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Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army **Date:** May 2021

| | |
|--|---|
| Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P) | R-1 Program Element (Number/Name) PE 0604114A / Lower Tier Air Missile Defense (LTAMD) Sensor |
|--|---|

| COST (\$ in Millions) | Prior Years | FY 2020 | FY 2021 | FY 2022 Base | FY 2022 OCO | FY 2022 Total | FY 2023 | FY 2024 | FY 2025 | FY 2026 | Cost To Complete | Total Cost |
|--|-------------|---------|---------|--------------|-------------|---------------|---------|---------|---------|---------|------------------|------------|
| Total Program Element | - | 364.154 | 308.805 | 327.690 | - | 327.690 | - | - | - | - | - | - |
| EX2: Lower Tier Air Missile Defense (LTAMD) Capability | - | 364.154 | 308.805 | 327.690 | - | 327.690 | - | - | - | - | - | - |

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

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 (IAMMD) 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.

FY2022 UMR tasks include prototype manufacturing, acquiring targets for testing, conducting Developmental and Qualification testing, and conducting an Operational Demonstration. Pre-Planned Product Improvements (P3I) tasks include acquiring long lead hardware, targets for testing, and additional capability development. Other FY2022 tasks include long term power solution 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).

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| Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Army | Date: May 2021 |
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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> |
|---|--|

| B. Program Change Summary (\$ in Millions) | <u>FY 2020</u> | <u>FY 2021</u> | <u>FY 2022 Base</u> | <u>FY 2022 OCO</u> | <u>FY 2022 Total</u> |
|---|-----------------------|-----------------------|----------------------------|---------------------------|-----------------------------|
| Previous President's Budget | 379.772 | 376.373 | 332.007 | - | 332.007 |
| Current President's Budget | 364.154 | 308.805 | 327.690 | - | 327.690 |
| Total Adjustments | -15.618 | -67.568 | -4.317 | - | -4.317 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | -53.830 | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -15.618 | -13.738 | | | |
| • Adjustments to Budget Years | - | - | -4.317 | - | -4.317 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2022 Army | | | | | | | | | | Date: May 2021 | | |
| 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 2020 | FY 2021 | FY 2022 Base | FY 2022 OCO | FY 2022 Total | FY 2023 | FY 2024 | FY 2025 | FY 2026 | Cost To Complete | Total Cost |
| EX2: Lower Tier Air Missile Defense (LTAMD) Capability | - | 364.154 | 308.805 | 327.690 | - | 327.690 | - | - | - | - | - | - |
| 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) 2022 funding will be utilized for UMR prototype manufacturing, acquiring targets for UMR testing, conducting Developmental and Qualification testing, and conducting an Operational Demonstration. FY2022 funding will be utilized to procure P3I long lead hardware, targets for testing, and capability development. FY2022 funding will also be utilized for long term power solution 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). FY 2022 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)

| | FY 2020 | FY 2021 | FY 2022 |
|---|----------------|----------------|----------------|
| Title: Lower Tier Missile Defense Sensor | 364.154 | 308.805 | 327.690 |
| 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 2021 Plans: -Continue procurement of prototypes -Acquisition of targets -Integration of LTAMDS with IAMD Battle Command System (IBCS), PAC-2 GEM-T, and PAC-3 Family of Missiles -Develop and integrate additional capabilities through P3I efforts -Initiation of Contractor Verification Testing -Initiation of Long Term Power Development | | | |
| FY 2022 Plans: - Completion of LTAMDS Urgent Material Release (UMR) Prototypes - Completion of Developmental Test and Evaluation | | | |

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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 |
|--|---|---|

| B. Accomplishments/Planned Programs (\$ in Millions) | FY 2020 | FY 2021 | FY 2022 |
|--|---------|---------|---------|
| <ul style="list-style-type: none"> - Completion of Qualification testing - Conduct Operational Demonstration - Initiate development of P3I sensors - Acquire targets and interceptors for P3I testing - Continue integration with IAMD Battle Command System (IBCS) - Continue integration with PATRIOT family of interceptors (PAC-2 GEM-T, PAC-3, PAC-3 MSE) <p>FY 2021 to FY 2022 Increase/Decrease Statement: The increase in funding from FY2021 to FY2022 of \$20.123M represents the initial Long Term Power Development funding and increased test range and test support activities.</p> | | | |
| Accomplishments/Planned Programs Subtotals | 364.154 | 308.805 | 327.690 |

| C. Other Program Funding Summary (\$ in Millions) | | | | | | | | | | | |
|--|----------------|----------------|-------------------------|------------------------|--------------------------|----------------|----------------|----------------|----------------|-----------------------------|-------------------|
| Line Item | FY 2020 | FY 2021 | FY 2022 Base | FY 2022 OCO | FY 2022 Total | FY 2023 | FY 2024 | FY 2025 | FY 2026 | Cost To Complete | Total Cost |
| • C12101: Lower Tier Air and Missile Defense Sensor | - | - | 35.473 | - | 35.473 | - | - | - | - | - | - |

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 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. The Urgent Materiel Release (UMR) LTAMDS program employs a 2-phased test approach. Phase 1 includes initial LTAMDS capabilities with PAC-3 MSE engagements in the primary radar sector along with 360O surveillance and PAC-2 GEM-T engagements in secondary sector. Phase 2 includes full LTAMDS UMR capability including 360 PAC-3 MSE and PAC-2 GEM-T engagements. UMR Phase 1 culminates with an Operational Demonstration of the military utility of the LTAMDS prototype in FY2022. Upon successful prototype demonstration, additional sensors will be procured to field up to four high-priority battalions. Concurrent to the LTAMDS UMR Rapid Prototyping efforts, Pre-Planned Product Improvement (P3I) efforts will develop solutions to bridge known capability gaps in the UMR prototypes. P3I efforts will develop a materiel solution that meets Full Materiel Release criteria and leading to Full Rate Production.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army **Date:** May 2021

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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 |
|--|---|---|

| Management Services (\$ in Millions) | | | | FY 2020 | | FY 2021 | | FY 2022 Base | | FY 2022 OCO | | FY 2022 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 : Redstone Arsenal, AL | 14.315 | 2.350 | Oct 2019 | 4.100 | Oct 2020 | 4.250 | Oct 2021 | - | | 4.250 | Continuing | Continuing | - |
| Systems Engineering and Technical Assistance (SETA) | Various | Systems Engineering and Technical Assistance : Huntsville, AL | 13.000 | 3.509 | Oct 2019 | 6.000 | Oct 2020 | 7.500 | Oct 2021 | - | | 7.500 | Continuing | Continuing | - |
| Subtotal | | | 27.315 | 5.859 | | 10.100 | | 11.750 | | - | | 11.750 | Continuing | Continuing | N/A |

| Product Development (\$ in Millions) | | | | FY 2020 | | FY 2021 | | FY 2022 Base | | FY 2022 OCO | | FY 2022 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 |
| 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 | 3.000 | 6.349 | Dec 2019 | 7.500 | Oct 2020 | 12.500 | Oct 2021 | - | | 12.500 | Continuing | Continuing | - |
| OGA Development and Integration Activities | C/Various | Various : Various | - | - | | - | | 39.140 | Dec 2021 | - | | 39.140 | Continuing | Continuing | - |
| Rapid Prototyping | C/FFP | Raytheon : Various | 51.366 | 293.703 | Jan 2020 | 211.106 | Feb 2021 | 114.324 | Feb 2022 | - | | 114.324 | Continuing | Continuing | - |
| Pre-Planned Product Improvements (Raytheon) | SS/TBD | Raytheon : Various | - | - | | - | | 59.556 | Jan 2022 | - | | 59.556 | Continuing | Continuing | - |
| Development Engineering/ Contractor SEPM & Test | Various | CCDC WDI; Various : Picatinny Arsenal; Various | - | - | | 63.499 | | - | | - | | - | Continuing | Continuing | - |

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Army **Date:** May 2021

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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 |
|--|---|---|

| Product Development (\$ in Millions) | | | | FY 2020 | | FY 2021 | | FY 2022 Base | | FY 2022 OCO | | FY 2022 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 | | | |
| Subtotal | | | 129.183 | 300.052 | | 282.105 | | 225.520 | | - | | 225.520 | Continuing | Continuing | N/A |

| Support (\$ in Millions) | | | | FY 2020 | | FY 2021 | | FY 2022 Base | | FY 2022 OCO | | FY 2022 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 | | | |
| Product Development | C/Various | Army Laboratories, S3I System Integration Laboratory, CCDC : Various | - | 2.454 | Dec 2019 | - | | 8.920 | Dec 2021 | - | | 8.920 | Continuing | Continuing | - |
| Subtotal | | | - | 2.454 | | - | | 8.920 | | - | | 8.920 | Continuing | Continuing | N/A |

| Test and Evaluation (\$ in Millions) | | | | FY 2020 | | FY 2021 | | FY 2022 Base | | FY 2022 OCO | | FY 2022 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 | | | |
| Test Planning/Targets/Interceptors/U.S. Other Government Agencies (OGAs) | MIPR | RDEC, SED, WSMR-T&E Support : Huntsville, AL; White Sands, NM | 19.695 | 55.789 | Jan 2020 | 16.600 | Feb 2021 | 81.500 | Feb 2022 | - | | 81.500 | Continuing | Continuing | - |
| Subtotal | | | 19.695 | 55.789 | | 16.600 | | 81.500 | | - | | 81.500 | Continuing | Continuing | N/A |

| | | | Prior Years | FY 2020 | FY 2021 | FY 2022 Base | FY 2022 OCO | FY 2022 Total | Cost To Complete | Total Cost | Target Value of Contract |
|----------------------------|--|--|-------------|---------|---------|--------------|-------------|---------------|------------------|------------|--------------------------|
| Project Cost Totals | | | 176.193 | 364.154 | 308.805 | 327.690 | - | 327.690 | Continuing | Continuing | N/A |

Remarks

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| Exhibit R-4, RDT&E Schedule Profile: PB 2022 Army | | Date: May 2021 |
| 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 |

| Event Name | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | | FY 2024 | | | | FY 2025 | | | | FY 2026 | | | |
|--|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|
| | 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 |
| Select Single Vendor | 1 | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Production Representative Unit Manufacturing | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Qualification Testing | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Developmental Test & Evaluation (Phase 1) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operational Demonstration Test Event | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Initial Operational Capability (Urgent Materiel Release) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Developmental Test & Evaluation (Phase 2) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Early User Test (EUT) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| P3I Dev Testing/Operational Testing/Initial Operational T&E (DT/OT/IOTE) | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| Exhibit R-4A, RDT&E Schedule Details: PB 2022 Army | | Date: May 2021 |
| 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 |

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 | 4 | 2022 |
| Developmental Test & Evaluation (Phase 1) | 1 | 2022 | 3 | 2022 |
| Operational Demonstration Test Event | 3 | 2022 | 4 | 2022 |
| Initial Operational Capability (Urgent Materiel Release) | 4 | 2022 | 4 | 2022 |
| Developmental Test & Evaluation (Phase 2) | 1 | 2023 | 3 | 2023 |
| Early User Test (EUT) | 3 | 2023 | 3 | 2023 |
| P3I Dev Testing/Operational Testing/Initial Operational T&E (DT/OT/IOTE) | 2 | 2024 | 4 | 2026 |