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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>					<b>R-1 Program Element (Number/Name)</b>							
2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					PE 0205410A / Materials Handling Equipment							
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
Total Program Element	-	0.386	0.124	1.582	-	1.582	1.480	0.752	0.771	0.699	0.000	5.794
EE9: Material Handling Equipment - Advance Development	-	0.386	0.124	1.582	-	1.582	1.480	0.752	0.771	0.699	0.000	5.794

**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>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>
Previous President's Budget	0.402	0.124	1.405	-	1.405
Current President's Budget	0.386	0.124	1.582	-	1.582
Total Adjustments	-0.016	0.000	0.177	-	0.177
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.016	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	0.000	0.000	0.177	-	0.177

**Change Summary Explanation**

Funding realigned from 603804A Project G14

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Appropriation/Budget Activity 2040 / 7					R-1 Program Element (Number/Name) PE 0205410A / Materials Handling Equipment				Project (Number/Name) EE9 / Material Handling Equipment - Advance Development			
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
EE9: Material Handling Equipment - Advance Development	-	0.386	0.124	1.582	-	1.582	1.480	0.752	0.771	0.699	0.000	5.794
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
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 2016	FY 2017	FY 2018
Title: Material Handling Equipment (MHE) Enhancement										0.340	-	0.647
Description: Integrate and demonstrate Commercial-off-the-Shelf (COTS) technologies to enhance Material Handling Equipment (MHE) operations. System technologies will include obstacle detection, electronic control systems, electric-hydraulic controls, driveline control technology, and work tool automation.												
FY 2016 Accomplishments: Started the effort to develop and integrate an Automated Material Handling Technology (AMHT) kit for the Army’s ATLAS II 10,000 pound capability forklift. This includes the hardware and software necessary for the vehicle to conduct its missions both autonomously and semi-autonomously, and to demonstrate the AMHT kit through a series of tests and obstacle courses that were developed from the vehicle’s performance specification and were designed to imitate its mission profile.												
FY 2018 Plans: Integrate Commercial-off-the-Shelf (COTS) obstacle detectors, similar to collision sensors, to increase situational awareness of MHE operator. Integrate COTS controllers, similar to gaming devices to enable MHE operator to control machine from outside the cab. Research the integration and replacement of levers with joysticks for improved operator efficiency. Research steering and driving control devices which will allow semi or full autonomous control. Research and integrate COTS technology such as self-aligning forks and boom extension for telescoping boom forklift.												
Title: Operational Energy Technologies										-	-	0.050
Description: Evaluate emerging technologies that can improve machine productivity and efficiency. Baseline fuel efficiency, engine management, efficient lubricants and hydraulic technologies.												

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B. Accomplishments/Planned Programs (\$ in Millions)										FY 2016	FY 2017	FY 2018
FY 2018 Plans: 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.												
Title: System Engineering/Program Management Description: Fund for Material Handling Equipment System Engineering and Program Management.										0.046	0.124	0.211
FY 2016 Accomplishments: Provided funding for Material Handling Equipment System Engineering and Program Management.												
FY 2017 Plans: Funding provided for Material Handling Equipment System Engineering and Program Management												
FY 2018 Plans: Provide funding for Material Handling Equipment System Engineering and Program Management.												
Title: Driver Assist Description: Research and demonstrate technologies which would enhance operation such as the inclusion of cameras, collision sensors, and lifting aids.										-	-	0.674
FY 2018 Plans: Integrate COTS cameras, similar to backup cameras, to increase situational awareness of MHE operator. Integrate COTS collision warning sensors to increase situational awareness of MHE operator. Integrate discrete lifting aids to assist rough terrain forklifts with non-pallet lift missions.												
Accomplishments/Planned Programs Subtotals										0.386	0.124	1.582
C. Other Program Funding Summary (\$ in Millions)												
Line Item	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	
• 5K Light Capacity Rough Terrain: 5K LIGHT CAPABILITY ROUGH TERRAIN (LCRT) FORKLIFT G41002	27.982	3.153	9.000	-	9.000	17.937	18.297	19.721	20.345	Continuing	Continuing	

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<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<b>Line Item</b>	<b>FY 2016</b>	<b>FY 2017</b>	<b>FY 2018 Base</b>	<b>FY 2018 OCO</b>	<b>FY 2018 Total</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>	<b>FY 2022</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
• MA4501: <i>Modification Of In-Svc Equipment (OPA-3) Const. Equipment</i>	3.207	4.785	5.172	-	5.172	3.233	6.366	3.889	4.000	Continuing	Continuing
• MA4501: <i>Modification Of In-Svc Equipment (OPA-3) MHE</i>	0.182	0.180	0.143	-	0.143	0.143	0.246	0.253	0.264	Continuing	Continuing
<b>Remarks</b>											
<b>D. Acquisition Strategy</b>											
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.											
<b>E. Performance Metrics</b>											
N/A											