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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Army **Date:** February 2020

<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor
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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	-	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	Continuing	Continuing
EX2: Lower Tier Air Missile Defense (LTAMD) Capability	-	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	Continuing	Continuing

**A. Mission Description and Budget Item Justification**

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 Production Representative Unit sensors under the authority of Section 804 Rapid Prototyping. The sensor/radar set (RS) replaces the baseline PATRIOT RS (AN/MPQ-65A) in an IAMD 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.

FY 2021 base dollars in the amount of \$376.373 million supports the acceleration of the Lower Tier Air and Missile Defense Sensor (LTAMDS) program. FY 2021 tasks include Production Representative Units manufacturing (purchase of 3 prototypes, final phase of Contractor Verification Testing and initial Government Developmental Testing and Qualification Testing events), acquiring targets, acquiring long lead items, Pre-Planned Product Improvements (P3I), and supporting programmatic and engineering activities needed to integrate the LTAMDS equipment with the Integrated Battle Command System, the PAC-3 Interceptor, and the Integrated Fire Control Network relay.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	89.248	427.772	376.738	-	376.738
Current President's Budget	84.981	379.772	376.373	-	376.373
Total Adjustments	-4.267	-48.000	-0.365	-	-0.365
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-48.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-4.267	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.365	-	-0.365

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor				<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
EX2: Lower Tier Air Missile Defense (LTAMD) Capability	-	84.981	379.772	376.373	-	376.373	332.007	241.235	87.419	88.298	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 Fiscal Year (FY) 2021 funding will be utilized for Production Representative Units manufacturing (final phase of Contractor Verification Testing and purchase of three prototypes), acquiring targets, acquiring long lead items, and supporting programmatic and engineering activities needed to integrate the LTAMDS equipment with the Integrated Battle Command System, the PAC-3 Interceptor, and the Integrated Fire Control Network relay. FY 2021 funding supports additional capabilities to meet full LTAMDS requirements, to include Pre-Planned Product Improvements (P3I). It further supports initial Government Developmental Testing and Qualification Testing events. FY 2021 activities support the FY 2018 National Defense Authorization Act (NDAA) requirement to accelerate LTAMDS Initial Operational Capability to no later than December 2023.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Lower Tier Missile Defense Sensor	84.981	362.526	376.373
<b>Description:</b> 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.			
<b>FY 2020 Plans:</b>			
- Initiated LTAMDS prototype manufacture and integration activities			
- Conducted knowledge point and functional reviews of vendor prototypes			
- Initiated Contractor Verification Testing			
<b>FY 2021 Plans:</b>			
-Continue procurement of prototypes			
-Integration of LTAMDS with IAMD Battle Command System (IBCS)			

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability
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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	FY 2019	FY 2020	FY 2021
-Acquisition of targets -Integration of LTAMDS with PAC-2 Interceptor -Integration of LTAMDS with PAC-3 Family of Missiles -Develop and integrate additional capabilities through P3I efforts -Completion of Contractor Verification Testing -Initiation of Development Testing -Initiation of Qualification Testing  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Realignment of funds in FY20 cost categories Product Development, Test/Planning/Targets/Interceptors, and Product Development Support was necessary to support requirements (MEP 810, Advanced Threat), additional flight tests, and purchase of additional interceptors. Delta between budget years FY20 and FY21 for LTAMDS (0604114A) is less than 10%.			
<b>Title:</b> FY 2020 SBIR/STTR Transfer  <b>Description:</b> Funding transferred in accordance with Title 15 USC ?638  <b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638	-	17.246	-
<b>Accomplishments/Planned Programs Subtotals</b>			
	84.981	379.772	376.373

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• C12101: Lower Tier Air and Missile Defense Sensor	-	-	0.000	-	0.000	35.960	147.055	306.669	348.624	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 NDAA Congressional language. Middle Tier Acquisition approach (Section 804, FY 2016 NDAA) authorities were leveraged in conjunction with the OTA to facilitate and accelerate the LTAMDS program. OTA promotes non-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Army Date: February 2020

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

traditional defense contractor involvement, cost sharing arrangements, and accelerates schedules. A FEDBIZOPS 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. Planned demonstration of military utility of the LTAMDS PRUs occurs in 3Q FY 2022 during the Early User Test (EUT). A planned Urgent Materiel Release decision point occurs in 1Q FY 2023 subsequent to a declaration of success for the Rapid Prototyping program evidenced by the EUT results. The UMR decision point enables the decision for Rapid Fielding and the procurement of the follow on sixteen sensors planned in 1Q FY 2023.

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

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability
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<b>Management Services (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Government Program Management	MIPR	Various : Redstone Arsenal, AL	9.800	4.515	Oct 2018	2.350	Oct 2019	4.100	Oct 2020	-		4.100	Continuing	Continuing	-
Systems Engineering and Technical Assistance (SETA)	Various	Systems Engineering and Technical Assistance : Huntsville, AL	8.000	5.000	Oct 2018	3.509	Oct 2019	6.000	Oct 2020	-		6.000	Continuing	Continuing	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		17.246		-		-		-	0.000	17.246	-
<b>Subtotal</b>			17.800	9.515		23.105		10.100		-		10.100	Continuing	Continuing	N/A

<b>Product Development (\$ in Millions)</b>				<b>FY 2019</b>		<b>FY 2020</b>		<b>FY 2021 Base</b>		<b>FY 2021 OCO</b>		<b>FY 2021 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Concept Definition	C/CPFF	Raytheon, Lockheed Martin, Technovative Applications, Northrop Grumman : Andover MA; Liverpool NY; Brea CA; Linthicum MD	64.817	10.000	Jan 2019	-		-		-		-	0.000	74.817	-
Product Development Support	C/Various	University Affiliated Research Center (UARC); MIT; The Federally Funded Research and Development Center (FFRDC) : Various	-	3.000	Oct 2018	6.349	Dec 2019	5.250	Oct 2020	-		5.250	Continuing	Continuing	-
Prototype Manufacturing and Integration (Rapid Prototyping)	C/FFP	Raytheon : Various	-	51.366	Oct 2019	293.703	Jan 2020	228.774	Feb 2021	-		228.774	Continuing	Continuing	-
Development Engineering/ Contractor SEPM & Test	Various	CCDC WDI; Picatinny Arsenal : Various	-	-		-		103.999	Feb 2021	-		103.999	Continuing	Continuing	-

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
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							
<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
<b>Subtotal</b>			64.817	64.366		300.052		338.023		-		338.023	Continuing	Continuing	N/A
<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	Dec 2019	2.250	Dec 2020	-		2.250	Continuing	Continuing	-
<b>Subtotal</b>			-	-		2.454		2.250		-		2.250	Continuing	Continuing	N/A
<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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	8.595	11.100	Jan 2019	54.161	Jan 2020	26.000	Feb 2021	-		26.000	Continuing	Continuing	-
<b>Subtotal</b>			8.595	11.100		54.161		26.000		-		26.000	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			91.212	84.981		379.772		376.373		-		376.373	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor	<b>Project (Number/Name)</b> EX2 / Lower Tier Air Missile Defense (LTAMD) Capability

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
Concept Definition	[Blue Bar]																											
Select Single Vendor	CD				▲ 1 Select Single Vendor																							
Production Representative Unit Manufacturing					[Blue Bar]				[Blue Bar]				[Blue Bar]															
Qualification Testing													[Blue Bar]															
Developmental Test & Evaluation													[Blue Bar]															
Limited User Test/Early User Test (LUT/EUT)													[Blue Bar]															
Initial Operational Capability (Urgent Material Release)																	▲ 2 IOC (UMR)											
Production Long Lead Decision																	▲ 3 Product Long Lead Decision											
Production Contract Award																	▲ 4 Production Contract Award											
Production																	[Blue Bar]				[Blue Bar]							

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604114A / <i>Lower Tier Air Missile Defense (LTAMD) Sensor</i>	<b>Project (Number/Name)</b> 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	2020	4	2022
Qualification Testing	1	2022	1	2023
Developmental Test & Evaluation	1	2022	4	2022
Limited User Test/Early User Test (LUT/EUT)	3	2022	1	2023
Initial Operational Capability (Urgent Material Release)	1	2023	1	2023
Production Long Lead Decision	1	2023	1	2023
Production Contract Award	1	2023	1	2023
Production	1	2023	3	2027