

UNCLASSIFIED

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

| Appropriation/Budget Activity 2040: <i>Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development</i> | | | | | R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</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 | - | 0.802 | 0.402 | 0.124 | - | 0.124 | 1.405 | 1.314 | 0.586 | 0.604 | 0.000 | 5.237 |
| EE9: <i>Material Handling Equipment - Advance Development</i> | - | 0.802 | 0.402 | 0.124 | - | 0.124 | 1.405 | 1.314 | 0.586 | 0.604 | 0.000 | 5.237 |

Note

The FY 2017 funding request was reduced by \$0.180 million to account for the availability of prior year execution balances.0

A. Mission Description and Budget Item Justification

This program element supports component development and Material Handling Equipment (MHE) prototyping and stays abreast of emerging and available technologies to be integrated into military MHE to address identified capability gaps and warfighter objectives. This project enables the development of selected technologies and transition to system integration and development or production of MHE products. MHE includes Rough Terrain Forklifts, Rough Terrain Container Handlers (RTCH) and Cranes, as well as ancillary MHE equipment, to support distribution of critical supplies in the theater of operations.

| B. Program Change Summary (\$ in Millions) | FY 2015 | FY 2016 | FY 2017 Base | FY 2017 OCO | FY 2017 Total |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| Previous President's Budget | 0.834 | 0.402 | 0.304 | - | 0.304 |
| Current President's Budget | 0.802 | 0.402 | 0.124 | - | 0.124 |
| Total Adjustments | -0.032 | 0.000 | -0.180 | - | -0.180 |
| • Congressional General Reductions | - | - | | | |
| • Congressional Directed Reductions | - | - | | | |
| • Congressional Rescissions | - | - | | | |
| • Congressional Adds | - | - | | | |
| • Congressional Directed Transfers | - | - | | | |
| • Reprogrammings | - | - | | | |
| • SBIR/STTR Transfer | -0.032 | - | | | |
| • Other Adjustments 1 | - | - | -0.180 | - | -0.180 |

Change Summary Explanation

Funding realigned from 603804A Project G14

UNCLASSIFIED

| | | | | | | | | | | | | |
|--|--------------------|----------------|----------------|---------------------|---|----------------------|----------------|----------------|--|----------------------------|-------------------------|-------------------|
| Exhibit R-2A, RDT&E Project Justification: PB 2017 Army | | | | | | | | | | Date: February 2016 | | |
| Appropriation/Budget Activity 2040 / 7 | | | | | R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i> | | | | Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</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 |
| EE9: <i>Material Handling Equipment - Advance Development</i> | - | 0.802 | 0.402 | 0.124 | - | 0.124 | 1.405 | 1.314 | 0.586 | 0.604 | 0.000 | 5.237 |
| Quantity of RDT&E Articles | - | - | - | - | - | - | - | - | - | - | | |

Note

The FY 2017 funding request was reduced by \$0.180 million to account for the availability of prior year execution balances.

A. Mission Description and Budget Item Justification

This project supports component development and Material Handling Equipment (MHE) prototyping and stays abreast of emerging and available technologies to be integrated into military MHE to address identified capability gaps and warfighter objectives. This project enables the development of selected technologies and transition to system integration and development or production of MHE products. MHE includes Rough Terrain Forklifts, Rough Terrain Container Handlers (RTCH) and Cranes, as well as ancillary MHE equipment, to support distribution of critical supplies in the theater of operations.

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

| | FY 2015 | FY 2016 | FY 2017 Base | FY 2017 OCO | FY 2017 Total |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| Title: Baseline Fuel Efficiency of Material Handling Equipment (MHE) | - | 0.060 | - | - | - |
| Description: Develop standard duty cycles for fielded system, investigate training/technology for improving efficiency and validate performance of proposed changes. | | | | | |
| FY 2016 Plans: Continue baseline and evaluate new solutions for fluid and controls. | | | | | |
| Title: Upgrade RTCH control systems and on-board diagnostics | 0.293 | - | - | - | - |
| Description: Perform analysis of current control systems and technology which can be used to improve performance and reliability. Investigate integration of on-board diagnostics to aid in operation and maintenance. | | | | | |
| FY 2015 Accomplishments: Investigate current RTCH control systems and conduct Market Research | | | | | |
| Title: Investigate Robotic Assist on Material Handling Equipment (MHE) | 0.121 | - | - | - | - |
| Description: Research and demonstrate technologies which would enhance operation such as the inclusion of cameras, collision sensors and lifting aids. | | | | | |

UNCLASSIFIED

| | | | | | |
|---|----------------|---|---------------------|--|----------------------|
| Exhibit R-2A, RDT&E Project Justification: PB 2017 Army | | | | Date: February 2016 | |
| Appropriation/Budget Activity 2040 / 7 | | R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i> | | Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i> | |
| B. Accomplishments/Planned Programs (\$ in Millions) | | | | | |
| | FY 2015 | FY 2016 | FY 2017 Base | FY 2017 OCO | FY 2017 Total |
| <i>FY 2015 Accomplishments:</i> Conduct research into appliqué which will enhance operation | | | | | |
| <i>Title:</i> Operational Energy Technologies | | | | | |
| <i>Description:</i> Evaluate emerging technologies that can improve machine productivity and efficiency. Baseline fuel efficiency, engine management, efficient lubricants and hydraulic technologies. | | | | | |
| <i>FY 2015 Accomplishments:</i> Investigate commercially available technology which can be integrated onto the RTCH to enhance the operational capability of the operator. These improvements should allow the operator to complete normal operations in a more expedient manner and/or reduce the number of personnel to complete the mission. | | | | | |
| <i>FY 2016 Plans:</i> Instrument up to three vehicle types (Light Capacity Rough Terrain Forklift, Rough Terrain Container Handler and All Terrain Lifting Army System) and monitor fuel consumption during operations. Build duty cycle profiles for the classes of equipment and identify areas of inefficiency and language to include in future procurements. | | | | | |
| <i>Title:</i> Machine Diagnostic | | | | | |
| <i>Description:</i> Evaluate machine diagnostic and condition based maintenance technologies to enhance operational availability and reduce overall maintenance burden. | | | | | |
| <i>FY 2016 Plans:</i> Investigate the commercially available technology for integration on the RTCH which would allow onboard diagnostic and fault production capability. | | | | | |
| <i>Title:</i> System Engineering/Program Management | | | | | |
| <i>Description:</i> Funding provided for Material Handling Equipment System Engineering and Program Management | | | | | |
| <i>FY 2015 Accomplishments:</i> Funding provided for Material Handling Equipment System Engineering and Program Management | | | | | |
| <i>FY 2017 Base Plans:</i> Funding provided for Material Handling Equipment System Engineering and Program Management | | | | | |
| <i>Title:</i> Material Handling Equipment (MHE) System Improvement | | | | | |

UNCLASSIFIED

| | | |
|--|---|--|
| Exhibit R-2A, RDT&E Project Justification: PB 2017 Army | | Date: February 2016 |
| Appropriation/Budget Activity 2040 / 7 | R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i> | Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i> |

| B. Accomplishments/Planned Programs (\$ in Millions) | FY 2015 | FY 2016 | FY 2017 Base | FY 2017 OCO | FY 2017 Total |
|---|----------------|----------------|---------------------|--------------------|----------------------|
| Description: Investigate lightweight Armor for MHE equipment | | | | | |
| FY 2015 Accomplishments: Investigate lightweight Armor for ATLAS II | | | | | |
| Accomplishments/Planned Programs Subtotals | 0.802 | 0.402 | 0.124 | - | 0.124 |

| C. Other Program Funding Summary (\$ in Millions) | | | | | | | | | | | |
|--|----------------|----------------|---------------------|--------------------|----------------------|----------------|----------------|----------------|----------------|-------------------------|-------------------|
| Line Item | 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 |
| • 5K Light Capacity Rough Terrain: <i>5K Light Capacity Rough Terrain (LCRT) Forklift G41002</i> | 14.392 | 27.982 | 2.307 | 0.846 | 3.153 | 17.999 | 18.391 | 17.759 | 20.240 | Continuing | Continuing |
| • All Terrain Cranes R06701: <i>All Terrain Cranes R06701</i> | - | - | 65.285 | - | 65.285 | 8.935 | 17.632 | 31.477 | 38.163 | Continuing | Continuing |

Remarks

D. Acquisition Strategy
Procure prototype component items for engineering tests and demonstrations with subject matter experts. Conduct trades between cost and improved maintainability and environmental risk reduction. Process engineering change proposals, update technical manuals and training materials, and prepare supporting acquisition documents and data to procure new training aids.

E. Performance Metrics
N/A

UNCLASSIFIED

| Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Army | | | | | | | | | | | | Date: February 2016 | | | |
|---|------------------------|--------------------------------|-------------|--|------------|---------|------------|---|------------|-------------|------------|---------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity | | | | R-1 Program Element (Number/Name) | | | | Project (Number/Name) | | | | | | | |
| 2040 / 7 | | | | PE 0205410A / Materials Handling Equipment | | | | EE9 / Material Handling Equipment - Advance Development | | | | | | | |
| Product Development (\$ in Millions) | | | | FY 2015 | | FY 2016 | | FY 2017 Base | | FY 2017 OCO | | FY 2017 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 |
| Upgrade RTCH control systems and on-board diagnostics | MIPR | Various : Various | 0.000 | 0.293 | Jul 2015 | - | | - | | - | | - | 0 | 0.293 | 0 |
| Robotic Assist on Material Handling Equipment | TBD | TBD : TBD | 0.000 | 0.121 | May 2016 | - | | - | | - | | - | 0 | 0.121 | 0 |
| Operational Energy Technologies | MIPR | Various : Various | 0.000 | 0.143 | Jan 2016 | 0.240 | Jan 2017 | - | | - | | - | 0 | 0.383 | 0 |
| Machine Diagnostic | Various | Various : Various | 0.000 | - | | 0.102 | May 2016 | - | | - | | - | 0 | 0.102 | 0 |
| Subtotal | | | 0.000 | 0.557 | | 0.342 | | - | | - | | - | 0.000 | 0.899 | 0.000 |
| Support (\$ in Millions) | | | | FY 2015 | | FY 2016 | | FY 2017 Base | | FY 2017 OCO | | FY 2017 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/ Program Management | MIPR | TARDEC : Warren, MI | 0.000 | 0.075 | Dec 2014 | - | | 0.124 | Dec 2016 | - | | 0.124 | 0 | 0.199 | 0 |
| Subtotal | | | 0.000 | 0.075 | | - | | 0.124 | | - | | 0.124 | 0.000 | 0.199 | 0.000 |
| Test and Evaluation (\$ in Millions) | | | | FY 2015 | | FY 2016 | | FY 2017 Base | | FY 2017 OCO | | FY 2017 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 Armor for ATLAS II | Various | Various : Various | 0.000 | 0.170 | Sep 2015 | - | | - | | - | | - | 0 | 0.170 | 0 |
| Baseline Fuel Efficiency of Material Handling Equipment (MHE) | Various | Various : Various | 0.000 | - | | 0.060 | Jul 2016 | - | | - | | - | 0 | 0.060 | 0 |
| Subtotal | | | 0.000 | 0.170 | | 0.060 | | - | | - | | - | 0.000 | 0.230 | 0.000 |

UNCLASSIFIED

| | | | | | | | | | | | |
|---|--------------------|----------------|---|--|---------------------|--------------------|--|----------------------------|-------------------|---------------------------------|--|
| Exhibit R-3, RDT&E Project Cost Analysis: PB 2017 Army | | | | | | | | Date: February 2016 | | | |
| Appropriation/Budget Activity 2040 / 7 | | | R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i> | | | | Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i> | | | | |
| | Prior Years | FY 2015 | FY 2016 | | FY 2017 Base | FY 2017 OCO | FY 2017 Total | Cost To Complete | Total Cost | Target Value of Contract | |
| Project Cost Totals | 0.000 | 0.802 | 0.402 | | 0.124 | - | 0.124 | 0.000 | 1.328 | 0.000 | |

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2017 Army **Date:** February 2016

| | | |
|--|---|--|
| Appropriation/Budget Activity 2040 / 7 | R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i> | Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i> |
|--|---|--|

| Event Name | 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 |
| Baseline fuel efficiency of equipment | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Investigate robotic assist on Material Handling Equipment | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Operational Energy Technologies | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Machine Diagnostic | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Driver Assist | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| System Engineering/Program Management | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

UNCLASSIFIED

| | | |
|---|---|--|
| Exhibit R-4A, RDT&E Schedule Details: PB 2017 Army | | Date: February 2016 |
| Appropriation/Budget Activity 2040 / 7 | R-1 Program Element (Number/Name) PE 0205410A / <i>Materials Handling Equipment</i> | Project (Number/Name) EE9 / <i>Material Handling Equipment - Advance Development</i> |

Schedule Details

| Events | Start | | End | |
|---|---------|------|---------|------|
| | Quarter | Year | Quarter | Year |
| Baseline fuel efficiency of equipment | 1 | 2015 | 4 | 2016 |
| Investigate robotic assist on Material Handling Equipment | 3 | 2015 | 3 | 2019 |
| Operational Energy Technologies | 2 | 2016 | 2 | 2018 |
| Machine Diagnostic | 4 | 2016 | 2 | 2017 |
| Driver Assist | 2 | 2018 | 4 | 2021 |
| System Engineering/Program Management | 1 | 2015 | 4 | 2021 |