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Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army										Date: February 2018		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 0205456A I Lower Tier Air and Missile Defense (AMD) System							
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	-	61.449	78.926	79.283	-	79.283	107.785	111.124	121.376	117.336	Continuing	Continuing
EF9: System Integration and Test	-	61.449	78.926	79.283	-	79.283	107.785	111.124	121.376	117.336	Continuing	Continuing
Program MDAP/MAIS Code: 505												
A. Mission Description and Budget Item Justification												
<p>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.</p> <p>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.</p> <p>Funding 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.</p> <p>FY2019 base dollars in the amount of \$79.283 million supports the continuance of program development with the integration of missile and ground system software and hardware in support of complete Post Deployment Build-8.1 (PDB-8.1). Continues the testing program to support the Test and Evaluation Master Plan (TEMP) and system testing/analysis long lead activities for PDB-8.1 Development Test and Evaluation (DTE) and Limited User Test (LUT).</p>												

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2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development		PE 0205456A / Lower Tier Air and Missile Defense (AMD) System			
B. Program Change Summary (\$ in Millions)	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	73.417	78.926	80.314	-	80.314
Current President's Budget	61.449	78.926	79.283	-	79.283
Total Adjustments	-11.968	0.000	-1.031	-	-1.031
• Congressional General Reductions	-0.031	-			
• Congressional Directed Reductions	-5.528	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.409	-			
• Adjustments to Budget Years	-	-	-1.031	-	-1.031
• Amended FY2017 not appropriated	-4.000	-	-	-	-
Change Summary Explanation					
FY2017: -\$5.528 million due to the availability of prior year execution balances.					
FY2017: Amended PB17 Base request of \$4.0 million was not appropriated.					
FY2019: Base Adjustments to Budget Years: Program Office core employee labor costs moved from RDTE to OMA as part of an OSD auditability directive.					

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Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EF9: System Integration and Test	-	61.449	78.926	79.283	-	79.283	107.785	111.124	121.376	117.336	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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 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 Modeling and Simulation as well as satisfying ATEC/DOTE requirements of segment improvements.

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.

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

	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Title: Program Development, Integration, and Support	27.171	32.144	38.684	-	38.684
Description: Funding is provided for the following effort:					
FY 2018 Plans:					
-Continued program development.					
-Continued integration of missile and ground system hardware and software to complete Post Deployment Build (PDB) -8.1 activities.					
FY 2019 Base Plans:					
-Continues program development.					
-Continues integration of missile and ground system hardware and software to complete PDB-8.1 activities.					
FY 2018 to FY 2019 Increase/Decrease Statement:					
FY18 budget reflects completing PDB-8 testing and initial PDB 8.1 test planning, support, analysis and integration efforts to include significant investments of long-lead target hardware. FY19 budget reflects ramping into PDB 8.1 test support, analysis and integration efforts with lower levels of target hardware investments. The resultant budget is an increase of FY19 budget of \$363K over FY18.					
Title: Testing, Targets, Modeling and Simulation	34.278	46.782	40.599	-	40.599

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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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
<p>Description: Funding is provided for the following effort:</p> <p>FY 2018 Plans:</p> <p>-Continued the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts.</p> <p>-Continued test activities to support the Test & Evaluation Master Plan (TEMP).</p> <p>-Completed (Post Deployment Build) PDB 8.0 Testing</p> <p>-Completed PDB 8.0.5 Testing</p> <p>-Continued system testing/analysis for PDB-8.1 Development Test and Evaluation (DTE) and Limited User Test (LUT).</p> <p>-Began planning, integration and testing of missile and ground system hardware and software to complete PDB 8.1 activities.</p> <p>-Began planning, design, and acquisition of long lead Targets for PDB 8.1 Testing</p> <p>-Continued PATRIOT program Modeling & Simulation (M&S) laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements.</p> <p>FY 2019 Base Plans:</p> <p>-Continues the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts.</p> <p>-Continues test activities to support the TEMP.</p> <p>-Continues system testing/analysis for PDB-8.1 DTE and LUT.</p> <p>-Continues planning, integration and testing of missile and ground system hardware and software to complete PDB 8.1 activities.</p> <p>-Continues PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements.</p> <p>-Planning, design, and acquisition of long lead Targets for PDB 8.1 Testing.</p> <p>-Begins Ballistic Missile Defense System (BMDS) Integration Testing.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement:</p> <p>FY18 budget reflects completing PDB-8 testing and initial PDB 8.1 test planning, support, analysis and integration efforts to include significant investments of long-lead target hardware. FY19 budget reflects ramping</p>						

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B. Accomplishments/Planned Programs (\$ in Millions)								FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
into PDB 8.1 test support, analysis and integration efforts with lower levels of target hardware investments. The resultant budget is an increase of FY19 budget of \$363K over FY18.												
Accomplishments/Planned Programs Subtotals								61.449	78.926	79.283	-	79.283
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost	
• C53101: MSE Missile	809.201	1,106.040	871.276	260.000	1,131.276	512.775	734.152	727.032	813.280	793.430	6,627.186	
• C50016: Lower Tier Air and Missile Defense (AMD)	126.470	140.826	111.395	-	111.395	130.051	105.044	107.288	106.178	0.000	827.252	
• 0604319A: Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	-	11.303	51.030	-	51.030	146.731	132.361	156.732	21.528	0.000	519.685	
• C62002: IFPC INC 2-I BLOCK 1 SYSTEM	-	-	0.000	-	0.000	175.576	303.422	273.802	388.377	0.000	1,141.177	
• C62001: IFPC Inc 2-I Block 1 Missile	-	57.742	145.636	-	145.636	143.466	99.516	14.472	-	0.000	460.832	
• E10: Sentinel	15.368	32.968	39.338	-	39.338	91.534	96.427	80.394	43.874	0.000	399.903	
• S40: Army Integrated Air and Missile Defense	273.240	336.420	277.607	-	277.607	200.275	130.860	63.741	33.196	0.000	1,315.339	
• BZ5075: IAMD Battle Command System	-	-	0.000	-	0.000	72.307	323.680	428.572	497.974	Continuing	Continuing	
• 0604741A: Air Defense Command, Control and Intelligence - Eng Dev	200.205	28.726	95.172	119.300	214.472	15.577	9.310	2.915	29.489	0.000	500.694	
• AD5070: AIR & MSL Defense Planning & Control Sys	126.539	35.735	33.837	-	33.837	24.983	49.385	68.021	63.273	0.000	401.773	
• EX2: Lower Tier Air Missile Defense (LTAMD) Capability	33.780	76.728	120.374	-	120.374	125.772	376.738	332.322	241.461	0.000	1,307.175	
• EY7: IFPC Increment 2 - Block 1	80.781	175.069	157.710	-	157.710	77.599	32.517	-	-	0.000	523.676	
Remarks												
This program is an integral part of the Army Integrated Air and Missile Defense (IAMD) architecture.												

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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
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.		
E. Performance Metrics N/A		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2019 Army												Date: February 2018			
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					
Management Services (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Program Management	MIPR	Various : Huntsville, Alabama	2.308	0.964	Dec 2016	1.156	Dec 2017	1.186	Dec 2018	-		1.186	Continuing	Continuing	-
PAC-3 Product Office	RO	Project Office : Huntsville, AL	1.265	1.051	Oct 2016	1.188	Oct 2017	1.663	Oct 2018	-		1.663	Continuing	Continuing	-
Subtotal			3.573	2.015		2.344		2.849		-		2.849	Continuing	Continuing	N/A
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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 Integration MSE LMMFC	Various	Lockheed Martin Missiles and Fire Control (LMMFC) : Dallas, Texas	12.300	14.427	Feb 2017	15.456	Feb 2018	18.207	Feb 2019	-		18.207	Continuing	Continuing	-
MSE/PAC-3 Raytheon	Various	Raytheon : Waltham, Massachusetts	8.250	4.569	Feb 2017	5.598	Feb 2018	6.930	Feb 2019	-		6.930	Continuing	Continuing	-
SETA Contracts	Various	Multiple : Multiple	4.933	0.889	Feb 2017	1.069	Feb 2018	1.096	Feb 2019	-		1.096	Continuing	Continuing	-
U.S. Other Government Agencies (OGAs)	MIPR	Various : Huntsville, Alabama	9.530	7.680	Dec 2016	7.677	Dec 2017	9.602	Dec 2018	-		9.602	Continuing	Continuing	-
Subtotal			35.013	27.565		29.800		35.835		-		35.835	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Targets/Threats Simulators	MIPR	Various : Huntsville, Alabama	47.533	20.591	Feb 2017	33.637	Feb 2018	14.833	Feb 2019	-		14.833	Continuing	Continuing	-
Modeling and Simulation	MIPR	Various : Huntsville, Alabama	6.724	3.065	Jan 2017	3.685	Jan 2018	3.779	Jan 2019	-		3.779	Continuing	Continuing	-
Contractor T&E	Various	Multiple : Multiple	13.377	1.625	Feb 2017	1.953	Feb 2018	2.003	Feb 2019	-		2.003	Continuing	Continuing	-
Other T&E funding	MIPR	Various : WSMR, NM	6.135	2.822	May 2017	3.190	May 2018	3.246	May 2019	-		3.246	Continuing	Continuing	-

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Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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
Mobile Flight Mission Simulator (MFMS)	SS/FPIF	Raytheon : Massachusetts	9.900	1.226	Jan 2017	0.948	Jan 2018	1.080	Jan 2019	-		1.080	Continuing	Continuing	-
PDB-8	MIPR	Various : WSMR, NM	3.231	2.540	Feb 2017	3.369	Feb 2018	15.658	Feb 2019	-		15.658	Continuing	Continuing	-
PDB-8 DT/OT	MIPR	Various : WSMR, NM	14.887	-		-		-		-		-	0.000	14.887	-
Subtotal			101.787	31.869		46.782		40.599		-		40.599	Continuing	Continuing	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			140.373	61.449		78.926		79.283		-		79.283	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army			Date: February 2018		
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 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
	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-8.0.5 Agile Build																												
PDB-8 IOC																												
PDB 8.1																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0205456A / <i>Lower Tier Air and Missile Defense (AMD) System</i>	Project (Number/Name) EF9 / <i>System Integration and Test</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
PATRIOT System Testing, Integration and Evaluation	1	2015	4	2023
Program Development, Integration, and Support	1	2015	4	2023
Testing, Targets, Modeling and Simulation	1	2015	4	2023
PDB-8.0.5 Agile Build	1	2017	4	2018
PDB-8 IOC	4	2018	4	2018
PDB 8.1	1	2018	4	2022