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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0604852A I Suite of Survivability Enhancement Systems - EMD							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	90.187	52.839	98.698	-	98.698	93.844	97.626	100.673	93.971	0.000	627.838
FE8: Vehicle Protection Suite	-	10.656	26.871	47.698	-	47.698	93.844	97.626	100.673	93.971	0.000	471.339
XU9: Active Protection System	-	79.531	25.968	51.000	-	51.000	0.000	0.000	0.000	0.000	0.000	156.499

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 Program Element (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 Project (XU9) 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 will also serve to inform the Vehicle Protection Suite Analysis of Alternatives (AoA).

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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Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 5: System Development & Demonstration (SDD)		R-1 Program Element (Number/Name) PE 0604852A I Suite of Survivability Enhancement Systems - EMD				
B. Program Change Summary (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget		98.600	69.204	47.706	-	47.706
Current President's Budget		90.187	52.839	98.698	-	98.698
Total Adjustments		-8.413	-16.365	50.992	-	50.992
• Congressional General Reductions		-0.055	-0.065			
• Congressional Directed Reductions		-30.700	-16.300			
• Congressional Rescissions		-	-			
• Congressional Adds		25.000	-			
• Congressional Directed Transfers		-	-			
• Reprogrammings		-	-			
• SBIR/STTR Transfer		-2.658	-			
• Adjustments to Budget Years		-	-	50.992	-	50.992
Congressional Add Details (\$ in Millions, and Includes General Reductions)						
Project: XU9: Active Protection System						FY 2018
Congressional Add: Additional APS Funding						FY 2019
						25.000
Congressional Add Subtotals for Project: XU9						-
						25.000
Congressional Add Totals for all Projects						-
Change Summary Explanation						
FY 2020 increase of \$50.992 supports the completion of engineering, logistics, and program management to mature the Abrams and Bradley APS integration kit design, build APS prototypes, and execute system performance and safety testing necessary to obtain an APS Urgent Materiel Release (UMR).						

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FE8: Vehicle Protection Suite	-	10.656	26.871	47.698	-	47.698	93.844	97.626	100.673	93.971	0.000	471.339
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
Note Survivability improvements are a new start for FY 2020.												
A. Mission Description and Budget Item Justification Survivability improvements are a new start for FY 2020. 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 system platforms.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Modular Active protection system Controller (MAC) Framework Integration of Non-Developmental Items (NDI)								7.572	19.969	31.563	-	31.563
Description: (Title Change, previously Maturation and Characterization of MAPS Compliant/Non-developmental Items (NDI) Capabilities) Development effort to incorporate the MAC framework and Non-developmental technologies on to ground combat platforms. The development effort will include design development, prototype build, component and platform qualification testing and logistics products.												
FY 2019 Plans: Continued design effort, incorporating mature active, reactive and passive solutions into the Modular Active protection system Controller. Laser Warning Receiver will be the initial system integrated with MAC.												
FY 2020 Base Plans:												

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army			Date: March 2019			
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Integration of the Laser Warning Receiver (LWR) with the Modular Active protection system Controller (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 2019 to FY 2020 Increase/Decrease Statement: Increase is due to initiation of the LWR and MAC integration efforts on the Abrams, Bradley, AMPV, and Stryker platforms.						
Title: VPS - Trade Study and Analysis of Alternatives (AoA) Description: Initiation of the VPS Trade Study and Analysis of Alternatives (AoA) will identify technologies, active, reactive and passive protection solutions, to pursue in the next phase of the program (Tranche II). FY 2019 Plans: Prepare an Analysis of Alternatives (AoA) and execute trade study of both existing and developmental active, reactive, and passive protection solutions. The VPS Trade Study and AoA will assess the cost, maturity, complexity, performance, and physical properties of alternative survivability sets to determine the optimal application of VPS into to the Army's ground platforms. FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to the completion of the AoA effort.		-	2.291	-	-	-
Title: Vehicle Protection Suite Government Engineering and Program Management Description: Government program management support and program oversight. FY 2019 Plans: Continued government program management support (labor, travel, training, supplies, and equipment) to support VPS program planning, to include the oversight of MAC characterization. FY 2020 Base Plans: Continuing government program management support to support VPS program planning, to include the oversight of MAC characterization and development of MAC-compliant VPS survivability sets.		3.084	3.627	3.627	-	3.627
Title: Survivability Improvements Description: Funding for the design development of the platform integration, test and logistic products of active, reactive, and passive survivability improvements onto ground combat vehicle platforms.		-	-	12.508	-	12.508

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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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
FY 2020 Base Plans: New start: 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 AoA/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 and hard kill, top attack defense, radar system upgrades, and other emerging technologies.					
FY 2019 to FY 2020 Increase/Decrease Statement: Increase is due to initiation of armor tile upgrade effort for three ground combat vehicle platforms and initiation of the integration of the Tranche II technologies.					
Title: FY 2019 SBIR / STTR Transfer					
FY 2019 Plans: FY 2019 SBIR / STTR Transfer					
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer					
Accomplishments/Planned Programs Subtotals		10.656	26.871	47.698	-
C. Other Program Funding Summary (\$ in Millions)					
N/A					
Remarks					
D. Acquisition Strategy					
In FY 2018, the VPS program will initiate characterization of the MAC compliant/NDI capabilities (hardware, software, interfaces, etc.) to inform the VPS Analysis of Alternative (AoA). 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 AoA, informed by the 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 platforms. The VPS Tranche II solutions will have a decision point in FY 2020 with contract awards for platform specific engineering efforts planned for the first quarter of FY 2020.					
E. Performance Metrics					
N/A					

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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					
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	3.084	Oct 2017	3.627	Oct 2018	3.627	Oct 2019	-		3.627	28.196	38.534	-
Subtotal			-	3.084		3.627		3.627		-		3.627	28.196	38.534	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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)	MIPR	Various TACOM Warren : Warren, MI	-	7.572	Nov 2017	19.969	Dec 2018	26.274	Nov 2019	-		26.274	0.000	53.815	-
Survivability Improvements	MIPR	Various TACOM Warren : Warren, MI	-	-		-		6.024	Nov 2019	-		6.024	0.000	6.024	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		0.984	Nov 2018	-		-		-	0.000	0.984	-
Subtotal			-	7.572		20.953		32.298		-		32.298	0.000	60.823	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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 Analysis of Alternatives (AoA)	MIPR	Various : TACOM Warren Michigan	-	-		2.291	Jan 2019	-		-		-	0.000	2.291	-
Subtotal			-	-		2.291		-		-		-	0.000	2.291	N/A

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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					
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Survivability Improvements	MIPR	Various TACOM Warren : Warren, MI	-	-		-		6.484	Jun 2020	-		6.484	0.000	6.484	-
MAC Framework Integration of Non-Developmental Items (NDI)	MIPR	Various TACOM Warren : Warren, MI	-	-		-		5.289	Jun 2020	-		5.289	0.000	5.289	-
Subtotal			-	-		-		11.773		-		11.773	0.000	11.773	N/A
Remarks N/A															
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	10.656		26.871		47.698		-		47.698	28.196	113.421	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
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 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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																												
VPS NDI Capability Install/Characterization																												
Vehicle Protection Suite (VPS) Analysis of Alternatives (AoA)																												
Vehicle Protection Suite (VPS) Development Contract Awards																												
MAC and LWR Platform Integration																												
MAC and LWR Component Qualification Testing																												
MAC and LWR Integration Design (Abrams, Bradley, AMPV, Stryker ICV & ICV-S)																												
MAC and LWR Logisitic product Development																												
MAC and LWR Software Development																												
MAC and LWR Plaform Qualification Testing																												
Survivability Improvement Development																												
Survivability Improvement - Armor Upgrade Logistics Package Development																												
Survivability Improvement - Armor Upgrade Qualification Testing																												

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army												Date: March 2019																
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 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Tranche II Technology Maturation & Development																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
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	2018	2	2019
VPS NDI Capability Install/Characterization	2	2018	4	2019
Vehicle Protection Suite (VPS) Analysis of Alternatives (AoA)	2	2018	4	2019
Vehicle Protection Suite (VPS) Development Contract Awards	1	2020	1	2020
MAC and LWR Platform Integration	1	2020	4	2021
MAC and LWR Component Qualification Testing	1	2020	2	2020
MAC and LWR Integration Design (Abrams, Bradley, AMPV, Stryker ICV & ICV-S)	1	2020	3	2020
MAC and LWR Logisitic product Development	1	2020	2	2021
MAC and LWR Software Development	2	2020	2	2021
MAC and LWR Plaform Qualification Testing	4	2020	1	2022
Survivability Improvement Development	1	2020	1	2021
Survivability Improvement - Armor Upgrade Logistics Package Development	1	2020	1	2021
Survivability Improvement - Armor Upgrade Qualification Testing	1	2020	1	2021
Tranche II Technology Maturation & Development	1	2020	4	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
XU9: Active Protection System	-	79.531	25.968	51.000	-	51.000	0.000	0.000	0.000	0.000	0.000	156.499
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Active Protection System (APS) Installation Kit Refinement and System Test - Abrams								31.905	-	15.000	-	15.000
Description: Funding provided supports APS Test Support for the M1A2 SEPv3												
FY 2020 Base Plans: The Abrams APS effort will characterize and test the modified Abrams APS A-Kit with the existing B-Kit on an M1A2 SEPv3. Execute government, contractor and safety testing.												
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2020 increase supports the completion of engineering, logistics, and program management to mature the Abrams APS integration kit design, build APS prototypes, and execute system performance and safety testing necessary to obtain an APS Urgent Materiel Release (UMR).												
Title: Active Protection System (APS) Installation Kit Refinement and System Test - Bradley								10.000	24.493	36.000	-	36.000
Description: Funding provided support APS integration and Test support for Bradley												
FY 2019 Plans: Continued engineering, logistics, and program management to mature the Bradley Active Protection System (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 Urgent Material Release (UMR).												
FY 2020 Base Plans:												

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Exhibit R-2A, RDT&E Project Justification: PB 2020 Army									Date: March 2019		
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				
B. Accomplishments/Planned Programs (\$ in Millions)							FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Continue engineering, logistics, and program management to mature the Bradley Active Protection System (APS) integration kit design, develop software releases across Bradley vehicle variants to operate the APS, and execute contractor testing of the vehicle software version updates prior to the execution of system performance and safety testing necessary to obtain a Bradley APS Urgent Material Release (UMR). FY 2019 to FY 2020 Increase/Decrease Statement: Increase supports the completion of engineering, logistics, and program management to mature the Bradley APS integration kit design, build APS prototypes, and execute system performance and safety testing necessary to obtain an APS Urgent Materiel Release (UMR).											
Title: Active Protection System (APS) Installation Kit Refinement and System Test - Stryker Description: Funding provided support APS integration and Test support for Stryker							12.626	-	-	-	-
Title: FY 2019 SBIR / STTR Transfer FY 2019 Plans: FY 2019 SBIR / STTR Transfer FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer							-	1.475	-	-	-
Accomplishments/Planned Programs Subtotals							54.531	25.968	51.000	-	51.000
							FY 2018	FY 2019			
Congressional Add: Additional APS Funding							25.000	-			
FY 2018 Accomplishments: Additional APS Funding											
Congressional Adds Subtotals							25.000	-			
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• GA0700: M1 Abrams Tank (MOD)	602.026	959.041	348.800	13.100	361.900	399.314	369.166	386.422	370.544	Continuing	Continuing
• GZ2400: Bradley Program (MOD)	585.851	515.424	638.781	-	638.781	715.310	487.603	60.919	55.913	Continuing	Continuing
• GM0100: Stryker (Mod)	285.320	127.301	144.387	4.100	148.487	164.269	283.913	286.396	303.480	Continuing	Continuing

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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) XU9 / Active Protection System	

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

<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020</u> <u>Base</u>	<u>FY 2020</u> <u>OCO</u>	<u>FY 2020</u> <u>Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
Remarks											

D. Acquisition Strategy

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

The Active Protection System (APS) installation and characterization effort will evaluate platform (Abrams, Bradley, Stryker) performance with an Non-Developmental Item (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, as well as Bradley and Stryker pending Army leadership approval.

E. Performance Metrics

N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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					
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	14.152	Nov 2017	-		-		-		-	0.000	14.152	-
Active Protection System (APS) Installation Kit Development and Prototype Build - Bradley	SS/ Various	US Army TARDEC; Israeli Military Industries (IMI); BAE Systems : Warren, MI	-	0.039	Jan 2018	22.300	Jan 2019	30.300	Nov 2019	-		30.300	0.000	52.639	-
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	-	0.251	Jan 2018	-		-		-		-	0.000	0.251	-
Active Protection System (APS) Installation Kit Development and Prototype Build - 4th System	C/CPIF	Contract : Texas	-	25.000	Dec 2018	-		-		-		-	0.000	25.000	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		1.475	Nov 2018	-		-		-	0.000	1.475	-
Subtotal			-	39.442		23.775		30.300		-		30.300	0.000	93.517	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	3.685	Oct 2017	0.600	Oct 2018	0.150	Oct 2019	-		0.150	0.000	4.435	-
Subtotal			-	3.685		0.600		0.150		-		0.150	0.000	4.435	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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					
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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	-	15.859	Nov 2017	-		15.000	Jan 2020	-		15.000	0.000	30.859	-
Government Testing - Bradley Active Protection System (APS)	MIPR	Various : Army Test Centers	-	9.261		1.593	Jan 2019	5.550	Jan 2020	-		5.550	0.000	16.404	-
Government Testing - Stryker Active Protection System (APS)	MIPR	Various : Army Test Centers	-	11.284	Jan 2018	-		-		-		-	0.000	11.284	-
Subtotal			-	36.404		1.593		20.550		-		20.550	0.000	58.547	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	79.531		25.968		51.000		-		51.000	0.000	156.499	N/A
Remarks															

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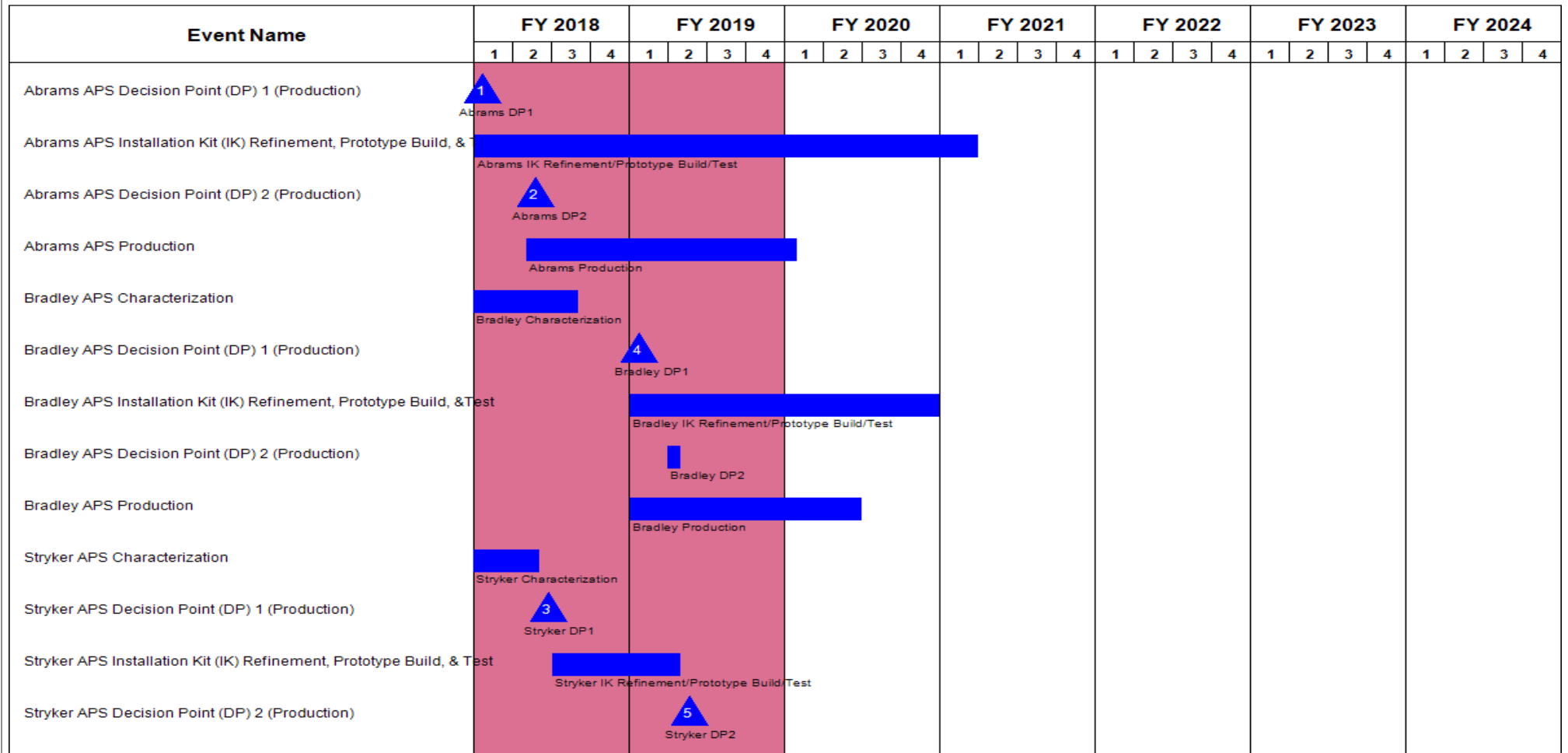
Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army

Date: March 2019

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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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army																Date: March 2019												
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 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Stryker APS Production					<div></div> <div>Stryker Production</div>																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
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 APS Production	2	2019	3	2019