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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604114A / <i>Lower Tier Air Missile Defense (LTAMD) Sensor</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	-	308.805	297.629	382.147	-	382.147	89.187	89.984	90.002	90.874	Continuing	Continuing
EX2: <i>Lower Tier Air Missile Defense (LTAMD) Capability</i>	-	308.805	297.629	382.147	-	382.147	89.187	89.984	90.002	90.874	Continuing	Continuing

Note

LTAMDS program will develop nascent capability and support Army demonstration and test initiatives to increase integrated offensive and defensive capability across warfighter functions and multiple domains.

A. Mission Description and Budget Item Justification

This funding line is directly aligned to the Army Air and Missile Defense Modernization Priority. Lower Tier Air Missile Defense Sensor (LTAMDS) program will provide the required sensing capabilities, surveillance and fire control in the lower tier portion of the Army Integrated Air and Missile Defense (IAMD) of the ballistic missile defense battlespace. The acquisition program competitively selected the LTAMDS prime vendor in 1st Quarter (Q) Fiscal Year (FY) 2020 to build six Prototype sensors under the authority of Section 804 Rapid Prototyping. The sensor/radar set (RS) replaces the baseline PATRIOT RS (AN/MPQ-65A) in an IBCS enabled PATRIOT Battalion mitigating the risk associated with threat changes while also addressing growing obsolescence and increasing Operational & Support (O&S) cost. The LTAMDS capability addresses critical capability gaps, modernizes technology, and increases reliability and maintainability. The LTAMDS capability increases sensor/radar performance to maximize the inherent PATRIOT Advanced Capability (PAC-3) Missile Segment Enhanced (MSE) Interceptor capabilities to engage threats.

LTAMDS will provide 4 prototype sensors under Urgent Materiel Release (UMR) in FY23. Pre-Planned Product Improvement (P3I) efforts will bridge known capability gaps leading to an Initial Operational Test and Evaluation (IOT&E) in FY26 and Full Rate Production in FY27. FY2023 UMR tasks include acquiring remaining targets for testing, completing Contractor Verification Test, Developmental Test and Evaluation, and Operational Assessment. P3I tasks include acquiring up to two P3I prototypes, targets for testing, and additional capability development. Other FY2023 tasks include Large Tactical Power System (LTPS) development and integration activities with the Integrated Air and Missile Defense Battle Command System (IBCS) and PATRIOT family of interceptors (PAC-2 GEM-T, PAC-3, PAC-3 MSE) in support of Integrated Fires and Multi-domain Operations.

The total cost of the LTAMDS Middle Tier of Acquisition effort is \$1,524.8 million RDT&E from FY19 to FY24.

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Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0604114A / <i>Lower Tier Air Missile Defense (LTAMD) Sensor</i>
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B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	308.805	327.690	0.000	-	0.000
Current President's Budget	308.805	297.629	382.147	-	382.147
Total Adjustments	0.000	-30.061	382.147	-	382.147
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-30.061			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	382.147	-	382.147

Change Summary Explanation

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army										Date: April 2022		
Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor				Project (Number/Name) EX2 / Lower Tier Air Missile Defense (LTAMD) Capability			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
EX2: Lower Tier Air Missile Defense (LTAMD) Capability	-	308.805	297.629	382.147	-	382.147	89.187	89.984	90.002	90.874	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Lower Tier Air and Missile Defense Sensor (LTAMDS) satisfies the Warfighter's capability requirements in the Integrated Air and Missile Defense domain. The program provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the PATRIOT Advanced Capability (PAC-3) Missile Segment Enhancement (MSE) interceptor, and will be upgradable for the Future Interceptor. The Army Requirements Oversight Council (AROC) approved LTAMDS requirements in April 2016. The Army competitively selected the LTAMDS, which will counter air and missile defense threats using state-of-the-art technology, while reducing operating and sustainment costs, mitigating obsolescence, and increasing reliability and maintainability .

LTAMDS will provide 4 prototype sensors under Urgent Materiel Release (UMR) in FY23. Pre-Planned Product Improvement (P3I) efforts will bridge known capability gaps leading to an Initial Operational Test and Evaluation (IOT&E) in FY26 and Full Rate Production in FY27. LTAMDS Fiscal Year (FY) FY2023 funding for UMR include acquiring remaining targets for testing, completing Contractor Verification Test, Developmental Test and Evaluation, and Operational Assessment. P3I tasks include acquiring up to two P3I prototypes, targets for testing, and additional capability development such as non-cooperative target recognition and electronic protect. Other FY2023 tasks include Large Tactical Power System (LTPS) development and integration activities with the Integrated Air and Missile Defense Battle Command System (IBCS) and PATRIOT family of interceptors (PAC-2 GEM-T, PAC-3, PAC-3 MSE) in support of Integrated Fires and Multi-domain Operations.

The total cost of the LTAMDS Middle Tier of Acquisition effort is \$1,524.8 million RDT&E from FY19 to 1QFY24.

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

	FY 2021	FY 2022	FY 2023
Title: Lower Tier Missile Defense Sensor	308.805	286.766	382.147
Description: Provides the required sensing capabilities in the lower tier portion of the air and missile defense battlespace and expands the battlespace for the PAC-3 MSE interceptor.			
FY 2022 Plans:			
<ul style="list-style-type: none"> - Continue LTAMDS Urgent Materiel Release (UMR) Prototypes - Conduct Developmental Test and Evaluation - Conduct Qualification testing - Initiate development of P3I sensors - Acquire targets and interceptors for P3I testing - Continue integration with IAMD Battle Command System (IBCS) 			

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Army		Date: April 2022		
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	Project (Number/Name) EX2 / Lower Tier Air Missile Defense (LTAMD) Capability		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2021	FY 2022	FY 2023
<p>- Continue integration with PATRIOT family of interceptors (PAC-2 GEM-T, PAC-3, PAC-3 MSE)</p> <p>FY 2023 Plans: UMR - Provide four prototypes under UMR - Complete prototype Developmental Test and Evaluation - Complete Operational Demonstration - Complete Operation Assessment</p> <p>P3I - Buildup of P3I Test Assets to support DT/OT and IOTE - Software Development Activities to include Non-Cooperative Target Recognition, Electronic Protection, and continue software development tasks with IBCS. - Activities needed to support a MS C decision in FY24 - Digital Modeling and Simulation activities - Support Large Tactical Power System (LTPS) development - Critical Design Review of P3I configuration</p> <p>Integration - Continue integration with IBCS - Continue integration with PATRIOT family of interceptors (PAC-2, GEM-T, PAC-3, PAC-3 MSE) - Continue Development and integration of Large Tactical Power System (LTPS)</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: Increase in funding to procure Production Representative Units to support DT/OT testing in FY25/FY26.</p>				
<p>Title: FY22 SBIR/STTR Transfer</p> <p>Description: Funding transferred in accordance with Title 15 USC ?638.</p> <p>FY 2022 Plans: FY22 SBIR/STTR \$10.863M transferred in accordance with Title 15 USC ?638.</p> <p>FY 2022 to FY 2023 Increase/Decrease Statement: FY22 SBIR/STTR \$10.863M transferred in accordance with Title 15 USC ?638.</p>		-	10.863	-
Accomplishments/Planned Programs Subtotals		308.805	297.629	382.147

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Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	Project (Number/Name) EX2 / Lower Tier Air Missile Defense (LTAMD) Capability
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C. Other Program Funding Summary (\$ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• C12101: Lower Tier Air and Missile Defense Sensor	-	33.473	13.460	-	13.460	619.165	368.041	581.767	584.309	Continuing	Continuing

Remarks

D. Acquisition Strategy

To enhance the Warfighter's lethality, survivability, and combat effectiveness, the Army used full and open competitive processes within Other Transactions Authority (OTA) agreements for rapid prototyping, qualification, and initial fielding efforts to meet the intent of FY 2018 National Defense Authorization Act (NDAA) Congressional language. Middle Tier Acquisition (MTA) rapid prototyping approach (Section 804, FY 2016 NDAA) authorities were leveraged in conjunction with the OTA to facilitate and accelerate traditional defense contractor involvement, cost sharing arrangements, and accelerate schedules. A FedBizOpps (FBO) announcement and subsequent LTAMDS Industry Day generated government-contractor dialogue, provided contractor cost and schedule estimates, verified industry technology and manufacturing readiness, and informed stakeholders on design approaches and potential materiel solutions. This approach also provides senior leader decision points along the way to make informed decisions based on industry ability to meet threshold requirements. The Sense-Off conducted in 3rd Quarter (Q) FY 2019, along with industry proposals, enabled the selection of an LTAMDS single vendor with the subsequent award of the OTA Agreement in 1Q FY 2020.

The MTA LTAMDS program will produce six prototypes and conduct contractor and Government testing through 3Q FY 2023. An LTAMDS Operational Assessment will be conducted 3Q FY 2023 during an Army Integrated Air and Missile Defense (IAMD) Integrated Fires Test Campaign event. Upon successful prototype demonstration, four prototypes will be immediately provided under Urgent Materiel Release (UMR), which includes the 400kW Mobile Electric Power (MEP)-Power Unit (PU)-810 as an interim power source. The LTAMDS program will then transition from a MTA program to a Major Capabilities Acquisition (MCA) Program with entry at Milestone C in 1Q FY 2024.

The LTAMDS Pre-Planned Product Improvement (P3I) efforts will bridge known capability gaps in the UMR prototypes and will include necessary qualification testing to comply with Type Classification and Full Materiel Release requirements. In addition, development of the 500kW Large Tactical Power System (LTPS) begins with the release of the Request for Prototype Proposal in FY 2022. The LTPS is a critical component of the LTAMDS sensor, allowing LTAMDS to support the full kinematic range of the PAC-3 Missile Segment Enhancement (MSE) interceptor.

On 11 August 2020, the LTAMDS Long Term Power General Officer Steering Committee directed the Expeditionary Energy & Sustainment Systems (E2S2) Project Office to pursue a new Army standard generator that would meet LTAMDS power requirements. The Search, Track, Acquire, Radiate, Eliminate (STARE) Project Office partnered with the E2S2 Project Office to develop and deliver the LTPS during the LTAMDS Production and Deployment Phase. The E2S2 Project Office will release a Request for Prototype Proposal in 2Q FY 22. LTAMDS will provide approximately \$57M for Research, Development, Test and Evaluation (RDT&E) funding across FY 2022-2025 for LTPS development and testing. A two-vendor prototyping effort begins in FY 2023, producing eight prototypes to conduct developmental testing (DT) and operational testing (OT) sufficient to award the single-vendor production contract planned in FY 2025. The schedule outlines a two-vendor test-off and single-vendor down-select process resulting in prototype selection in 2Q FY 2024. LTAMDS will conduct a combined DT/OT event in FY 2025 to validate LTAMDS performance functionality using prototype LTPS as the threshold power source. The first four LTPSs are projected for delivery 1Q FY 2026 to support LTAMDS New Equipment Training, Collective Training, and Initial Operational Test & Evaluation (IOT&E). A Full Rate Production decision is anticipated in FY 2027, subsequent to the Full Materiel Release.

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Appropriation/Budget Activity	R-1 Program Element (Number/Name)	Project (Number/Name)
2040 / 4	PE 0604114A / <i>Lower Tier Air Missile Defense (LTAMD) Sensor</i>	EX2 / <i>Lower Tier Air Missile Defense (LTAMD) Capability</i>

LTAMDS is a component of an integrated fires development effort that includes survivability, resiliency, and effectiveness improvements against advanced threats from near-peer adversaries. This effort includes integration with an evolving common fires mission command, common development tools and processes, and annual test and evaluation to provide data supporting program assessments and progress toward closure of performance gaps.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army **Date:** April 2022

Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	Project (Number/Name) EX2 / Lower Tier Air Missile Defense (LTAMD) Capability
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Management Services (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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 : Redstone Arsenal, AL	16.665	4.100	Oct 2020	4.250	Oct 2021	4.780	Oct 2022	-		4.780	Continuing	Continuing	-
Systems Engineering and Technical Assistance (SETA)	Various	Systems Engineering and Technical Assistance : Huntsville, AL	16.509	6.000	Oct 2020	7.500	Oct 2021	7.655	Oct 2022	-		7.655	Continuing	Continuing	-
FY22 SBIR/STTR Transfer	TBD	Various : Various	-	-		10.863		-		-		-	0.000	10.863	-
Subtotal			33.174	10.100		22.613		12.435		-		12.435	Continuing	Continuing	N/A

Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Concept Definition	C/CPFF	Raytheon, Lockheed Martin, Technovative Applications, Northrop Grumman : Andover MA; Liverpool NY; Brea CA; Linthicum MD	74.817	-		-		-		-		-	0.000	74.817	-
Product Development Support	C/Various	University Affiliated Research Center (UARC); MIT; The Federally Funded Research and Development Center (FFRDC) : Various	9.349	7.500	Oct 2020	12.500	Oct 2021	12.880	Oct 2022	-		12.880	Continuing	Continuing	-
OGA Development and Integration Activities	C/Various	Various : Various	-	-		34.319	Dec 2021	54.430	Dec 2022	-		54.430	Continuing	Continuing	-
Rapid Prototyping	C/FFP	Raytheon : Various	345.069	211.106	Feb 2021	103.461	Feb 2022	14.650	Feb 2023	-		14.650	Continuing	Continuing	-
Pre-Planned Product Improvements (Raytheon)	Various	Raytheon : Various	-	-		59.556	Jan 2022	201.790	Jan 2023	-		201.790	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Army												Date: April 2022			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor				EX2 / Lower Tier Air Missile Defense (LTAMD) Capability							
Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Development Engineering/ Contractor SEPM & Test	MIPR	CCDC WDI; Various : Picatinny Arsenal; Various	-	63.499		-		-		-		-	Continuing	Continuing	-
Subtotal			429.235	282.105		209.836		283.750		-		283.750	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Product Development	C/Various	Army Laboratories, S3I System Integration Laboratory, CCDC : Various	2.454	-		8.920	Dec 2021	8.930	Dec 2022	-		8.930	Continuing	Continuing	-
Subtotal			2.454	-		8.920		8.930		-		8.930	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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
Test Planning/Targets/ Interceptors/U.S. Other Government Agencies (OGAs)	MIPR	RDEC, SED, WSMR-T&E Support : Huntsville, AL; White Sands, NM	75.484	16.600	Feb 2021	56.260	Feb 2022	77.032	Feb 2023	-		77.032	Continuing	Continuing	-
Subtotal			75.484	16.600		56.260		77.032		-		77.032	Continuing	Continuing	N/A
Project Cost Totals			540.347	308.805		297.629		382.147		-		382.147	Continuing	Continuing	N/A
Remarks															

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Army		Date: April 2022
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604114A / <i>Lower Tier Air Missile Defense (LTAMD) Sensor</i>	Project (Number/Name) EX2 / <i>Lower Tier Air Missile Defense (LTAMD) Capability</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Concept Definition	4	2017	4	2019
Select Single Vendor	1	2020	1	2020
Production Representative Unit Manufacturing	1	2021	4	2023
Qualification Testing	4	2022	1	2023
Developmental Test & Evaluation	3	2022	3	2023
Operational Demonstration Test Event	2	2023	2	2023
Residual Operational Capability (Urgent Materiel Release)	4	2023	4	2023
Operational Assessment / Integrated Fires FY23 Campaign	3	2023	4	2023
Milestone C Decision	1	2024	1	2024
P3I AMTC Contract	4	2022	3	2025
P3I Dev Testing/Operational Testing/Initial Operational T&E (DT/OT/IOTE)	4	2025	1	2027
Large Tactical Power System (LTPS)	4	2022	2	2025