

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 0205456A / Lower Tier Air and Missile Defense (AMD) 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
Total Program Element	-	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	Continuing	Continuing
EF9: System Integration and Test	-	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	Continuing	Continuing
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.												
FY 2020 base dollars in the amount of \$107.746 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).												
B. Program Change Summary (\$ in Millions)				FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total				
Previous President's Budget				78.926	79.283	107.785	-	107.785				
Current President's Budget				69.558	77.188	107.746	-	107.746				
Total Adjustments				-9.368	-2.095	-0.039	-	-0.039				
• Congressional General Reductions				-0.058	-0.095							
• Congressional Directed Reductions				-6.500	-2.000							
• Congressional Rescissions				-	-							
• Congressional Adds				-	-							
• Congressional Directed Transfers				-	-							
• Reprogrammings				-	-							
• SBIR/STTR Transfer				-2.810	-							
• Adjustments to Budget Years				-	-	-0.039	-	-0.039				

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army		Date: March 2019
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>	
Change Summary Explanation FY 2018 decrement of \$9.4 million citing prior year carryover and for Small Business Innovation Research.		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army										Date: March 2019		
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 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
EF9: System Integration and Test	-	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Program Development, Integration, and Support								29.800	38.684	33.465	-	33.465
Description: Funding is provided for the following effort:												
FY 2019 Plans:												
-Continue program development.												
-Continue integration of missile and ground system hardware and software to complete PDB-8.1 activities.												
FY 2020 Base 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 2019 to FY 2020 Increase/Decrease Statement:												
FY 2019 to FY 2020 spending in Program Development, Integration, and Support decreases by \$5.2 million as peak testing and development activities related to PDB 8.0 completed.												
Title: Testing, Targets, Modeling and Simulation								39.758	35.629	74.281	-	74.281
FY 2019 Plans:												
-Continue the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts.												

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army				Date: March 2019		
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 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<div>-Continue test activities to support the TEMP.</div> <div>-Continue system testing/analysis for PDB-8.1 DTE and LUT.</div> <div>-Continue planning, integration and testing of missile and ground system hardware and software to complete PDB 8.1 activities.</div> <div>-Continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements.</div> <div>-Planning, design, and acquisition of long lead Targets for PDB 8.1 Testing.</div> <div>-Begin Ballistic Missile Defense System (BMDS) Integration Testing.</div> <div>FY 2020 Base Plans:</div> <div>-Will continue the testing program to include utilization of targets/threat simulators, flight simulator and modeling efforts.</div> <div>-Will continue test activities to support the TEMP.</div> <div>-Will continue system testing/analysis for PDB-8.1 DTE and LUT.</div> <div>-Will continue planning, integration and testing of missile and ground system hardware and software to complete PDB 8.1 activities.</div> <div>-Will continue PATRIOT program M&S laboratory infrastructure maintenance as well as the conduct of M&S for hardware/software capability improvements.</div> <div>-Will continue planning, design, and acquisition of long lead Targets for PDB 8.1 Testing.</div> <div>-Will continue Ballistic Missile Defense System (BMDS) Integration Testing.</div> <div>FY 2019 to FY 2020 Increase/Decrease Statement:</div> <div>Testing, Targets, Modeling and Simulation increase of \$38.7 million from FY 2019 to FY 2020 will provide for purchase of targets and additional PDB 8.1 testing.</div>						
<div>Title: SBIR/STTR</div> <div>Description: FY 2019 SBIR/STTR TRANSFER</div> <div>FY 2019 Plans:</div> <div>FY 2019 SBIR/STTR TRANSFER</div> <div>FY 2019 to FY 2020 Increase/Decrease Statement:</div> <div>FY 2019 SBIR/STTR TRANSFER</div>		-	2.875	-	-	-
Accomplishments/Planned Programs Subtotals		69.558	77.188	107.746	-	107.746

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army									Date: March 2019			
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				
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	
• C53101: MSE Missile	1,103.040	1,131.276	0.000	736.541	736.541	767.495	749.530	999.731	898.131	793.430	7,179.174	
• C50016: System Integration and Test Procurement	136.579	105.395	0.000	113.857	113.857	105.044	107.288	86.178	87.410	Continuing	Continuing	
• 0604319A: Indirect Fire Protection Capability Increment 2-Intercept (IFPC2)	10.871	40.979	0.000	-	0.000	-	-	-	-	0.000	51.850	
• C62002: IFPC INC 2- I BLOCK 1 SYSTEM	-	31.286	0.000	9.337	9.337	241.387	446.464	424.568	446.541	0.000	1,599.583	
• C62001: IFPC Inc 2-I Block 1 Missile 1	50.056	145.636	0.000	-	0.000	-	-	-	-	0.000	195.692	
• E10: Sentinel	31.651	39.289	105.243	-	105.243	103.427	105.394	65.574	69.407	0.000	519.985	
• S40: Army Integrated Air and Missile Defense	339.051	322.263	208.938	-	208.938	130.859	63.738	33.193	94.845	0.000	1,192.887	
• BZ5075: IAMD Battle Command System	-	-	29.629	-	29.629	254.834	353.929	417.426	413.775	Continuing	Continuing	
• 0604741A: Air Defense Command, Control and Intelligence - Eng Dev	190.385	212.373	43.502	-	43.502	24.944	7.068	1.228	3.405	0.000	482.905	
• AD5070: AIR & MSL Defense Planning & Control Sys	132.713	29.913	24.730	14.331	39.061	49.147	106.671	63.143	0.075	0.000	420.723	
• EX2: Lower Tier Air Missile Defense (LTAMD) Capability	57.437	89.248	427.772	-	427.772	376.738	332.322	241.461	87.500	0.000	1,612.478	
• EY7: IFPC Increment 2 - Block 1	156.361	132.283	243.228	-	243.228	101.000	58.000	45.000	5.000	0.000	740.872	
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.												

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2020 Army		Date: March 2019
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
E. Performance Metrics N/A		

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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 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 Program Management	MIPR	Various : Huntsville, Alabama	3.272	1.156	Dec 2017	1.186	Dec 2018	2.258	Dec 2019	-		2.258	Continuing	Continuing	-
PAC-3 Product Office	RO	Project Office : Huntsville, AL	2.316	1.188	Oct 2017	1.663	Oct 2018	1.700	Oct 2019	-		1.700	Continuing	Continuing	-
Subtotal			5.588	2.344		2.849		3.958		-		3.958	Continuing	Continuing	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
Program Integration MSE LMMFC	Various	Lockheed Martin Missiles and Fire Control (LMMFC) : Dallas, Texas	26.727	15.456	Feb 2018	13.237	Feb 2019	16.400	Feb 2020	-		16.400	Continuing	Continuing	-
MSE/PAC-3 Raytheon	Various	Raytheon : Waltham, Massachusetts	12.819	5.598	Feb 2018	6.930	Feb 2019	7.700	Feb 2020	-		7.700	Continuing	Continuing	-
SETA Contracts	Various	Multiple : Multiple	5.822	1.069	Feb 2018	1.096	Feb 2019	2.745	Feb 2020	-		2.745	Continuing	Continuing	-
U.S. Other Government Agencies (OGAs)	MIPR	Various : Huntsville, Alabama	17.210	7.677	Dec 2017	9.602	Dec 2018	6.620	Dec 2019	-		6.620	Continuing	Continuing	-
SBIR/STTR	TBD	TBD : TBD	-	-		2.875		-		-		-	0.000	2.875	-
Subtotal			62.578	29.800		33.740		33.465		-		33.465	Continuing	Continuing	N/A
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
Targets/Threats Simulators	MIPR	Various : Huntsville, Alabama	68.124	24.269	Feb 2018	14.833	Feb 2019	35.146	Feb 2020	-		35.146	Continuing	Continuing	-
Modeling and Simulation	MIPR	Various : Huntsville, Alabama	9.789	3.685	Jan 2018	3.779	Jan 2019	3.500	Jan 2020	-		3.500	Continuing	Continuing	-
Contractor T&E	Various	Multiple : Multiple	15.002	1.953	Feb 2018	2.003	Feb 2019	9.730	Feb 2020	-		9.730	Continuing	Continuing	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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					

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
Other T&E funding	MIPR	Various : WSMR, NM	8.957	3.190	Feb 2018	3.246	May 2019	3.884	Feb 2020	-		3.884	Continuing	Continuing	-
Mobile Flight Mission Simulator (MFMS)	SS/FPIF	Raytheon : Massachusetts	11.126	0.948	Jan 2018	1.080	Jan 2019	1.000	Jan 2020	-		1.000	Continuing	Continuing	-
PDB-8	MIPR	Various : WSMR, NM	5.771	3.369	Feb 2018	15.658	Feb 2019	17.063	Feb 2020	-		17.063	Continuing	Continuing	-
PDB-8 DT/OT	MIPR	Various : WSMR, NM	14.887	-		-		-		-		-	0.000	14.887	-
Subtotal			133.656	37.414		40.599		70.323		-		70.323	Continuing	Continuing	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	201.822	69.558		77.188		107.746		-		107.746	Continuing	Continuing	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019
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 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
PATRIOT System Testing, Integration and Evaluation																												
Program Development, Integration, and Support																												
Testing, Targets, Modeling and Simulation																												
PDB-8.0.5 Agile Build																												
PDB-8 Fielding																												
PDB-8 IOC																												
PDB 8.1																												
Developmental/Operational Flight Testing																												
Follow-On Flight Testing																												

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
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	2025
Program Development, Integration, and Support	1	2015	4	2025
Testing, Targets, Modeling and Simulation	1	2015	4	2025
PDB-8.0.5 Agile Build	1	2017	4	2018
PDB-8 Fielding	2	2018	4	2025
PDB-8 IOC	3	2018	3	2018
PDB 8.1	1	2018	4	2022
Developmental/Operational Flight Testing	3	2020	4	2021
Follow-On Flight Testing	3	2022	4	2025