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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army										Date: March 2019		
Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army I BA 4: Advanced Component Development & Prototypes (ACD&P)					R-1 Program Element (Number/Name) PE 0604117A I Maneuver - Short Range Air Defense (M-SHORAD)							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	19.201	79.016	33.100	6.000	39.100	105.700	341.100	382.600	308.700	Continuing	Continuing
FI4: Maneuver - Short Range Air Defense (M-SHORAD)	-	19.201	79.016	33.100	6.000	39.100	105.700	341.100	382.600	308.700	Continuing	Continuing

A. Mission Description and Budget Item Justification

M-SHORAD is an Air Defense weapon system consisting of multiple ground-to-air missile launchers, sensors and a gun on a Stryker A1 combat vehicle. M-SHORAD provides the Army improved capabilities for defense of maneuver formations and other tactical echelons from low altitude air attack and surveillance. Adaptive threats have developed a suite of airborne threat capabilities, supported by an integrated mix of surface-to-air and surface-to-surface shooters that threaten the ability of maneuver forces to conduct operations. Specifically, maneuver formations require the improved M-SHORAD air defense identification and defeat capabilities to counter Fixed Wing (FW), Rotary Wing (RW), Unmanned Aircraft Systems (UAS) and Rocket, Artillery and Mortar (RAM) threats.

The M-SHORAD capability will be provided through a multi-phase approach with a rapidly fielded Initial M-SHORAD system (supported by an Army Approved Directed Requirement) and an enduring M-SHORAD (supported by a Joint Requirements Oversight Council approved Capability Development Document (CDD) or Capability Production Document (CPD)) that will field the full capability. First, the Army will field the Initial M-SHORAD solution based on a FY 2018 Directed Requirement, which was informed by the FY 2017 M-SHORAD Demonstration. This system will provide the capability to identify, track, and neutralize or destroy low-altitude air threats to include FW, RW, and Group 3 UAS while keeping pace and surviving with the maneuver Brigades. The Initial M-SHORAD will be fielded to four M-SHORAD battalions. In addition, M-SHORAD will transition the Multi-Mission High Energy Laser (MMHEL) from Science and Technology into the M-SHORAD Program of Record. With the increased capability provided by the MMHEL technology, M-SHORAD will provide the long term capability to counter a broader range of FW, RW, UAS, and indirect fires (RAM) threats.

FY 2020 dollars in the amount of \$39.100 million (\$33.100 million base and \$6.000 million OCO) will complete the Initial M-SHORAD capability development and integration into existing maneuver formation equipment. Efforts will include: completion of testing to achieve Urgent Materiel Release and Safety Certification; continuation of the development; and finalization of the required program documentation.

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Appropriation/Budget Activity		R-1 Program Element (Number/Name)			
2040: Research, Development, Test & Evaluation, Army / BA 4: Advanced Component Development & Prototypes (ACD&P)		PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)			
B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	20.000	118.085	102.806	-	102.806
Current President's Budget	19.201	79.016	33.100	6.000	39.100
Total Adjustments	-0.799	-39.069	-69.706	6.000	-63.706
• Congressional General Reductions	-0.016	-0.069			
• Congressional Directed Reductions	-	-62.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	23.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.783	-			
• Adjustments to Budget Years	-	-	-69.706	6.000	-63.706
Change Summary Explanation					
The FY 2019 decrease of \$39.069 million consists of a \$62.000 million Army Budget Office withhold, an \$23.000 million addition from OCO and a \$0.069 million Congressional reduction.					
The FY 2020 decrease of \$69.706 million consists of a \$63.706 million realignment of funding within the Air and Missile Defense portfolio to support Army Modernization in support of the National Defense Strategy and a \$6.000 million realignment to OCO.					

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Appropriation/Budget Activity 2040 / 4					R-1 Program Element (Number/Name) PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)				Project (Number/Name) FI4 / Maneuver - Short Range Air Defense (M-SHORAD)			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
FI4: Maneuver - Short Range Air Defense (M-SHORAD)	-	19.201	79.016	33.100	6.000	39.100	105.700	341.100	382.600	308.700	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

This program supports the Cross functional Team (CFT), M-SHORAD.

A. Mission Description and Budget Item Justification

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FY 2020 dollars in the amount of \$39.100 million (\$33.100 million base and \$6.000 million OCO) will complete the Initial M-SHORAD capability development and integration into existing maneuver formation equipment. Efforts will include: completion of testing to achieve Urgent Materiel Release and Safety Certification; continuation of the development; and finalization of the required program documentation.

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

	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Initial M-SHORAD Materiel Development/Integration	19.201	75.711	33.100	6.000	39.100
Description: Develop, test and integrate the Initial M-SHORAD system.					
FY 2019 Plans:					

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B. Accomplishments/Planned Programs (\$ in Millions)								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<div>- Complete fabrication of production representative articles</div> <div>- Begin testing to achieve Urgent Materiel Release</div> <div>- Continue the development and finalization of the required program documentation</div> <div>FY 2020 Base Plans:</div> <div>- Complete testing to achieve Urgent Materiel Release and Safety Certification</div> <div>- Complete required program documentation</div> <div>- Completes final prototypes</div> <div>- Complete Initial M-SHORAD development effort</div> <div>- Transition MMHEL from Science and Technology into the M-SHORAD Program of Record using the Office of the Secretary of Defense (OSD) Manufacturing Technology (ManTech) program</div> <div>FY 2020 OCO Plans:</div> <div>- Complete testing to achieve Urgent Materiel Release and Safety Certification</div> <div>- Complete required program documentation</div> <div>- Complete final prototypes</div> <div>- Complete Initial M-SHORAD development effort</div> <div>FY 2019 to FY 2020 Increase/Decrease Statement:</div> <div>Decrease from FY 2019 to FY 2020 is due to anticipated completion of prototype builds.</div>												
Title: FY 2019 SBIR / STTR Transfer								-	3.305	-	-	-
FY 2019 Plans: FY 2019 SBIR / STTR Transfer												
FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 SBIR / STTR Transfer												
Accomplishments/Planned Programs Subtotals								19.201	79.016	33.100	6.000	39.100
C. Other Program Funding Summary (\$ in Millions)												
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost	
• C14301: Maneuver - Short Range Air Defense (M-SHORAD)	-	-	0.000	262.100	262.100	537.400	292.200	80.500	78.600	Continuing	Continuing	

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Appropriation/Budget Activity 2040 / 4				R-1 Program Element (Number/Name) PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)				Project (Number/Name) F14 / Maneuver - Short Range Air Defense (M-SHORAD)			
C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Remarks											
M-SHORAD procurement is funded through C14301. This includes Initial M-SHORAD procurement (FY 2020 through FY 2022).											
D. Acquisition Strategy											
The acquisition approach begins with the Initial M-SHORAD. The Initial M-SHORAD uses the FY 2017 M-SHORAD Demonstration as the initial basis to identify near-term initial solutions. The Program Office uses Defense Ordnance Technology Consortium (DOTC) Other Transactional Authority (OTA) agreements for the development and purchase of five Initial M-SHORAD prototypes according to the content of the Directed Requirement. The OTA efforts include: Mission Equipment Package (MEP); Platform Integrator effort to procure the Stryker vehicle and integrate the MEP; and the Stinger Launcher.											
In addition, the Program Office will use FY 2021-2024 funds for an M-SHORAD with the MMHEL capability. The Program Office plans to award a single competitive OTA agreement. In FY 2021-2024, the Program will conduct development activities, component qualification, Operational Performance Assessment and Logistics and Safety Certifications. An Urgent Materiel Release and First Unit Equipped are planned for FY 2024.											
E. Performance Metrics											
N/A											

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
Appropriation/Budget Activity 2040 / 4						R-1 Program Element (Number/Name) PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)				Project (Number/Name) FI4 / Maneuver - Short Range Air Defense (M-SHORAD)					
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Product Management	Various	Trident, Intuitive Research and others : Huntsville, Alabama	-	1.699	Mar 2018	2.595	Oct 2018	1.601	Oct 2019	-		1.601	0.000	5.895	-
FY 2019 SBIR / STTR Transfer	TBD	TBD : TBD	-	-		3.305		-		-		-	0.000	3.305	-
Subtotal			-	1.699		5.900		1.601		-		1.601	0.000	9.200	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Engineering and Technical Support	MIPR	Aviation and Missiles Research Development and Engineering Center : Redstone Arsenal, AL	-	-		1.781	Oct 2018	1.557	Oct 2019	-		1.557	0.000	3.338	-
System Development, Prototypes and Integration	C/CPAF	Defense Ordnance Technology Consortium (DOTC) (DRS Sustainment Systems, General Dynamics Land Systems and Raytheon Missile systems) : Various	-	14.876	Aug 2018	56.676	Oct 2018	8.925	Oct 2019	5.100	Oct 2019	14.025	0.000	85.577	-
Government Furnished Equipment (GFE)	MIPR	Program Executive Officer Missiles and Space : Various	-	2.374	Jul 2018	4.522	Oct 2018	0.474	Oct 2019	0.900	Oct 2019	1.374	0.000	8.270	-
Subtotal			-	17.250		62.979		10.956		6.000		16.956	0.000	97.185	N/A

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Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Remarks															
Systems Development, Prototypes and Integration uses DOTC Other Transactional Authority (OTA) agreements consisting of three separate efforts: Mission Equipment Package (MEP), Platform Integration and Stinger Missile Launcher. MEP is by DRS Sustainment Systems (St. Louis, MO): \$7.050 million FY18, \$30.040 million FY19 and \$3.900 million FY20. Platform Integration is by General Dynamics Land Systems (Lima, OH and Anniston, AL): \$7.050 million FY18, \$22.400 million FY19 and \$9.800 million FY20. Stinger Missile Launcher is by Raytheon Missile Systems (Tuscon, AZ): \$0.776 million FY18, \$3.881 million FY19 and \$0.325 million FY20.															
Significant GFE includes M299 Hellfire launchers, FAAD-C2 systems and radios. M299 launchers are by Lockheed Martin Corp. (Orlando, FL): \$1.125 million FY18. FAAD-C2 systems and radios are by Northrop Grumman (Redondo Beach, CA): \$1.249 million FY18.															
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Support Costs	MIPR	Aviation and Missiles Command (AMCOM) : Redstone Arsenal, AL	-	0.252	Jul 2018	3.460	Oct 2018	2.049	Oct 2019	-		2.049	0.000	5.761	-
Subtotal			-	0.252		3.460		2.049		-		2.049	0.000	5.761	N/A
Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
Developmental Testing	MIPR	Redstone Test Center (RTC) and White Sands Missile Range (WSMR) : Redstone, AL and WSMR, NM	-	-		2.386	Oct 2018	9.511	Oct 2019	-		9.511	0.000	11.897	-
Test Support	MIPR	RTC, WSMR, Target Management	-	-		4.291	Oct 2018	8.983	Oct 2019	-		8.983	0.000	13.274	-

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Test and Evaluation (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 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
		Office and others : Redstone, AL and WSMR, NM													
Subtotal			-	-		6.677		18.494		-		18.494	0.000	25.171	N/A
			Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals			-	19.201		79.016		33.100		6.000		39.100	0.000	137.317	N/A
Remarks															

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PE 0604117A: Maneuver - Short Range Air Defense (M-SH...
Army

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R-1 Program Element (Number/Name)	Program Element Description	Program Element Status	Program Element Comments

PE 0604117A / Maneuver - Short Range Air
Defense (M-SHORAD)

FI4 / Maneuver - Short Range Air Defense
(M-SHORAD)

PE 0604117A: Maneuver - Short Range Air Defense (M-SH...
Army

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Army			Date: March 2019
Appropriation/Budget Activity 2040 / 4	R-1 Program Element (Number/Name) PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	Project (Number/Name) FI4 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Directed Requirement	2	2018	2	2018
Initial M-SHORAD Material Development/Integration	4	2018	1	2020
Initial M-SHORAD Testing	4	2019	1	2021
Initial M-SHORAD First Unit Equipped (FUE)	2	2021	2	2021
M-SHORAD Other Transactional Authority (OTA) Award	4	2020	4	2020
M-SHORAD Design, Development, Prototype Build and Performance Assessment	4	2020	3	2024
M-SHORAD FUE	4	2024	4	2024