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**Exhibit R-2, RDT&E Budget Item Justification:** PB 2021 Army **Date:** February 2020

<b>Appropriation/Budget Activity</b> 2040: <i>Research, Development, Test &amp; Evaluation, Army / BA 4: Advanced Component Development &amp; Prototypes (ACD&amp;P)</i>	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>
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COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	-	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	Continuing	Continuing
FI4: <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	-	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	Continuing	Continuing

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

Maneuver - Short Range Air Defense (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) that will field the full capability. First, the Army will field the Initial M-SHORAD solution based on a Fiscal Year (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, the Rapid Capabilities and Critical Technologies Office (RCCTO) will transition the Directed Energy M-SHORAD (DE M-SHORAD) to the M-SHORAD Product Office in 1 Quarter (QTR) FY 2023. DE M-SHORAD will provide the long term capability to counter a broader range of FW, RW, UAS and RAM threats.

FY 2021 to FY 2025 dollars are for the ENDURING M-SHORAD ( DE M-SHORAD, Maneuver Air Defense Technologies (MAD-T) missiles and DISMOUNTED M-SHORAD) development. .

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<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
Previous President's Budget	79.016	39.100	105.700	-	105.700
Current President's Budget	75.711	42.900	4.995	-	4.995
Total Adjustments	-3.305	3.800	-100.705	-	-100.705
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-9.700			
• Congressional Rescissions	-	-			
• Congressional Adds	-	13.500			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.305	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-100.705	-	-100.705

**Change Summary Explanation**

The FY 2021 decrease of \$105.7 million was realigned within Air and Missile Defense Portfolio to support Army Modernization of National Defense Strategy to RCCTO for the Directed-Energy M-SHORAD program. \$4.995 million was reinstated in FY 2021 to the IM-SHORAD for Completing Operational Assessment Testing into 1 QTR FY 2021 and conducting Enduring M-SHORAD planning.

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 4					<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>				<b>Project (Number/Name)</b> F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>			
<b>COST (\$ in Millions)</b>	<b>Prior Years</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>	<b>FY 2022</b>	<b>FY 2023</b>	<b>FY 2024</b>	<b>FY 2025</b>	<b>Cost To Complete</b>	<b>Total Cost</b>
F14: <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	-	75.711	42.900	4.995	-	4.995	39.863	271.946	308.415	446.026	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Maneuver - Short Range Air Defense (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) that will field the full capability. First, the Army will field the Initial M-SHORAD solution based on a Fiscal Year (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. In addition, the Rapid Capabilities and Critical Technologies Office (RCCTO) will transition the Directed Energy M-SHORAD (DE M-SHORAD) to the M-SHORAD Product Office in 1 Quarter (QTR) FY 2023. DE M-SHORAD will provide the long term capability to counter a broader range of FW, RW, UAS and RAM threats.

FY 2021 to FY 2025 dollars are for Enduring M-SHORAD (DE M-SHORAD, Maneuver Air Defense Technologies (MAD-T) missiles and DISMOUNTED M-SHORAD) development.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
<b>Title:</b> Initial M-SHORAD Materiel Development/Integration	75.711	41.565	4.995	-	4.995
<b>Description:</b> Develop, test and integrate the Initial M-SHORAD system.					
<b>FY 2020 Plans:</b>					
- Completed testing to achieve Urgent Materiel Release and Safety Certification					
- Completed required program documentation					
- Continued final prototypes					

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<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	<b>Project (Number/Name)</b> F14 / <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021 Base</b>	<b>FY 2021 OCO</b>	<b>FY 2021 Total</b>
- Completed Initial M-SHORAD development effort - Transitioned Multi-Mission High Energy Laser (MMHEL) from Science and Technology (S&T) into the M-SHORAD Program of Record using the Office of the Secretary of Defense (OSD) Manufacturing Technology (ManTech) program  <b>FY 2021 Base Plans:</b> - Complete Operational Assessment Testing of Prototypes units built into 1 QTR FY 2021. - Initial Maneuver Short-Range Air Defense (IM-SHORAD) Urgent Material Release (UMR). - IM-SHORAD First Unit Equipped (FUE). - Conduct Enduring M-SHORAD planning.  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding as been adjusted from FY 2020 to FY 2021 to support Directed Energy Development and complete Operational Assessment Testing for the IM-SHORAD prototypes.					
<b>Title:</b> FY 2020 SBIR/STTR Transfer  <b>Description:</b> Funding transferred in accordance with Title 15 USC ?638  <b>FY 2020 Plans:</b> Funding transferred in accordance with Title 15 USC ?638  <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Funding transferred in accordance with Title 15 USC ?638	-	1.335	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	75.711	42.900	4.995	-	4.995

<b>C. Other Program Funding Summary (\$ in Millions)</b>										
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021 Base</u>	<u>FY 2021 OCO</u>	<u>FY 2021 Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To Complete Total Cost</u>
• C14301: <i>Maneuver - Short Range Air Defense (M-SHORAD)</i>	-	233.300	378.654	158.300	536.954	330.738	80.412	-	-	Continuing Continuing
<b>Remarks</b>	M-SHORAD procurement is funded through C14301. This includes Initial M-SHORAD procurement (FY 2020 through FY 2023).									

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**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 nine Initial M-SHORAD prototypes according to the content of the Directed Requirement. The OTA efforts include: Mission Equipment Package (MEP) subsystems include Stinger Vehicle Universal Launcher (SVUL), Longbow Missile, EO/IR Sensor, 30 mm Cannon, FAAD-C2, and M240 machine Gun; Platform Integrator effort to procure the Stryker vehicle and integrate the MEP; and the Stinger Launcher.

Program Office will use FY 2021-2025 funds for Enduring M-SHORAD (DE M-SHORAD, MAD-T missiles and DISMOUNTED M-SHORAD) capability. The Program Office plans to award competitive contracts. In FY 2022-2025, the Program will conduct development activities, integration, component qualification, Early Warfighter Assessment, Logistics, and Safety Certifications.

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**Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army** **Date:** February 2020

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)	<b>Project (Number/Name)</b> F14 / Maneuver - Short Range Air Defense (M-SHORAD)
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<b>Management Services (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Product Management	Various	Trident, Intuitive Research and others : Huntsville, Alabama	1.699	2.595	Oct 2018	1.410	Oct 2019	0.995	Oct 2019	-		0.995	0.000	6.699	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		1.335		-		-		-	0.000	1.335	-
<b>Subtotal</b>			1.699	2.595		2.745		0.995		-		0.995	0.000	8.034	N/A

**Remarks**  
Conduct Enduring M-SHORAD planning

<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Engineering and Technical Support	MIPR	Combat Capabilites Development Command : Redstone Arsenal, AL	-	1.781	Oct 2018	1.367	Oct 2019	-		-		-	0.000	3.148	-
System Development, Prototypes and Integration	C/CPIF	Defense Ordnance Technology Consortium (DOTC) (DRS Sustainment Systems, General Dynamics Land Systems and Raytheon Missile systems) : Various	64.876	56.676	Oct 2018	13.835	Oct 2019	-		-		-	0.000	135.387	-
Government Furnished Equipment (GFE)	MIPR	Program Executive Officer Missiles and Space : Various	2.374	4.522	Oct 2018	1.183	Oct 2019	-		-		-	0.000	8.079	-
<b>Subtotal</b>			67.250	62.979		16.385		-		-		-	0.000	146.614	N/A

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<b>Product Development (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			

**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): \$54.008 million FY19 and \$6.400 million FY20.  
 Platform Integration is by General Dynamics Land Systems (Lima, OH and Anniston, AL): \$52.182 million FY19 and \$6.600 million FY20.  
 Stinger Missile Launcher is by Raytheon Missile Systems (Tuscon, AZ): \$3.881 million FY19 and \$2.276 million FY20.

Significant GFE includes M299 Hellfire launchers, FAAD-C2 systems and radios.  
 M299 launchers are by Lockheed Martin Corp. (Orlando, FL).  
 FAAD-C2 systems and radios are by Northrop Grumman (Redondo Beach, CA).

<b>Support (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Support Costs	MIPR	Aviation and Missiles Command (AMCOM) : Redstone Arsenal, AL	0.252	3.460	Oct 2018	1.858	Oct 2019	-		-		-	0.000	5.570	-
<b>Subtotal</b>			0.252	3.460		1.858		-		-		-	0.000	5.570	N/A

<b>Test and Evaluation (\$ in Millions)</b>				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
Developmental Testing	MIPR	Redstone Test Center (RTC) and White Sands Missile Range (WSMR) : Redstone, AL and WSMR, NM	-	2.448	Oct 2018	11.210	Oct 2019	-		-		-	0.000	13.658	-
Test Support	MIPR	RTC, WSMR, Target Management	-	4.229	Oct 2018	10.702	Oct 2019	4.000	Oct 2020	-		4.000	0.000	18.931	-

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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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			
		Office and others : Redstone, AL and WSMR, NM													
<b>Subtotal</b>			-	6.677		21.912		4.000		-		4.000	0.000	32.589	N/A

**Remarks**  
Complete Operational Assessment Testing 1QTR in FY 2021.

	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
<b>Project Cost Totals</b>	69.201	75.711	42.900	4.995	-	4.995	0.000	192.807	N/A

**Remarks**

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0604117A / Maneuver - Short Range Air Defense (M-SHORAD)	<b>Project (Number/Name)</b> F14 / Maneuver - Short Range Air Defense (M-SHORAD)

Event Name	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025			
	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
Initial M-SHORAD Material Development/Integration	[Redacted]				Initial M-SHORAD Material Development/Integration																							
Initial M-SHORAD Testing					Initial M-SHORAD Testing																							
JROC approved CDD					1 M-SHORAD CDD																							
IM-SHORAD UMR									2 IM-SHORAD UMR																			
Initial M-SHORAD First Unit Equipped (FUE)									3 Initial M-SHORAD First Unit Equipped (FUE)																			
Enduring M-SHORAD Other Transactional Authority (OTA) Award													4 Enduring M-SHORAD OTA Award															
Enduring M-SHORAD Design, Development, Prototype Build & Performance Assessment													Enduring M-SHORAD Design, Development, Prototype Build & Performance Assessment															
Enduring M-SHORAD FUE																					6 Enduring M-SHORAD FUE							
DE M-SHORAD Transition													5 DE M-SHORAD Transition															
DE M-SHORAD Development																	DE M-SHORAD Development											

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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
JROC approved CDD	2	2020	2	2020
IM-SHORAD UMR	1	2021	1	2021
Initial M-SHORAD First Unit Equipped (FUE)	1	2021	1	2021
Enduring M-SHORAD Other Transactional Authority (OTA) Award	2	2022	2	2022
Enduring M-SHORAD Design, Development, Prototype Build & Performance Assessment	2	2022	4	2025
Enduring M-SHORAD FUE	4	2025	4	2025
DE M-SHORAD Transition	1	2023	1	2023
DE M-SHORAD Development	1	2023	4	2025