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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2017 Air Force **Date:** February 2016

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| <b>Appropriation/Budget Activity</b><br>3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i> | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F I <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i> |
|--|---|

| COST (\$ in Millions)                           | Prior Years | FY 2015 | FY 2016 | FY 2017 Base | FY 2017 OCO | FY 2017 Total | FY 2018 | FY 2019 | FY 2020 | FY 2021 | Cost To Complete | Total Cost |
|---|-------------|---------|---------|--------------|-------------|---------------|---------|---------|---------|---------|------------------|------------|
| Total Program Element                           | 442.900     | 0.000   | 54.637  | 74.308       | 0.000       | 74.308        | 32.287  | 36.349  | 2.180   | 0.000   | 0.000            | 642.661    |
| 645341: <i>Direct Strike Penetrator Systems</i> | 442.900     | 0.000   | 54.637  | 74.308       | 0.000       | 74.308        | 32.287  | 36.349  | 2.180   | 0.000   | 0.000            | 642.661    |
| Quantity of RDT&E Articles                      | 28          | -       | -       | -            | -           | -             | -       | -       | -       | -       | -                | -          |

**Program MDAP/MAIS Code:** 475

**Note**

This program, BA 04 PE 0604327F, project 645341, Massive Ordnance Penetrator (MOP) M-Code Development, is a new start.

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

The Direct Strike Penetrator Systems project includes development of a Quick Reaction Capability (QRC) known as Massive Ordnance Penetrator (MOP) and analysis efforts for the follow-on Hard Target Munitions (HTM) program. Hard and Deeply Buried Target Defeat System (HDBTDS) development activity stems from the Initial Capabilities Document (ICD) for HDBTDS, 1 Aug 2005, and MOP development flowed from the 2007 Urgent Operational Need (UON) document (revalidated Oct 2014).

The Direct Strike Penetrator System project develops advanced precision guided penetrator munitions that will provide the Air Force with improved ability to attack Hard & Deeply Buried Targets (HDBT), such as bunker and tunnel facilities, using air-to-surface conventional munitions. Systems developed in this project will hold HDBTs at risk using fewer weapons, reducing the number of missions necessary to defeat targets, and resulting in an increase to mission survivability. The Direct Strike Penetrator provides critical global strike capability not met by inventory conventional weapons. It will hold at risk the best defended and protected high priority assets essential to an enemy's warfighting ability. Additionally, the program will develop and implement an acquisition strategy to integrate M-code for improved anti-jamming and secure access to military GPS signals.

This project also conducted an HTM analysis-of-alternatives (AoA) to determine the best weapons and/or development efforts for addressing the Hard and Deeply Buried Targets (HDBT) mission area. The Air Force will use the AoA to start development, production, and modification activities for HDBT attack weapons identified in it as most effective and affordable. HTM is a pre-MDAP program.

This program is in Budget Activity 4, Advanced Component Development and Prototypes (ACD&P) because efforts are necessary to evaluate integrated technologies, representative modes, and prototype systems in a high fidelity and realistic operating environment.

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| <b>Appropriation/Budget Activity</b><br>3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P) | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program |
|---|--|

| <b>B. Program Change Summary (\$ in Millions)</b> | <b>FY 2015</b> | <b>FY 2016</b> | <b>FY 2017 Base</b> | <b>FY 2017 OCO</b> | <b>FY 2017 Total</b> |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| Previous President's Budget                       | 0.000          | 54.637         | 0.000               | 0.000              | 0.000                |
| Current President's Budget                        | 0.000          | 54.637         | 74.308              | 0.000              | 74.308               |
| Total Adjustments                                 | 0.000          | 0.000          | 74.308              | 0.000              | 74.308               |
| • Congressional General Reductions                | 0.000          | 0.000          |                     |                    |                      |
| • Congressional Directed Reductions               | 0.000          | 0.000          |                     |                    |                      |
| • Congressional Rescissions                       | 0.000          | 0.000          |                     |                    |                      |
| • Congressional Adds                              | 0.000          | 0.000          |                     |                    |                      |
| • Congressional Directed Transfers                | 0.000          | 0.000          |                     |                    |                      |
| • Reprogrammings                                  | 0.000          | 0.000          |                     |                    |                      |
| • SBIR/STTR Transfer                              | 0.000          | 0.000          |                     |                    |                      |
| • Other Adjustments                               | 0.000          | 0.000          | 74.308              | 0.000              | 74.308               |

**Change Summary Explanation**

FY17 - funding increased for GPS M-Code Inc 1 and additional MOP requirements.

| <b>C. Accomplishments/Planned Programs (\$ in Millions)</b>  | <b>FY 2015</b> | <b>FY 2016</b> | <b>FY 2017 Base</b> | <b>FY 2017 OCO</b> | <b>FY 2017 Total</b> |
|--|----------------|----------------|---------------------|--------------------|----------------------|
| <b>Title:</b> Massive Ordnance Penetrator (MOP) Weapon Development   | 0.000          | 7.567          | 7.400               | 0.000              | 7.400                |
| <b>Description:</b> MOP Weapon development/redesign and test and integration on the B-2. Develop the Enhanced Threat Response (ETR III & IV) capability for the current MOP weapon.  |                |                |                     |                    |                      |
| <b>FY 2015 Accomplishments:</b><br>N/A   |                |                |                     |                    |                      |
| <b>FY 2016 Plans:</b><br>Continue development of the the third and fourth phase of Enhanced Threat Response (ETR III & IV) capability for the current MOP weapon, including development of an acquisition strategy for incorporation of M-code.  |                |                |                     |                    |                      |
| <b>FY 2017 Base Plans:</b><br>Complete development of the third and fourth phase of Enhanced Threat Response (ETR III & IV) capability for the current MOP weapon, including development of an acquisition strategy for incorporation of M-code. |                |                |                     |                    |                      |
| <b>FY 2017 OCO Plans:</b><br>N/A   |                |                |                     |                    |                      |
| <b>Title:</b> Massive Ordnance Penetrator (MOP) Target Construction  | 0.000          | 38.270         | 0.965               | 0.000              | 0.965                |

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Air Force  |                |   | <b>Date:</b> February 2016 |                    |                      |
| <b>Appropriation/Budget Activity</b><br>3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>  |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F I <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i> |                            |                    |                      |
| <b>C. Accomplishments/Planned Programs (\$ in Millions)</b>   |                |   |                            |                    |                      |
|   | <b>FY 2015</b> | <b>FY 2016</b>  | <b>FY 2017 Base</b>        | <b>FY 2017 OCO</b> | <b>FY 2017 Total</b> |
| <p><b>Description:</b> Construct several hard and deeply buried targets for MOP testing.</p> <p><b>FY 2015 Accomplishments:</b><br/>N/A</p> <p><b>FY 2016 Plans:</b><br/>Construct several Hard and deeply buried targets for live weapon testing for the fourth phase of the MOP Enhanced Threat Response (ETR-IV) weapon modification.</p> <p><b>FY 2017 Base Plans:</b><br/>Instrumentation of test targets.</p> <p><b>FY 2017 OCO Plans:</b><br/>N/A</p>  |                |   |                            |                    |                      |
| <p><b>Title:</b> Massive Ordnance Penetrator (MOP) Testing</p> <p><b>Description:</b> Conduct MOP ground, subscale and live testing in support of the Enhanced Threat Response III-IV development efforts.</p> <p><b>FY 2015 Accomplishments:</b><br/>N/A</p> <p><b>FY 2016 Plans:</b><br/>Conduct several live weapon tests to validate the MOP ETR-III and IV modifications.</p> <p><b>FY 2017 Base Plans:</b><br/>Conduct live weapon tests to validate the MOP ETR-III and IV modifications.</p> <p><b>FY 2017 OCO Plans:</b><br/>N/A</p> | 0.000          | 6.300   | 5.215                      | 0.000              | 5.215                |
| <p><b>Title:</b> Massive Ordnance Penetrator (MOP) Analysis</p> <p><b>Description:</b> Analyze MOP weapon effectiveness</p> <p><b>FY 2015 Accomplishments:</b></p>  | 0.000          | 2.500   | 1.320                      | 0.000              | 1.320                |

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| <b>Appropriation/Budget Activity</b><br>3600: Research, Development, Test & Evaluation, Air Force I BA 4: Advanced Component Development & Prototypes (ACD&P) | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F I Hard and Deeply Buried Target Defeat System (HDBTDS) Program |
|---|--|

| <b>C. Accomplishments/Planned Programs (\$ in Millions)</b>   | FY 2015 | FY 2016 | FY 2017<br>Base | FY 2017<br>OCO | FY 2017<br>Total |
|---|---------|---------|-----------------|----------------|------------------|
| N/A   |         |         |                 |                |                  |
| <b>FY 2016 Plans:</b><br>Analyze weapons effects and develop methods to optimize the MOP weapon's effectiveness.      |         |         |                 |                |                  |
| <b>FY 2017 Base Plans:</b><br>Analyze weapons effects and develop methods to optimize the MOP weapon's effectiveness. |         |         |                 |                |                  |
| <b>FY 2017 OCO Plans:</b><br>N/A  |         |         |                 |                |                  |
| <b>Title:</b> Massive Ordnance Penetrator (MOP) M-Code Development  | 0.000   | 0.000   | 59.408          | 0.000          | 59.408           |
| <b>Description:</b> N/A   |         |         |                 |                |                  |
| <b>FY 2015 Accomplishments:</b><br>N/A  |         |         |                 |                |                  |
| <b>FY 2016 Plans:</b><br>N/A  |         |         |                 |                |                  |
| <b>FY 2017 Base Plans:</b><br>Development/integration of M-Code Receiver for MOP.                                     |         |         |                 |                |                  |
| <b>FY 2017 OCO Plans:</b><br>N/A  |         |         |                 |                |                  |
| <b>Accomplishments/Planned Programs Subtotals</b>   | 0.000   | 54.637  | 74.308          | 0.000          | 74.308           |

| <b>D. Other Program Funding Summary (\$ in Millions)</b> |                |                |                         |                        |                          |                |                |                |                |                             |                   |
|--|----------------|----------------|-------------------------|------------------------|--------------------------|----------------|----------------|----------------|----------------|-----------------------------|-------------------|
| <b>Line Item</b>   | <b>FY 2015</b> | <b>FY 2016</b> | <b>FY 2017<br/>Base</b> | <b>FY 2017<br/>OCO</b> | <b>FY 2017<br/>Total</b> | <b>FY 2018</b> | <b>FY 2019</b> | <b>FY 2020</b> | <b>FY 2021</b> | <b>Cost To<br/>Complete</b> | <b>Total Cost</b> |
| • PAAF: BA01: Line Item #353190:<br>WRM-Ammunition (MOP) | 0.000          | 39.690         | 3.600                   | 0.000                  | 3.600                    | 0.000          | 0.000          | 0.000          | 0.000          | 0.000                       | 39.690            |

**Remarks**  
MOP sustainment funding is under the Armament Sustainment portfolio PEC 28030. Current sustainment funding is ~\$4.7M per year starting FY16.

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| <b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2017 Air Force  |   | <b>Date:</b> February 2016 |
| <b>Appropriation/Budget Activity</b><br>3600: <i>Research, Development, Test &amp; Evaluation, Air Force I BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i> |                            |
| <b>E. Acquisition Strategy</b><br>MOP is a Quick Reaction Capability (QRC) with a sole source cost plus incentive fee contract to a single contractor.  |   |                            |
| <b>F. Performance Metrics</b><br>Please refer to the Performance Base Budget Overview Book for information on how Air Force resources are applied and how those resources are contributing to Air Force performance goals and most importantly, how they contribute to our mission. |   |                            |

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Air Force** **Date:** February 2016

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| <b>Appropriation/Budget Activity</b><br>3600 / 4 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i> | <b>Project (Number/Name)</b><br>645341 / <i>Direct Strike Penetrator Systems</i> |
|--|---|--|

| <b>Product Development (\$ in Millions)</b>       |                                   |   |                    | <b>FY 2015</b> |                   | <b>FY 2016</b> |                   | <b>FY 2017 Base</b> |                   | <b>FY 2017 OCO</b> |                   | <b>FY 2017 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>          |                         |                   |                                 |
| A/C Integration                                   | Various                           | AFLCMC/WW : Wright Pat, OH                            | 0.000              | 0.000          |                   | 2.000          | Jan 2016          | 0.000               |                   | 0.000              |                   | 0.000                | 0.000                   | 2.000             | 0.000                           |
| MOP Weapon Development                            | SS/CPIF                           | Boeing : St Louis, MO                                 | 246.772            | 0.000          |                   | 7.567          | Feb 2016          | 7.400               | Mar 2017          | 0.000              |                   | 7.400                | 0.000                   | 261.739           | 195.772                         |
| M-Code Receiver Development/Integration           | SS/TBD                            | Boeing : St Louis, MO                                 | 0.000              | 0.000          |                   | 0.000          |                   | 53.467              | Feb 2017          | 0.000              |                   | 53.467               | 62.319                  | 115.786           | 115.758                         |
| Hard Target Munitions (HTM) Capabilities Analysis | Various                           | Whitney, Bradley & Brown; ARA; Booz Allen : Eglin, FL | 3.614              | 0.000          |                   | 0.000          |                   | 0.000               |                   | 0.000              |                   | 0.000                | 0.000                   | 3.614             | 3.614                           |
| HTM Concept/Technology Study                      | Various                           | Several Local Companies : Eglin, FL                   | 2.779              | 0.000          |                   | 0.000          |                   | 0.000               |                   | 0.000              |                   | 0.000                | 0.000                   | 2.779             | 2.779                           |
| HTM Weapons Effects/Target Analysis               | RO                                | Defense Threat Reduction Agency : Albuquerque, NM     | 1.087              | 0.000          |                   | 0.000          |                   | 1.320               | Jun 2017          | 0.000              |                   | 1.320                | 0.000                   | 2.407             | 1.087                           |
| HTM Concept Tech Data                             | Various                           | Several Local Companies : Eglin AFB, FL               | 1.811              | 0.000          |                   | 0.000          |                   | 0.000               |                   | 0.000              |                   | 0.000                | 0.000                   | 1.811             | 1.811                           |
| HTM Technical Support                             | Various                           | Jacobs Engr. : Eglin, FL                              | 1.751              | 0.000          |                   | 0.000          |                   | 0.000               |                   | 0.000              |                   | 0.000                | 0.000                   | 1.751             | 1.751                           |
| <b>Subtotal</b>                                   |                                   |   | 257.814            | 0.000          |                   | 9.567          |                   | 62.187              |                   | 0.000              |                   | 62.187               | 62.319                  | 391.887           | 322.572                         |

| <b>Support (\$ in Millions)</b> |                                   |  |                    | <b>FY 2015</b> |                   | <b>FY 2016</b> |                   | <b>FY 2017 Base</b> |                   | <b>FY 2017 OCO</b> |                   | <b>FY 2017 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>          |                         |                   |                                 |
| Govt Support                    | Various                           | Several Govt Labs and test Centers : Eglin AFB, FL | 15.199             | 0.000          |                   | 0.967          | Jan 2016          | 3.106               | Oct 2016          | 0.000              |                   | 3.106                | 1.593                   | 20.865            | 13.199                          |
| <b>Subtotal</b>                 |                                   |  | 15.199             | 0.000          |                   | 0.967          |                   | 3.106               |                   | 0.000              |                   | 3.106                | 1.593                   | 20.865            | 13.199                          |

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Air Force** **Date:** February 2016

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| <b>Appropriation/Budget Activity</b><br>3600 / 4 | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i> | <b>Project (Number/Name)</b><br>645341 / <i>Direct Strike Penetrator Systems</i> |
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| <b>Test and Evaluation (\$ in Millions)</b>   |                        |   |             | FY 2015 |            | FY 2016 |            | FY 2017 Base |            | FY 2017 OCO |            | FY 2017 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          |                  |            |                          |
| MOP System Test & Evaluation                  | Various                | AFLCMC : Eglin , Holloman, Edwards, FL                    | 10.369      | 0.000   |            | 2.625   | Jan 2016   | 1.256        | Jun 2017   | 0.000       |            | 1.256         | 0.000            | 14.250     | 6.369                    |
| MOP Flight Test Range Support                 | Various                | White Sands Missile Range : White Sands Missile Range, NM | 14.004      | 0.000   |            | 1.675   | Jan 2016   | 1.459        | Jun 2017   | 0.000       |            | 1.459         | 0.000            | 17.138     | 13.644                   |
| Target Construction and Instrumentation (MOP) | Various                | Defense Threat Reduction Agency : Albuquerque, NM         | 101.527     | 0.000   |            | 38.270  | Jan 2016   | 0.965        | Jun 2017   | 0.000       |            | 0.965         | 0.000            | 140.762    | 81.527                   |
| MOP Test and Evaluation Activities            | Various                | AF Flight Test Center : Albuquerque, NM                   | 31.123      | 0.000   |            | 0.000   |            | 1.000        | Jun 2017   | 0.000       |            | 1.000         | 0.000            | 32.123     | 13.123                   |
| M-Code Test and Evaluation Activities         | Various                | AFLCMC : Eglin, Holloman, Edwards, FL                     | 0.000       | 0.000   |            | 0.000   |            | 1.035        | Jun 2017   | 0.000       |            | 1.035         | 4.780            | 5.815      | 5.815                    |
| <b>Subtotal</b>                               |                        |   | 157.023     | 0.000   |            | 42.570  |            | 5.715        |            | 0.000       |            | 5.715         | 4.780            | 210.088    | 120.478                  |

| <b>Management Services (\$ in Millions)</b>                       |                        |                                |             | FY 2015 |            | FY 2016 |            | FY 2017 Base |            | FY 2017 OCO |            | FY 2017 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          |                  |            |                          |
| Program Management Administration (PMA) for MOP                   | Various                | AFLCMC/EBD : Eglin AFB, FL     | 12.252      | 0.000   |            | 1.533   | Jan 2016   | 1.500        | Oct 2016   | 0.000       |            | 1.500         | 0.000            | 15.285     | 0.000                    |
| Program Management Administration (PMA) for M-Code                | Various                | AFLCMC/EBD : Eglin AFB, FL     | 0.000       | 0.000   |            | 0.000   |            | 1.800        | Oct 2016   | 0.000       |            | 1.800         | 2.124            | 3.924      | 0.000                    |
| Program Management Administration (PMA) for Hard Target Munitions | Various                | AFLCMC/XR : Eglin AFB, FL      | 0.612       | 0.000   |            | 0.000   |            | 0.000        |            | 0.000       |            | 0.000         | 0.000            | 0.612      | 0.000                    |
| <b>Subtotal</b>   |                        |                                | 12.864      | 0.000   |            | 1.533   |            | 3.300        |            | 0.000       |            | 3.300         | 2.124            | 19.821     | 0.000                    |

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| <b>Exhibit R-3, RDT&amp;E Project Cost Analysis: PB 2017 Air Force</b> |                    |                |   |  |                     |                    | <b>Date: February 2016</b>   |                         |                   |                                 |  |
| <b>Appropriation/Budget Activity</b><br>3600 / 4                       |                    |                | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i> |  |                     |                    | <b>Project (Number/Name)</b><br>645341 / <i>Direct Strike Penetrator Systems</i> |                         |                   |                                 |  |
|  | <b>Prior Years</b> | <b>FY 2015</b> | <b>FY 2016</b>  |  | <b>FY 2017 Base</b> | <b>FY 2017 OCO</b> | <b>FY 2017 Total</b>   | <b>Cost To Complete</b> | <b>Total Cost</b> | <b>Target Value of Contract</b> |  |
| <b>Project Cost Totals</b>   | 442.900            | 0.000          | 54.637  |  | 74.308              | 0.000              | 74.308   | 70.816                  | 642.661           | 456.249                         |  |

**Remarks**

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| <b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2017 Air Force</b> |   | <b>Date:</b> February 2016   |
| <b>Appropriation/Budget Activity</b><br>3600 / 4                  | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i> | <b>Project (Number/Name)</b><br>645341 / <i>Direct Strike Penetrator Systems</i> |

|   | FY 2015 |   |   |   | FY 2016 |   |   |   | FY 2017 |   |   |   | FY 2018 |   |   |   | FY 2019 |   |   |   | FY 2020 |   |   |   | FY 2021 |   |   |   |
|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|---------|---|---|---|
|   | 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 |
| MOP ETR-II Modification Design and Qualification Testing  | ■       |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| MOP ETR-II Flight Testing                                 | ■       | ■ |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| MOP ETR-III Modification Design and Qualification Testing | ■       | ■ | ■ | ■ |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| MOP ETR-IV Modification Design and Qualification Testing  | ■       | ■ | ■ | ■ | ■       | ■ | ■ | ■ |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| MOP ETR-III Test Construction and Flight Testing          |         |   |   |   |         | ■ | ■ | ■ |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| MOP ETR-IV Test Construction and Flight Testing           |         |   |   |   |         |   |   |   |         | ■ | ■ | ■ |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| MOP Analysis  | ■       | ■ | ■ | ■ | ■       | ■ | ■ | ■ |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |         |   |   |   |
| M-Code Development/Integration                            |         |   |   |   |         |   |   |   |         | ■ | ■ | ■ | ■       | ■ | ■ | ■ | ■       | ■ | ■ | ■ |         |   |   |   |         |   |   |   |

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| <b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2017 Air Force |   | <b>Date:</b> February 2016   |
| <b>Appropriation/Budget Activity</b><br>3600 / 4                   | <b>R-1 Program Element (Number/Name)</b><br>PE 0604327F / <i>Hard and Deeply Buried Target Defeat System (HDBTDS) Program</i> | <b>Project (Number/Name)</b><br>645341 / <i>Direct Strike Penetrator Systems</i> |

Schedule Details

| Events  | Start   |      | End     |      |
|---|---------|------|---------|------|
|   | Quarter | Year | Quarter | Year |
| MOP ETR-II Modification Design and Qualification Testing  | 1       | 2015 | 1       | 2015 |
| MOP ETR-II Flight Testing                                 | 1       | 2015 | 2       | 2015 |
| MOP ETR-III Modification Design and Qualification Testing | 1       | 2015 | 1       | 2016 |
| MOP ETR-IV Modification Design and Qualification Testing  | 1       | 2015 | 2       | 2017 |
| MOP ETR-III Test Construction and Flight Testing          | 2       | 2016 | 3       | 2016 |
| MOP ETR-IV Test Construction and Flight Testing           | 1       | 2017 | 2       | 2017 |
| MOP Analysis  | 1       | 2015 | 2       | 2017 |
| M-Code Development/Integration                            | 1       | 2017 | 4       | 2020 |