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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification: FY 2018 Army</b> | <b>Date: May 2017</b> |
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|---|---|
| <b>Appropriation/Budget Activity</b><br>2040: Research, Development, Test & Evaluation, Army / BA 5: System Development & Demonstration (SDD) | <b>R-1 Program Element (Number/Name)</b><br>PE 0604611A / JAVELIN |
|---|---|

| COST (\$ in Millions) | Prior Years | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO | FY 2018 Total | FY 2019 | FY 2020 | FY 2021 | FY 2022 | Cost To Complete | Total Cost |
|-----------------------|-------------|---------|---------|--------------|-------------|---------------|---------|---------|---------|---------|------------------|------------|
| Total Program Element | -           | 3.789   | 20.011  | 21.095       | -           | 21.095        | 17.772  | 5.000   | 0.000   | 0.000   | 0.000            | 67.667     |
| 499: Javelin (AAWS-M) | -           | 3.789   | 20.011  | 21.095       | -           | 21.095        | 17.772  | 5.000   | 0.000   | 0.000   | 0.000            | 67.667     |

**Note**

Not applicable for this item.

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

Javelin is a man-portable, fire-and-forget, medium-range missile with enhanced situational awareness and precision direct-fire effects to defeat armored vehicles, fortifications, and soft targets in a range of military operations. Javelin uses a modular design to allow the system to evolve to meet changing threats and requirements via both software and hardware upgrades. The system consists of a reusable Command Launch Unit (CLU) with a built-in-test (BIT), and a modular missile encased in a disposable launch tube assembly. The system also includes training devices for tactical training and classroom training

FY 2018 Base dollars in the amount of \$21.095 million will continue development engineering of the Javelin Lightweight Command Launch Unit (CLU). Objective of the Javelin Lightweight CLU is a 50% reduction in weight and a 35% reduction in size compared to the Block I CLU, while meeting detect, recognize, and identify requirements. Javelin Lightweight CLU is a result of user feedback on weight and bulk, and addresses the Close Combat Missile System - Medium Capability Production Document objective system weight requirement.

| <b><u>B. Program Change Summary (\$ in Millions)</u></b> | <b><u>FY 2016</u></b> | <b><u>FY 2017</u></b> | <b><u>FY 2018 Base</u></b> | <b><u>FY 2018 OCO</u></b> | <b><u>FY 2018 Total</u></b> |
|--|-----------------------|-----------------------|----------------------------|---------------------------|-----------------------------|
| Previous President's Budget                              | 3.945                 | 20.011                | 21.095                     | -                         | 21.095                      |
| Current President's Budget                               | 3.789                 | 20.011                | 21.095                     | -                         | 21.095                      |
| Total Adjustments  | -0.156                | 0.000                 | 0.000                      | -                         | 0.000                       |
| • Congressional General Reductions                       | -                     | -                     |                            |                           |                             |
| • Congressional Directed Reductions                      | -                     | -                     |                            |                           |                             |
| • Congressional Rescissions                              | -                     | -                     |                            |                           |                             |
| • Congressional Adds                                     | -                     | -                     |                            |                           |                             |
| • Congressional Directed Transfers                       | -                     | -                     |                            |                           |                             |
| • Reprogrammings   | -                     | -                     |                            |                           |                             |
| • SBIR/STTR Transfer                                     | -0.156                | -                     |                            |                           |                             |

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| Exhibit R-2A, RDT&E Project Justification: FY 2018 Army |             |         |         |              |  |               |         |         |   | Date: May 2017 |                  |            |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|---|----------------|------------------|------------|
| Appropriation/Budget Activity<br>2040 / 5               |             |         |         |              | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN |               |         |         | Project (Number/Name)<br>499 / Javelin (AAWS-M) |                |                  |            |
| COST (\$ in Millions)                                   | Prior Years | FY 2016 | FY 2017 | FY 2018 Base | FY 2018 OCO  | FY 2018 Total | FY 2019 | FY 2020 | FY 2021   | FY 2022        | Cost To Complete | Total Cost |
| 499: Javelin (AAWS-M)                                   | -           | 3.789   | 20.011  | 21.095       | -  | 21.095        | 17.772  | 5.000   | 0.000   | 0.000          | 0.000            | 67.667     |
| Quantity of RDT&E Articles                              | -           | -       | 7       | -            | -  | -             | -       | -       | -   | -              |                  |            |

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

Javelin is a man-portable, fire-and-forget, medium-range missile with enhanced situational awareness and precision direct-fire effects to defeat armored vehicles, fortifications, and soft targets in a range of military operations. Javelin uses a modular design to allow the system to evolve to meet changing threats and requirements via both software and hardware upgrades. The system consists of a reusable Command Launch Unit (CLU) with a built-in-test (BIT), and a modular missile encased in a disposable launch tube assembly. The system also includes training devices for tactical training and classroom training

FY2018 Base dollars in the amount of \$21.095 million will continue development engineering of the Javelin Lightweight Command Launch Unit (CLU). Objective of the Javelin Lightweight CLU is a 50% reduction in weight and a 35% reduction in size compared to the Block I CLU, while meeting detect, recognize, and identify requirements. Javelin Lightweight CLU is a result of user feedback on weight and bulk, and addresses the Close Combat Missile System - Medium Capability Production Document objective system weight requirement.

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

|   | <b>FY 2016</b> | <b>FY 2017</b> | <b>FY 2018 Base</b> | <b>FY 2018 OCO</b> | <b>FY 2018 Total</b> |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| <b>Title:</b> Javelin System Improvements   | 3.789          | 20.011         | 21.095              | -                  | 21.095               |
| <b>Description:</b> Develop Lightweight Command Launch Unit.  |                |                |                     |                    |                      |
| <b>FY 2016 Accomplishments:</b><br>Lightweight CLU: completion of prototype hardware, firmware and software design. Critical prototype fabrication and system integration activities.   |                |                |                     |                    |                      |
| <b>FY 2017 Plans:</b><br>Lightweight CLU Design phase - Conduct system level analysis; design, build and integrate 7 system-level prototypes for system-level design verification testing (DVT).  |                |                |                     |                    |                      |
| <b>FY 2018 Base Plans:</b><br>Conduct DVT to include environmental, producibility, reliability, electromagnetic/electrostatic discharge, image quality, and mechanical separation/launch dynamic tests. Conduct user evaluation, critical design review, and prepare preliminary engineering change proposal. |                |                |                     |                    |                      |
| <b>Accomplishments/Planned Programs Subtotals</b>   | 3.789          | 20.011         | 21.095              | -                  | 21.095               |

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|--|----------------|----------------|----------------|----------------|---|----------------|----------------|--|----------------|-----------------------|-------------------|
| <b>Exhibit R-2A, RDT&amp;E Project Justification:</b> FY 2018 Army   |                |                |                |                |   |                |                |  |                | <b>Date:</b> May 2017 |                   |
| <b>Appropriation/Budget Activity</b><br>2040 / 5   |                |                |                |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604611A / JAVELIN |                |                | <b>Project (Number/Name)</b><br>499 / Javelin (AAWS-M) |                |                       |                   |
| <b>C. Other Program Funding Summary (\$ in Millions)</b>   |                |                |                |                |   |                |                |  |                |                       |                   |
|  |                |                | <u>FY 2018</u> | <u>FY 2018</u> | <u>FY 2018</u>  |                |                |  |                | <u>Cost To</u>        |                   |
| <u>Line Item</u>   | <u>FY 2016</u> | <u>FY 2017</u> | <u>Base</u>    | <u>OCO</u>     | <u>Total</u>  | <u>FY 2019</u> | <u>FY 2020</u> | <u>FY 2021</u>   | <u>FY 2022</u> | <u>Complete</u>       | <u>Total Cost</u> |
| • SSN CC0007: <i>Javelin (AAWS-M) Procurement</i>  | 168.163        | 193.275        | 110.123        | 8.112          | 118.235   | 99.237         | 106.826        | 89.463   | 107.684        | Continuing            | Continuing        |
| • SSN H06103: <i>Javelin Lightweight Command Launch Unit (CLU)</i>   | -              | -              | -              | -              | -   | -              | -              | 30.000   | 45.000         | Continuing            | Continuing        |
| <b>Remarks</b>   |                |                |                |                |   |                |                |  |                |                       |                   |
| FY 2017-2020 procurement funds are to procure missiles only. No CLUs will be procured with these funds. Missiles, Lightweight CLUs, and associated training devices will be procured with FY 2021-2022 procurement funds.  |                |                |                |                |   |                |                |  |                |                       |                   |
| <b>D. Acquisition Strategy</b>   |                |                |                |                |   |                |                |  |                |                       |                   |
| Javelin Lightweight CLU development is Sole Source to the Javelin Joint Venture (Raytheon, Tucson, AZ, and Lockheed Martin, Orlando, FL). An Engineering Services Cost Plus contract with the Javelin Joint Venture will be utilized for Lightweight CLU development efforts. The major subassemblies, which are also the primary cost drivers, will be competed. The Javelin Joint Venture has invested Industry Research and Development in the Lightweight CLU. Development, prototype, and testing will occur FY 2015-2020 with production beginning in FY 2021. Army Acquisition Objective (AAO) is 4,500. Current plan is to field to priority Infantry Brigade Combat Teams and Special Forces and cascade Block 0 CLUs out of the inventory. |                |                |                |                |   |                |                |  |                |                       |                   |
| <b>E. Performance Metrics</b>  |                |                |                |                |   |                |                |  |                |                       |                   |
| N/A  |                |                |                |                |   |                |                |  |                |                       |                   |

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| Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Army                   |                        |   |             |         |            |  |            |              |            |   |            | Date: May 2017 |                  |            |                          |
|--|------------------------|---|-------------|---------|------------|--|------------|--------------|------------|---|------------|----------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity<br>2040 / 5                                |                        |   |             |         |            | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN |            |              |            | Project (Number/Name)<br>499 / Javelin (AAWS-M) |            |                |                  |            |                          |
| Management Services (\$ in Millions)                                     |                        |   |             | FY 2016 |            | FY 2017  |            | FY 2018 Base |            | FY 2018 OCO                                     |            | FY 2018 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 |
| System Engineering/<br>Program Management,<br>Govt                       | Allot                  | Close Combat<br>Weapon Systems<br>Project Office :<br>Redstone Arsenal,<br>AL | 0.363       | 0.403   | Nov 2015   | 1.767  | Nov 2016   | 1.883        | Oct 2017   | -   |            | 1.883          | 2.117            | 6.533      | 0.000                    |
| Subtotal   |                        |   | 0.363       | 0.403   |            | 1.767  |            | 1.883        |            | -   |            | 1.883          | 2.117            | 6.533      | 0.000                    |
| Product Development (\$ in Millions)                                     |                        |   |             | FY 2016 |            | FY 2017  |            | FY 2018 Base |            | FY 2018 OCO                                     |            | FY 2018 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 |
| Lightweight CLU<br>Development   | SS/CPFF                | JJV/Raytheon/<br>Lockheed Martin :<br>Orlando, FL/<br>Tucson,AZ               | 2.345       | 2.642   | Jan 2016   | 17.674   | May 2017   | 12.954       | Oct 2017   | -   |            | 12.954         | 13.600           | 49.215     | 0.000                    |
| Lightweight CLU<br>Development   | MIPR                   | Redstone Test<br>Center : Redstone<br>Arsenal, AL                             | 0.000       | -       |            | 0.570  | Nov 2016   | -            |            | -   |            | -              | 0.000            | 0.570      | 0.000                    |
| Lightweight CLU<br>Trade Studies and<br>Demonstrations                   | MIPR                   | AMRDEC : Redstone<br>Arsenal, AL  | 1.299       | 0.744   | Nov 2015   | -  |            | -            |            | -   |            | -              | 0.000            | 2.043      | 0.000                    |
| Subtotal   |                        |   | 3.644       | 3.386   |            | 18.244   |            | 12.954       |            | -   |            | 12.954         | 13.600           | 51.828     | 0.000                    |
| Remarks  |                        |   |             |         |            |  |            |              |            |   |            |                |                  |            |                          |
| JJV - Javelin Joint Venture  |                        |   |             |         |            |  |            |              |            |   |            |                |                  |            |                          |
| SS CPFF - Sole Source Cost Plus Fixed Fee                                |                        |   |             |         |            |  |            |              |            |   |            |                |                  |            |                          |
| CLU - Command Launch Unit  |                        |   |             |         |            |  |            |              |            |   |            |                |                  |            |                          |
| AMRDEC - Aviation & Missile Research, Development and Engineering Center |                        |   |             |         |            |  |            |              |            |   |            |                |                  |            |                          |
| MIPR - Military Interdepartmental Purchase Request                       |                        |   |             |         |            |  |            |              |            |   |            |                |                  |            |                          |

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| Exhibit R-3, RDT&E Project Cost Analysis: FY 2018 Army |                              |   |                |         |               |  |               |                 |               |   |               | Date: May 2017   |                     |               |                                |
|--|------------------------------|---|----------------|---------|---------------|--|---------------|-----------------|---------------|---|---------------|------------------|---------------------|---------------|--------------------------------|
| Appropriation/Budget Activity<br>2040 / 5              |                              |   |                |         |               | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN |               |                 |               | Project (Number/Name)<br>499 / Javelin (AAWS-M) |               |                  |                     |               |                                |
| Test and Evaluation (\$ in Millions)                   |                              |   |                | FY 2016 |               | FY 2017  |               | FY 2018<br>Base |               | FY 2018<br>OCO                                  |               | FY 2018<br>Total |                     |               |                                |
| Cost Category Item                                     | Contract<br>Method<br>& Type | Performing<br>Activity & Location                               | Prior<br>Years | Cost    | Award<br>Date | Cost   | Award<br>Date | Cost            | Award<br>Date | Cost  | Award<br>Date | Cost             | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
| Lightweight CLU Design<br>Verification Testing         | SS/CPFF                      | JJV/Raytheon/<br>Lockheed Martin :<br>Orlando, FL/Tucson,<br>AZ | 0.000          | -       |               | -  |               | 0.722           | Oct 2017      | -   |               | 0.722            | 0.000               | 0.722         | 0.000                          |
| Lightweight CLU Design<br>Verification Testing         | MIPR                         | Redstone Test<br>Center : Redstone<br>Arsenal, AL               | 0.000          | -       |               | -  |               | 1.587           | Oct 2017      | -   |               | 1.587            | 0.000               | 1.587         | 0.000                          |
| Lightweight CLU<br>Qualification Testing               | SS/CPFF                      | JJV/Raytheon/<br>Lockheed Martin :<br>Orlando, FL/Tucson,<br>AZ | 0.000          | -       |               | -  |               | 0.634           | May 2018      | -   |               | 0.634            | 0.991               | 1.625         | 0.000                          |
| Lightweight CLU<br>Qualification Testing               | MIPR                         | Redstone Test<br>Center : Redstone<br>Arsenal, AL               | 0.000          | -       |               | -  |               | 3.315           | May 2018      | -   |               | 3.315            | 6.064               | 9.379         | 0.000                          |
| Subtotal   |                              |   | 0.000          | -       |               | -  |               | 6.258           |               | -   |               | 6.258            | 7.055               | 13.313        | 0.000                          |
|  |                              |   | Prior<br>Years | FY 2016 |               | FY 2017  |               | FY 2018<br>Base |               | FY 2018<br>OCO                                  |               | FY 2018<br>Total | Cost To<br>Complete | Total<br>Cost | Target<br>Value of<br>Contract |
| Project Cost Totals                                    |                              |   | 4.007          | 3.789   |               | 20.011   |               | 21.095          |               | -   |               | 21.095           | 22.772              | 71.674        | -                              |
| Remarks  |                              |   |                |         |               |  |               |                 |               |   |               |                  |                     |               |                                |

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| Exhibit R-4, RDT&E Schedule Profile: FY 2018 Army    |         |   |   |   |         |   |   |   |         |  |   |   |         |   |   | Date: May 2017 |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |
|--|---------|---|---|---|---------|---|---|---|---------|--|---|---|---------|---|---|----------------|---------|---|---|---|---------|---|---|---|---------|---|---|---|--|--|--|--|
| Appropriation/Budget Activity<br>2040 / 5            |         |   |   |   |         |   |   |   |         | R-1 Program Element (Number/Name)<br>PE 0604611A / JAVELIN |   |   |         |   |   |                |         | Project (Number/Name)<br>499 / Javelin (AAWS-M) |   |   |         |   |   |   |         |   |   |   |  |  |  |  |
| Event Name   | FY 2016 |   |   |   | FY 2017 |   |   |   | FY 2018 |  |   |   | FY 2019 |   |   |                | FY 2020 |   |   |   | FY 2021 |   |   |   | FY 2022 |   |   |   |  |  |  |  |
|  | 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 |  |  |  |  |
| Initiate LW CLU Prototype Software/Firmware          |         |   |   |   |         |   |   |   |         |  |   |   |         |   |   |                |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |
| LW CLU Fabrication/ System Integration of Prototypes |         |   |   |   |         |   |   |   |         |  |   |   |         |   |   |                |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |
| LW CLU Prototype Demonstration                       |         |   |   |   |         |   |   |   |         |  |   |   |         |   |   |                |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |
| LW CLU Design / Build / Integrate DVT Units          |         |   |   |   |         |   |   |   |         |  |   |   |         |   |   |                |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |
| LW CLU Design Verification Testing                   |         |   |   |   |         |   |   |   |         |  |   |   |         |   |   |                |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |
| LW CLU Design/Build/Integrate Qualification Units    |         |   |   |   |         |   |   |   |         |  |   |   |         |   |   |                |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |
| LW CLU Qualification Testing                         |         |   |   |   |         |   |   |   |         |  |   |   |         |   |   |                |         |   |   |   |         |   |   |   |         |   |   |   |  |  |  |  |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> FY 2018 Army |   |  | <b>Date:</b> May 2017 |
| <b>Appropriation/Budget Activity</b><br>2040 / 5              | <b>R-1 Program Element (Number/Name)</b><br>PE 0604611A / JAVELIN | <b>Project (Number/Name)</b><br>499 / Javelin (AAWS-M) |                       |

Schedule Details

| Events   | Start   |      | End     |      |
|--|---------|------|---------|------|
|  | Quarter | Year | Quarter | Year |
| Initiate LW CLU Prototype Software/Firmware          | 4       | 2015 | 3       | 2016 |
| LW CLU Fabrication/ System Integration of Prototypes | 4       | 2016 | 1       | 2017 |
| LW CLU Prototype Demonstration                       | 1       | 2017 | 1       | 2017 |
| LW CLU Design / Build / Integrate DVT Units          | 3       | 2016 | 2       | 2018 |
| LW CLU Design Verification Testing                   | 2       | 2018 | 3       | 2018 |
| LW CLU Design/Build/Integrate Qualification Units    | 3       | 2018 | 2       | 2019 |
| LW CLU Qualification Testing                         | 4       | 2018 | 3       | 2020 |