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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 / BA 5: System Development & Demonstration (SDD)					R-1 Program Element (Number/Name) PE 0605457A / Army Integrated Air and Missile Defense (AIAMD)							
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	-	339.051	322.263	208.938	-	208.938	130.859	63.738	33.193	94.845	0.000	1,192.887
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

A. Mission Description and Budget Item Justification

The Army Integrated Air and Missile Defense (AIAMD) program is a designated Major Defense Acquisition Program (MDAP).

The AIAMD program is a direct response to the U.S. Army Air and Missile Defense (AMD) Concept and Operational and Organizational (O&O) Plan for the Future Force, the AIAMD System of Systems (SoS) Capabilities Development Document (CDD) and the AMD Task Force Concept of Operations (CONOPS). The AIAMD Program is uniquely structured to enable the development of an overarching SoS capability with all participating Air Defense Artillery (ADA) components functioning interdependently to provide total operational capabilities not achievable by the individual element systems. The AIAMD program achieves this objective by establishing the AIAMD architecture and developing (1) the IAMD Battle Command Systems (IBCS) Engagement Operations Center (EOC) that provides the common Mission Command capability, (2) the Integrated Fire Control Relay capability for fire control connectivity and distributed operations, and (3) the common Plug and Fight (P&F) Kits that network enable multiple sensor components, weapon components, and the IBCS EOC.

The AIAMD Program will provide advanced capabilities to the Army and the soldier by allowing transformation to a network-centric SoS capability (also referred to as "Plug and Fight") that integrates AMD sensors and weapons with the IBCS EOC. The AIAMD SoS architecture will enable extended range and non-line-of-sight engagements, to include joint kill chain engagements across the full spectrum of aerial threats, providing fire control quality data to the most appropriate weapon to complete the mission successfully. Further, it will mitigate the coverage gaps and the single points of failure that have plagued AMD design in the past. The AIAMD program will provide the user with the ability to train on a single IBCS that will result in overall training savings. The AIAMD program will also provide the Army with the ability to procure components that will interface with the Integrated Fire Control Network (IFCN), alleviating the cost of procuring total system capabilities in the future.

AIAMD IOC will be delivered through the fielding of the IBCS-based AIAMD architecture including the IBCS EOC, Integrated Fire Control Network (IFCN) Relay, Sentinel, and Patriot components working in an integrated manner through the IFCN connection. The government controlled open architecture enables integration of future capabilities to meet emerging threats and fielding to Indirect Fire Protection Capability (IFPC), Air Defense Airspace Management (ADAM) Cells, ADA Brigade, Army Air and Missile Defense Command (AAMDC), and Terminal High Altitude Area Defense (THAAD).

Funding in FY 2020 supports agile software development, developmental and operational testing, culminating in a Limited User Test (LUT) in fourth quarter FY 2020. These include: completion of IBCS Qualification Testing, Logistics Demonstration, New Equipment Training development, Collective Training development and developmental testing. The LUT supports a Low Rate Initial Production Decision at Milestone C in FY 2020 consisting of both hardware in the loop and live fire events. Software development continues throughout FY 2020 to integrate additional capabilities prior to Initial Operational Capability (IOC) in FY 2022.

AIAMD is a critical component of the Army's Air and Missile Defense strategy, the Chief of Staff of the Army's number five modernization priority.

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Appropriation/Budget Activity		R-1 Program Element (Number/Name)				
2040: Research, Development, Test & Evaluation, Army I BA 5: System Development & Demonstration (SDD)		PE 0605457A I Army Integrated Air and Missile Defense (AIAMD)				
B. Program Change Summary (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget		336.420	277.607	200.275	-	200.275
Current President's Budget		339.051	322.263	208.938	-	208.938
Total Adjustments		2.631	44.656	8.663	-	8.663
• Congressional General Reductions		-0.252	-0.344			
• Congressional Directed Reductions		-25.000	-			
• Congressional Rescissions		-	-			
• Congressional Adds		40.000	45.000			
• Congressional Directed Transfers		-	-			
• Reprogrammings		-	-			
• SBIR/STTR Transfer		-12.117	-			
• Adjustments to Budget Years		-	-	8.663	-	8.663
Congressional Add Details (\$ in Millions, and Includes General Reductions)						
Project: S40: Army Integrated Air and Missile Defense						
Congressional Add: Counter Emerging Threat						
Congressional Add: Cyber Security						
Congressional Add Subtotals for Project: S40						
Congressional Add Totals for all Projects						
		FY 2018	FY 2019			
		25.000	30.000			
		15.000	15.000			
		40.000	45.000			
		40.000	45.000			

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Appropriation/Budget Activity 2040 / 5					R-1 Program Element (Number/Name) PE 0605457A / Army Integrated Air and Missile Defense (AIAMD)				Project (Number/Name) S40 / Army Integrated Air and Missile Defense			
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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
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

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The AIAMD program is a direct response to the U.S. Army Air and Missile Defense (AMD) Concept and Operational and Organizational (O&O) Plan for the Future Force, the AIAMD System of Systems (SoS) Capabilities Development Document (CDD) and the AMD Task Force Concept of Operations (CONOPS). The AIAMD Program is uniquely structured to enable the development of an overarching SoS capability with all participating Air Defense Artillery (ADA) components functioning interdependently to provide total operational capabilities not achievable by the individual element systems. The AIAMD program achieves this objective by establishing the AIAMD architecture and developing (1) the IAMD Battle Command Systems (IBCS) Engagement Operations Center (EOC) that provides the common Mission Command capability, (2) the Integrated Fire Control Relay capability for fire control connectivity and distributed operations, and (3) the common Plug and Fight (P&F) Kits that network enable multiple sensor components, weapon components, and the IBCS EOC.

The AIAMD Program will provide advanced capabilities to the Army and the soldier by allowing transformation to a network-centric SoS capability (also referred to as "Plug and Fight") that integrates AMD sensors and weapons with the IBCS EOC. The AIAMD SoS architecture will enable extended range and non-line-of-sight engagements, to include joint kill chain engagements across the full spectrum of aerial threats, providing fire control quality data to the most appropriate weapon to complete the mission successfully. Further, it will mitigate the coverage gaps and the single points of failure that have plagued AMD design in the past. The AIAMD program will provide the user with the ability to train on a single IBCS that will result in overall training savings. The AIAMD program will also provide the Army with the ability to procure components that will interface with the Integrated Fire Control Network (IFCN), alleviating the cost of procuring total system capabilities in the future.

AIAMD IOC will be delivered through the fielding of the IBCS-based AIAMD architecture including the IBCS EOC, Integrated Fire Control Network (IFCN) Relay, Sentinel, and Patriot components working in an integrated manner through the IFCN connection. The government controlled open architecture enables integration of future capabilities to meet emerging threats and fielding to Indirect Fire Protection Capability (IFPC), Air Defense Airspace Management (ADAM) Cells, ADA Brigade, Army Air and Missile Defense Command (AAMDC), and Terminal High Altitude Area Defense (THAAD).

Funding in FY 2020 supports agile software development, developmental and operational testing, culminating in a Limited User Test (LUT) in fourth quarter FY 2020. These include: completion of IBCS Qualification Testing, Logistics Demonstration, New Equipment Training development, Collective Training development and developmental testing. The LUT supports a Low Rate Initial Production Decision at Milestone C in FY 2020 consisting of both hardware in the loop and live fire events. Software development continues throughout FY 2020 to integrate additional capabilities prior to Initial Operational Capability (IOC) in FY 2022.

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Appropriation/Budget Activity 2040 / 5	R-1 Program Element (Number/Name) PE 0605457A / Army Integrated Air and Missile Defense (AIAMD)	Project (Number/Name) S40 / Army Integrated Air and Missile Defense				
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<p>Title: Product Development</p> <p>Description: Product development in support of software development and developmental test phase activities.</p> <p>FY 2019 Plans: Provides for the continuation of software development with Patriot Radar/Launchers, Sentinel, Enduring IFPC, and initiation of agile software development efforts. Funding also provides support for developmental test activities, to include software integration testing and preparation and conduct of developmental flight test.</p> <p>FY 2020 Base Plans: The AIAMD Systems Engineering and Integration and Engineering Manufacturing and Development (EMD) will provide support for developmental test activities; to include software integration testing and preparation/conduct of the Limited User Test. Agile software development will continue to support future capabilities and will include software changes to defeat emerging threats. Government Furnished Equipment for EOC and Relay MEIs will be provided to EMD contractors. Government Systems Engineering and Logistics and AIAMD EMD will continue LUT NET development/Collective Training development.</p> <p>FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is in alignment with efforts associated with the baseline program, to include transition to a competitive agile software development process.</p>		252.489	225.730	166.309	-	166.309
<p>Title: Government Program Management</p> <p>Description: Government program management (core personnel) in support of the baseline program transitioned to Acquisition O&M effective FY 2019.</p>		4.503	-	-	-	-
<p>Title: Test and Evaluation</p> <p>Description: Test and Evaluation support for modeling and simulation, developmental test phase activities, and a Limited User Test.</p> <p>FY 2019 Plans: Provides for continuation of Modeling and Simulation, Joint Interoperability Test Support, Army Evaluation Center/Developmental Test Command/Operational Test Command support and White Sands Missile Range</p>		42.059	41.370	42.629	-	42.629

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B. Accomplishments/Planned Programs (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Test Support for developmental test activities. Provides for preparation and conduct of the developmental flight test. FY 2020 Base Plans: Provides for continuation of Modeling and Simulation efforts at the Government Systems Integration Lab, Joint Interoperability Test Support, Army Test and Evaluation Center and White Sands Missile Range test support for developmental test activities. Provides for preparation and conduct of the Limited User Test. FY 2019 to FY 2020 Increase/Decrease Statement: Increase is driven by the Limited User Test and all efforts directly related to it.					
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	-	10.163	-	-	-
Accomplishments/Planned Programs Subtotals	299.051	277.263	208.938	-	208.938
	FY 2018	FY 2019			
Congressional Add: Counter Emerging Threat FY 2018 Accomplishments: Counter Emerging Threat FY 2019 Plans: Counter Emerging Threat	25.000	30.000			
Congressional Add: Cyber Security FY 2018 Accomplishments: Cyber Security FY 2019 Plans: Cyber Security	15.000	15.000			
Congressional Adds Subtotals	40.000	45.000			

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
• 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

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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
• EF9: System Integration and Test	69.558	77.188	107.746	-	107.746	111.080	121.308	37.186	40.999	Continuing	Continuing
• EX2: Lower Tier Air Missile Defense (LTAMD) Capability	57.437	89.248	427.772	-	427.772	376.738	332.322	241.461	87.500	Continuing	Continuing
• 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
• DU3: IFPC2	10.871	40.979	0.000	-	0.000	-	-	-	-	Continuing	Continuing
• EY7: IFPC Increment 2 - Block 1	156.361	132.283	243.228	-	243.228	101.000	58.000	45.000	5.000	Continuing	Continuing
• 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	Continuing	Continuing
• BZ5075: IAMD Battle Command System	-	-	29.629	-	29.629	254.834	353.929	417.426	413.775	Continuing	Continuing
• 146: Air & Msl Defense Planning Control Sys	23.335	24.296	14.300	-	14.300	8.401	2.915	1.228	3.405	Continuing	Continuing
• 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
• 149: Counter-Rockets, Artillery & Mortar	17.250	14.844	1.277	-	1.277	0.909	-	-	-	0.000	34.280
• 0604403A: Future Interceptor	-	-	8.000	-	8.000	8.000	8.000	88.918	120.000	0.000	232.918
• 0604117A: Maneuver - Short Range Air Defense (M-SHORAD)	19.201	79.016	33.100	6.000	39.100	105.700	341.100	382.600	308.700	0.000	1,275.417
• C14300: M-SHORAD - Procurement	-	-	0.000	262.100	262.100	537.400	292.200	80.500	78.600	Continuing	Continuing
Remarks											
This program is an integral part of the Army Integrated Air and Missile Defense (AIAMD) architecture. It provides for development of a common Integrated Fire Control System through an open architecture approach allowing for integration of Air Defense Artillery (ADA) components as they become available. This approach enables the AIAMD program to pursue its baseline program independent of fluctuation of other programs.											

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<p><u>D. Acquisition Strategy</u></p> <p>The AIAMD acquisition strategy is to deliver an Initial Operational Capability (IOC) in FY 2022. The capabilities are delivered through the fielding of the IAMD Battle Command System (IBCS) based AIAMD architecture including the IBCS Engagement Operations Center (EOC), Sentinel, and Patriot (through a Radar Interface Unit (RIU)) components connected via an Integrated Fire Control Relay, working in an integrated manner. Future capabilities include the incorporation of IBCS functionality into Indirect Fire Protection Capabilities (IFPC), Air Defense Airspace Management (ADAM) Cells, ADA Brigade, Army Air and Missile Defense Command (AAMDC), Terminal High Altitude Area Defense (THAAD) batteries, and other Army and Joint net-centric architectures using an agile software development process.</p> <p>Key principles of the AIAMD acquisition approach are the following:</p> <ul style="list-style-type: none"> - Migrate from system-based acquisition to competitive component-based acquisition using agile development/operations methodology IAW FY 2019 National Defense Authorization Act direction - Use system-of-systems acquisition approach with collaboration among AIAMD, PEO MS, PEO C3T, and Brigade Combat Team (BCT) Modernization Component Project Offices, Missile Defense Agency (MDA), and other Service Project Offices to network-enable weapons and sensor components - Develop and procure a common Army IBCS EOC that replaces seven weapon system unique Battle Management Command, Control, Communications, Computers and Intelligence (BMC4I) components - Establish product lines used to evaluate and select, modify and integrate modular open systems hardware and software common configuration items - Conduct architecture-based System Engineering, Integration and Test (SEI&T) activities for an incrementally fielded configuration of the AIAMD Integrated Fire Control Network-compatible IBCS EOC, weapons and sensor system components <p><u>E. Performance Metrics</u></p> <p>N/A</p>		

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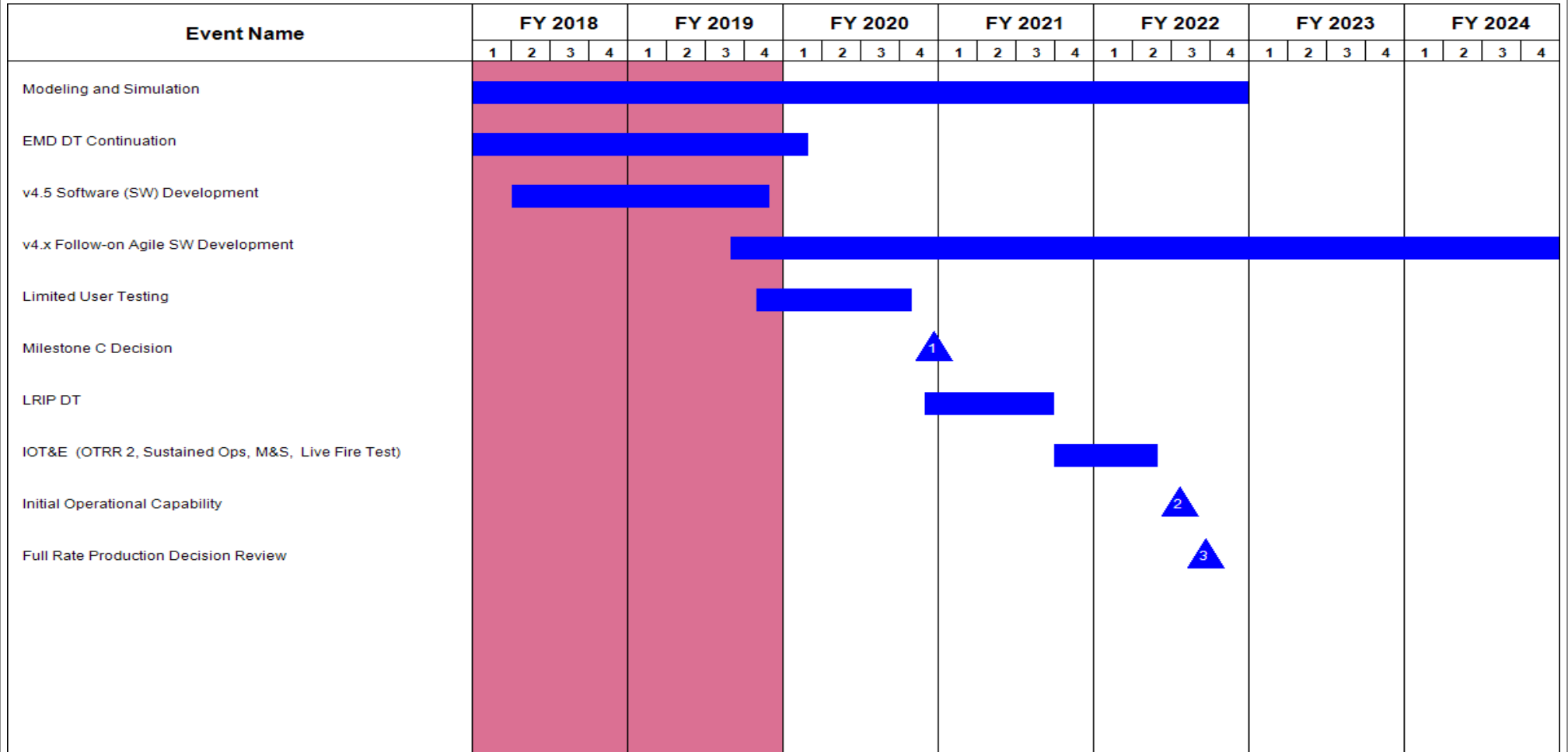
Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 5						R-1 Program Element (Number/Name) PE 0605457A / Army Integrated Air and Missile Defense (AIAMD)						Project (Number/Name) S40 / Army Integrated Air and Missile Defense			
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, AL	31.025	4.503	Oct 2017	-		-		-		-	Continuing	Continuing	Continuing
Subtotal			31.025	4.503		-		-		-		-	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
Air Space and Missile Defense (ASMD) System of Systems (SOS) Hardware-in-the- Loop Testbed	C/CPFF	Various : Huntsville, AL and multiple other locations	17.697	-		-		-		-		-	0.000	17.697	-
AIAMD System Engineering & Integration	C/CPFF	Various : Huntsville, AL	152.818	28.310	Oct 2017	23.401	Oct 2018	22.014	Oct 2019	-		22.014	Continuing	Continuing	Continuing
IAMD Engineering Manufacturing and Development	SS/ Various	Northrop Grumman, Raytheon, Lockheed Martin and Other : Huntsville, AL and Various other locations	1,119.922	205.000	Oct 2017	181.054	Oct 2018	122.295	Oct 2019	-		122.295	Continuing	Continuing	Continuing
Government Furnished Equipment	MIPR	Various : Multiple	21.101	2.876	Oct 2017	4.865	Oct 2018	4.660	Oct 2019	-		4.660	Continuing	Continuing	Continuing
Government Systems Engineering and Logistics	TBD	Various : Huntsville, AL	72.625	16.303	Oct 2017	16.410	Oct 2018	17.340	Oct 2019	-		17.340	Continuing	Continuing	Continuing
Advanced Electronic Protection Enhancement (AEPE)	Various	Various : TBD	21.000	-		-		-		-		-	0.000	21.000	-
Cyber Security	Various	Huntsville, AL : TBD	38.000	15.000	Jun 2018	15.000	Jan 2019	-		-		-	0.000	68.000	-
Counter Emerging Threat	Various	AMRDEC/Torch Technologies : Huntsville, AL	15.000	25.000	Jul 2018	30.000	Jan 2019	-		-		-	0.000	70.000	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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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
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		10.163		-		-		-	0.000	10.163	-
Subtotal			1,458.163	292.489		280.893		166.309		-		166.309	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
Other Test Activities/ Army Evaluation Center/ Developmental Test Command/Operational Test Command	MIPR	Various : Multiple Locations	43.752	7.546	Jan 2018	9.769	Oct 2018	14.892	Oct 2019	-		14.892	Continuing	Continuing	Continuing
Modeling & Sim/Joint Interoperability Test Spt	MIPR	SED : Huntsville, AL	165.404	27.670	Jan 2018	23.789	Oct 2018	17.501	Oct 2019	-		17.501	Continuing	Continuing	Continuing
Range Support	MIPR	WSMR : White Sands, NM	45.027	6.843	Oct 2017	7.812	Oct 2018	10.236	Oct 2019	-		10.236	Continuing	Continuing	Continuing
Subtotal			254.183	42.059		41.370		42.629		-		42.629	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			1,743.371	339.051		322.263		208.938		-		208.938	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Army			Date: March 2019		
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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Modeling and Simulation	1	2013	4	2022
EMD Developmental Test (DT)	4	2014	1	2017
EMD DT Continuation	1	2018	1	2020
v4.5 Software (SW) Development	2	2018	4	2019
v4.x Follow-on Agile SW Development	3	2019	4	2024
Limited User Testing	4	2019	4	2020
Milestone C Decision	4	2020	4	2020
LRIP DT	4	2020	3	2021
IOT&E (OTRR 2, Sustained Ops, M&S, Live Fire Test)	4	2021	2	2022
Initial Operational Capability	3	2022	3	2022
Full Rate Production Decision Review	3	2022	3	2022