

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2019 Army	Date: February 2018
---	----------------------------

Appropriation/Budget Activity	R-1 Program Element (Number/Name)											
2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	PE 0205410A / Materials Handling Equipment											
COST (\$ in Millions)	Prior Years	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
Total Program Element	-	0.119	1.582	1.464	-	1.464	0.743	0.762	0.691	0.799	Continuing	Continuing
EE9: Material Handling Equipment - Advance Development	-	0.119	1.582	1.464	-	1.464	0.743	0.762	0.691	0.799	Continuing	Continuing

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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total
Previous President's Budget	0.124	1.582	1.480	-	1.480
Current President's Budget	0.119	1.582	1.464	-	1.464
Total Adjustments	-0.005	0.000	-0.016	-	-0.016
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.005	-			
• Adjustments to Budget Years	-	-	-0.016	-	-0.016

Change Summary Explanation

Funding realigned from 603804A Project G14

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army										Date: February 2018		
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 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
EE9: Material Handling Equipment - Advance Development	-	0.119	1.582	1.464	-	1.464	0.743	0.762	0.691	0.799	Continuing	Continuing
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 2017	FY 2018	FY 2019
Title: Material Handling Equipment (MHE) Enhancement	-	0.647	0.677
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 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.			
FY 2019 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.			
FY 2018 to FY 2019 Increase/Decrease Statement:			

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army		Date: February 2018		
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		
B. Accomplishments/Planned Programs (\$ in Millions)		FY 2017	FY 2018	FY 2019
Man-Year Rates are increased for FY19 Reimbursable Labor Costs.				
<p>Title: Operational Energy Technologies</p> <p>Description: Evaluate emerging technologies that can improve machine productivity and efficiency. Baseline fuel efficiency, engine management, efficient lubricants and hydraulic technologies.</p> <p>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.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Operational Energy Technologies efforts will be completed in FY2018.</p>		-	0.050	-
<p>Title: System Engineering/Program Management</p> <p>Description: Fund for Material Handling Equipment System Engineering and Program Management.</p> <p>FY 2018 Plans: Provide funding for Material Handling Equipment System Engineering and Program Management.</p> <p>FY 2019 Plans: Fund for Material Handling Equipment System Engineering and Program Management.</p> <p>FY 2018 to FY 2019 Increase/Decrease Statement: Man-Year Rates for reimbursable labor support increased from FY2018 to FY2019.</p>		0.119	0.211	0.217
<p>Title: Driver Assist</p> <p>Description: Research and demonstrate technologies which would enhance operation such as the inclusion of cameras, collision sensors, and lifting aids.</p> <p>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.</p> <p>FY 2019 Plans:</p>		-	0.674	0.570

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2019 Army								Date: February 2018			
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 2017	FY 2018	FY 2019	
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.											
<i>FY 2018 to FY 2019 Increase/Decrease Statement:</i> Man-Year required for FY2019 is reduced.											
Accomplishments/Planned Programs Subtotals								0.119	1.582	1.464	
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2017	FY 2018	FY 2019 Base	FY 2019 OCO	FY 2019 Total	FY 2020	FY 2021	FY 2022	FY 2023	Cost To Complete	Total Cost
• G41001: 5K LIGHT CAPABILITY ROUGH TERRAIN (LCRT) FORKLIFT G41002	3.153	9.000	12.901	-	12.901	16.869	15.887	21.772	22.973	Continuing	Continuing
• MA4501: Modification Of In- Svc Equipment (OPA-3) MHE	46.363	26.018	25.201	-	25.201	28.122	26.466	22.310	30.770	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 2019 Army												Date: February 2018			
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					
Product Development (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	Various	Various : Various	0.293	-		-		-		-		-	0.000	0.293	-
Robotic Assist on Material Handling Equipment	MIPR	TARDEC : Warren, MI	0.461	-		0.647		0.677	Mar 2019	-		0.677	Continuing	Continuing	-
Operational Energy Technologies	MIPR	Various : Various	0.143	-		0.050		-		-		-	0.000	0.193	-
Driver Assist	Various	Various : Various	-	-		0.674		0.570	Mar 2019	-		0.570	Continuing	Continuing	-
Subtotal			0.897	-		1.371		1.247		-		1.247	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	0.121	0.119	Dec 2017	0.211		0.217	Oct 2018	-		0.217	Continuing	Continuing	-
Subtotal			0.121	0.119		0.211		0.217		-		0.217	Continuing	Continuing	N/A
Test and Evaluation (\$ in Millions)				FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 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	0.170	-		-		-		-		-	0.000	0.170	-
Subtotal			0.170	-		-		-		-		-	0.000	0.170	N/A
			Prior Years	FY 2017		FY 2018		FY 2019 Base		FY 2019 OCO		FY 2019 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			1.188	0.119		1.582		1.464		-		1.464	Continuing	Continuing	N/A
Remarks															

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2019 Army																								Date: February 2018													
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 2017				FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023			
										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
Material Handling Equipment Enhancement (Robotic Assist)																																					
Operational Energy Technologies																																					
Driver Assist																																					
System Engineering/Program Management																																					

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2019 Army			Date: February 2018
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
Material Handling Equipment Enhancement (Robotic Assist)	1	2018	4	2023
Operational Energy Technologies	1	2018	4	2018
Driver Assist	2	2018	4	2023
System Engineering/Program Management	1	2019	4	2023