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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 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0205456A / <i>Lower Tier Air and Missile Defense (AMD) System</i>							
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	-	74.295	97.746	0.166	-	0.166	0.169	0.000	0.000	0.000	0.000	172.376
EF9: <i>System Integration and Test</i>	-	74.295	97.746	0.166	-	0.166	0.169	0.000	0.000	0.000	0.000	172.376

Program MDAP/MAIS Code: 505

A. Mission Description and Budget Item Justification

The PATRIOT system includes a family of hardware, software, interceptors (PAC-2, Guidance Enhanced Missiles, PAC-3 and PAC-3 Missile Segment Enhancement) and Ground Support Equipment. As software and hardware improvements are developed, there is a continuing need for system level modeling, simulation, integration and testing. Modeling and Simulation (M&S) allow for performance assessment against all threats that would not be possible in flight tests due to cost, target and range constraints. Flight testing is periodically required for validation of the modeling and simulation as well as satisfying Army Test and Evaluation Command/Director, Operational Test and Evaluation (ATEC/DOTE) requirements of segment improvements. The Lower Tier AMD System line also supports identification, analysis, design, and test materiel solutions to counter cyber security and electronic warfare shortcomings to all elements of the Lower Tier Battle Space.

PATRIOT is an integral part of the overall Air and Missile Defense (AMD) Architecture and enables the incremental fielding of the system capability for Army Air and Missile Defense Battalions.

Program Element (PE) 0205456A Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement beginning of Fiscal Year (FY) 2021, to PE 0607865A Patriot Product Improvement and C12101000 Lower Tier Air and Missile Defense Sensor beginning of FY 2022.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	77.188	107.746	111.080	-	111.080
Current President's Budget	74.295	97.746	0.166	-	0.166
Total Adjustments	-2.893	-10.000	-110.914	-	-110.914
• Congressional General Reductions	-	-	-	-	-
• Congressional Directed Reductions	-	-10.000	-	-	-
• Congressional Rescissions	-	-	-	-	-
• Congressional Adds	-	-	-	-	-
• Congressional Directed Transfers	-	-	-	-	-
• Reprogrammings	-0.018	-	-	-	-
• SBIR/STTR Transfer	-2.875	-	-	-	-
• Adjustments to Budget Years	-	-	-110.914	-	-110.914

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army										Date: February 2020		
Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) System				Project (Number/Name) EF9 / System Integration and Test			
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
EF9: System Integration and Test	-	74.295	97.746	0.166	-	0.166	0.169	0.000	0.000	0.000	0.000	172.376
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Program Development, Integration, and Support	38.621	31.256	0.166	-	0.166
Description: Funding provides program development, integration, and support for the Lower Tier Air and Missile Defense System.					
FY 2020 Plans:					
-Will continue program development through system level modeling, simulation, integration and testing support.					
-Will continue integration of missile and ground system hardware and software to complete PDB-8.1 activities.					
FY 2021 Base Plans:					
Beginning FY 2021, PE 0205456A / Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement. The remaining FY 2021 funds of \$166 thousand will be used for SMDC support.					
FY 2020 to FY 2021 Increase/Decrease Statement:					

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Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) System	Project (Number/Name) EF9 / System Integration and Test

B. Accomplishments/Planned Programs (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Beginning FY 2021, PE 0205456A Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement.					
Title: Testing, Targets, Modeling and Simulation FY 2020 Plans: -Will continue the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts. -Will continue test activities to support the TEMP. -Will continue system testing/analysis for PDB-8.1 DTE and LUT. -Will continue planning, integration and testing of missile and ground system hardware and software to complete PDB 8.1 activities. -Will continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements. -Will continue planning, design, and acquisition of long lead Targets for PDB 8.1 Testing. -Will continue Ballistic Missile Defense System (BMDS) Integration Testing. FY 2020 to FY 2021 Increase/Decrease Statement: Beginning FY 2021, PE 0205456A Lower Tier Air and Missile Defense (AMD) System funding will be realigned to PE 0607865A Patriot Product Improvement.	35.674	62.073	-	-	-
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	-	4.417	-	-	-
Accomplishments/Planned Programs Subtotals	74.295	97.746	0.166	-	0.166

C. Other Program Funding Summary (\$ in Millions)											
Line Item	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
• C53101: MSE Missile	1,131.276	702.437	603.188	176.585	779.773	765.887	1,008.835	908.799	804.295	Continuing	Continuing

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

Line Item	FY 2019	FY 2020	FY 2021	FY 2021	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025	Cost To	
			Base	OCO	Total					Complete	Total Cost
• C50016: System Integration and Test Procurement	105.395	107.157	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• S40: Army Integrated Air and Missile Defense	318.850	208.638	193.929	-	193.929	63.678	33.162	94.758	74.936	0.000	987.951
• BZ5075: IAMD Battle Command System	-	29.629	201.587	-	201.587	353.561	416.995	413.356	417.415	Continuing	Continuing
• 0604741A: Air Defense Command, Control and Intelligence - Eng Dev	208.965	33.502	43.651	27.000	70.651	49.051	39.720	24.397	16.692	0.000	442.978
• AD5070: AIR & MSL Defense Planning & Control Sys	29.913	39.061	47.374	15.143	62.517	68.778	102.399	-	-	0.000	302.668
• EX2: Lower Tier Air Missile Defense (LTAMD) Capability	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	0.000	1,590.085
• 0604319A: Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	10.324	-	0.000	-	0.000	-	-	-	-	0.000	10.324
• C62002: IFPC INC 2- I BLOCK 1 SYSTEM	31.286	9.337	106.261	-	106.261	237.803	392.134	368.447	274.566	0.000	1,419.834
• EY7: IFPC Increment 2 - Block 1	92.674	194.366	235.770	-	235.770	341.077	181.830	98.210	13.639	0.000	1,157.566

Remarks

This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.

D. Acquisition Strategy

The ongoing design and developmental activities enable modeling and simulation infrastructure maintenance and upgrades coupled with end to end testing of the Lower Tier architecture against the evolving threat as an element of an integrated Air and Missile Defense system. This strategy minimizes technological risks and provides a means of enhancing system capability through planned upgrades of deployed systems. Lower Tier system development efforts enable further improvement of system capabilities against emerging and reactive threats. Developing, fabricating and testing hit to kill surface to air missile and associated ground support equipment provides essential increases in battle space, accuracy, lethality and firepower to counter and destroy evolving air defense threats. These state-of-the-art capabilities and enhancements require ongoing demonstration through a series of flight tests and modeling and simulation activities.

Beginning in FY 2021, these efforts will be funded through PE 0607865A Patriot Product Improvement.

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

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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			
Government Program Management	MIPR	Various : Huntsville, Alabama	4.428	1.123	Dec 2018	1.890	Dec 2019	-		-		-	0.000	7.441	-
PAC-3 Product Office	RO	Project Office : Huntsville, AL	3.504	1.663	Oct 2018	1.331	Oct 2019	-		-		-	0.000	6.498	-
SMDC DA Civilian Labor	IA	SMDC : SMDC	-	-		-		0.166	Dec 2020	-		0.166	0.000	0.166	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		4.417		-		-		-	0.000	4.417	-
Subtotal			7.932	2.786		7.638		0.166		-		0.166	0.000	18.522	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			
Program Integration MSE LMMFC	Various	Lockheed Martin Missiles and Fire Control (LMMFC) : Dallas, Texas	42.183	13.237	Feb 2019	16.032	Feb 2020	-		-		-	0.000	71.452	-
MSE/PAC-3 Raytheon	Various	Raytheon : Waltham, Massachusetts	18.417	6.930	Feb 2019	7.332	Feb 2020	-		-		-	0.000	32.679	-
SETA Contracts	Various	Multiple : Multiple	6.891	1.096	Feb 2019	2.377	Feb 2020	-		-		-	0.000	10.364	-
U.S. Other Government Agencies (OGAs)	MIPR	Various : Huntsville, Alabama	24.887	9.602	Dec 2018	6.252	Dec 2019	-		-		-	0.000	40.741	-
Subtotal			92.378	30.865		31.993		-		-		-	0.000	155.236	N/A

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			
Targets/Threats Simulators	MIPR	Various : Huntsville, Alabama	92.393	14.878	Feb 2019	24.778	Feb 2020	-		-		-	0.000	132.049	-

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Army		Date: February 2020
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) System	Project (Number/Name) EF9 / System Integration and Test

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
PATRIOT System Testing, Integration and Evaluation																												
Program Development, Integration, and Support																												
Testing, Targets, Modeling and Simulation																												
PDB-8 Fielding																												
PDB 8.1																												
Developmental/Operational Flight Testing																												

Note
Please note, beginning in FY21 these activities will be funded through 0607865A / Patriot Product Improvement.

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

Events	Start		End	
	Quarter	Year	Quarter	Year
PATRIOT System Testing, Integration and Evaluation	1	2015	4	2020
Program Development, Integration, and Support	1	2015	4	2020
Testing, Targets, Modeling and Simulation	1	2015	4	2020
PDB-8.0.5 Agile Build	1	2017	4	2018
PDB-8 Fielding	2	2018	4	2020
PDB-8 IOC	3	2018	3	2018
PDB 8.1	1	2018	4	2020
Developmental/Operational Flight Testing	3	2020	4	2020