZ2400: Bradley Program (MOD)	514.424	415.740	493.109	-	493.109	467.648	261.313	54.993	30.562	Continuing	Continuing
• GM0100: Stryker (Mod)	127.289	397.687	0.000	-	0.000	-	-	-	-	Continuing	Continuing

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.

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

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0604852A / <i>Suite of Survivability Enhancement Systems - EMD</i>	Project (Number/Name) XU9 / <i>Active Protection System</i>

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 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604852A / Suite of Survivability Enhancement Systems - EMD				XU9 / Active Protection System							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.703		-		-		-	0.000	1.703	-
Subtotal			-	-		1.703		-		-		-	0.000	1.703	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
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	8.865	23.687	Aug 2019	26.189	Feb 2020	-		-		-	0.000	58.741	-
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			43.828	23.687		26.189		-		-		-	0.000	93.704	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 5				PE 0604852A / Suite of Survivability Enhancement Systems - EMD				XU9 / Active Protection System							
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
Program Management Office (PMO) Support	MIPR	PEO Ground Combat Systems : Warren, MI	3.276	0.180	Oct 2018	0.176	Jul 2020	-		-		-	0.000	3.632	-
Subtotal			3.276	0.180		0.176		-		-		-	0.000	3.632	N/A
Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
Government Testing - Abrams Active Protection System (APS)	MIPR	Various : Army Test Centers	19.782	-		9.432	Feb 2020	-		-		-	0.000	29.214	-
Government Testing - Bradley Active Protection System (APS)	MIPR	Various : Army Test Centers	9.271	0.626	Jan 2019	-		-		-		-	0.000	9.897	-
Government Testing - Stryker Active Protection System (APS)	MIPR	Various : Army Test Centers	3.374	-		-		-		-		-	0.000	3.374	-
Subtotal			32.427	0.626		9.432		-		-		-	0.000	42.485	N/A
Project Cost Totals			79.531	24.493		37.500		-		-		-	0.000	141.524	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
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 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025															
	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 spanning FY 2019 Q1-Q4, FY 2020 Q1-Q4]																																							
Abrams APS Production	[Blue bar spanning FY 2019 Q1-Q4]																																							
Bradley APS Decision Point (DP) 1 (Production)	1																																							
Bradley APS Installation Kit (IK) Refinement, Prototype Build, & Test	[Blue bar spanning FY 2019 Q1-Q4, FY 2020 Q1-Q4]																																							
Bradley APS Decision Point (DP) 2 (Production)	2																																							
Bradley APS Production	[Blue bar spanning FY 2019 Q1-Q4]																																							
Stryker APS Installation Kit (IK) Refinement, Prototype Build, & Test	[Blue bar spanning FY 2019 Q1-Q2]																																							
Stryker APS Decision Point (DP) 2 (Production)	3																																							
Stryker Additional APS Demonstration	[Blue bar spanning FY 2019 Q1-Q2]																																							
Stryker Continued Additional APS Refinement/Prototype Build																	[Blue bar spanning FY 2020 Q3-Q4, FY 2021 Q1-Q2]																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Army		Date: February 2020
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