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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</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	-	40.255	82.915	64.092	-	64.092	44.621	60.843	44.437	16.423	Continuing	Continuing
606: <i>Cntrmn/Barrier Adv Dev</i>	-	2.869	0.000	0.000	-	0.000	0.000	4.947	4.578	9.935	0.000	22.329
BU5: <i>Standoff Volcano Obstacle (SAVO) Adv Tech</i>	-	0.000	12.983	6.956	-	6.956	0.000	0.000	0.000	0.000	0.000	19.939
EK7: <i>Area Denial Capability Development</i>	-	37.386	69.932	57.136	-	57.136	44.621	55.896	39.859	6.488	Continuing	Continuing

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

This Program Element (PE) provides for the Concept Exploration and Refinement of Terrain Shaping Obstacles and develops modernized alternatives to the Family of Scatterable Mines systems.

Project 606 Countermine/Barrier Advanced Development enables development and evaluation of technologies that will perform detection, neutralization, and clearing of landmines and Improvised Explosive Devices (IEDs) at operational speeds. The Forward Reconnaissance and Explosive Hazard Detection (FREHD) system is a suite of four capabilities for use by route clearance patrols to provide standoff detection of explosive hazards: vehicle-mounted anomaly detection; pinpoint explosive hazard detection; explosive hazard vapor and particle detection; and remote visualization. FREHD increases the rate of advance of the route clearance formation while removing Soldiers and equipment from the proximity of blast and fragmentation.

Project BU5 Standoff Activated Volcano Obstacle (SAVO) provides an Anti-Vehicle (AV) capability to address the Army's directed close tactical obstacle capability gap and has been identified as a part of the Army Modernization Strategy. SAVO will utilize a Middle Tier of Acquisition approach for Rapid Prototyping and Fielding in accordance with Section 804 of the 2016 National Defense Authorization Act (NDAA). SAVO supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) ONS # 18-22702 as well as a revision to the Multiple Delivery Mine System (Volcano) Joint Service Operational Requirement (JSOR) # 0683. This capability will allow for a formation of pre-emplaced directed obstacles that can be initiated remotely via fielded wired or wireless initiation systems. If the emplaced obstacle is not initiated, SAVO can be recovered for future re-deployment. SAVO consists of a newly developed base plate from which the existing stock of National Landmine Policy compliant munitions (M87A1 Volcano canisters) can be launched. SAVO can be initiated via three fielded systems; the M7 Spider Networked Munition System, the MK152/M156 Remote Activation Munition Systems (RAMS), or the CD450-4J Blasting Machine. Fiscal Year (FY) 2021 funding resources the continued execution of the SAVO Rapid Prototyping activities in preparation for transition to the Rapid Fielding phase.

Project EK7 Area Denial Capability Development provides for the advanced capability development of terrain shaping obstacle systems and develops modernized alternatives to the Family of Scatterable Mines. The project will evaluate integrated technologies and develop prototype systems in a realistic operating environment for the next generation of Terrain Shaping Obstacles (TSO). TSO will deny the enemy terrain and freedom of action in a joint, multi-domain, high-intensity conflict while allowing friendly forces to maneuver freely within the same battle space. TSO may include multiple methods of defeat to include top attack and bottom attack and provide controlled scalable effects against mounted enemy forces that disrupt, turn, fix, delay or block their ability to maneuver. TSO enables the Combatant

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<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army	<b>Date:</b> February 2020
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<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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>
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Commander to shape the battle space without exposing friendly forces to enemy engagement. This capability supports Army Modernization priorities as a critical enabler for soldier lethality and creates targets for long range precision fires within the engagement area. TSO will utilize an open system and modular architecture to facilitate future development, maintenance, repair, and product improvements. TSO supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) # 18-22702.

<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	45.198	92.915	6.963	-	6.963
Current President's Budget	40.255	82.915	64.092	-	64.092
Total Adjustments	-4.943	-10.000	57.129	-	57.129
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-10.000			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-4.943	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	57.129	-	57.129

**Change Summary Explanation**

FY 2021 funding increase in the amount of \$57.191 million due to realignment from Program Element (PE) 0604808A Landmine Warfare/Barrier - Eng Dev due to change in acquisition strategy.

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>				<b>Project (Number/Name)</b> 606 / <i>Cntrmn/Barrier Adv Dev</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>
606: <i>Cntrmn/Barrier Adv Dev</i>	-	2.869	0.000	0.000	-	0.000	0.000	4.947	4.578	9.935	0.000	22.329
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Project 606 Countermines/ Barrier Advanced Development enables development and evaluation of technologies that will perform detection, neutralization, and clearing of landmines and Improvised Explosive Devices (IEDs) at operational speeds.

The Forward Reconnaissance and Explosive Hazard Detection (FREHD) system is a suite of four capabilities for use by route clearance patrols to provide standoff detection of explosive hazards: vehicle-mounted anomaly detection; pinpoint explosive hazard detection; explosive hazard vapor and particle detection; and remote visualization. FREHD increases the rate of advance of the route clearance formation while removing Soldiers and equipment from the proximity of blast and fragmentation.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Forward Reconnaissance and Explosive Hazard Detection (FREHD)	2.869	-	-
<b>Description:</b> The Forward Reconnaissance and Explosive Hazard Detection (FREHD) system is a suite of four capabilities for use by route clearance patrols to provide standoff detection of explosive hazards: vehicle-mounted anomaly detection; pinpoint explosive hazard detection; explosive hazard vapor and particle detection; and remote visualization. FREHD increases the rate of advance of the route clearance formation while removing Soldiers and equipment from the proximity of blast and fragmentation. FREHD enables development and evaluation of technologies that will perform detection, neutralization, and clearing of landmines and Improvised Explosive Devices (IEDs) at operational speeds.			
<b>Accomplishments/Planned Programs Subtotals</b>	2.869	-	-

**C. Other Program Funding Summary (\$ in Millions)**

<b>Line Item</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>
• 415: <i>Mine Neutral/Detection</i>	31.807	17.910	1.998	-	1.998	5.995	6.994	-	-	Continuing	Continuing
• R64001: <i>HUSKY MOUNTED DETECTION SYSTEM (HMDS)</i>	35.834	75.586	109.069	-	109.069	76.800	-	-	-	0.000	297.289
• R64002: <i>HMDS - GROUND PENETRATING RADAR</i>	35.834	46.204	24.853	-	24.853	12.609	-	-	-	0.000	119.500
• R64003: <i>HMDS - DEEP BURIED DETECTION</i>	-	29.382	84.216	-	84.216	64.191	-	-	-	0.000	177.789

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> 606 / <i>Cntrmn/Barrier Adv Dev</i>

**C. Other Program Funding Summary (\$ in Millions)**

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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**Remarks**

PE 0604808 Landmine Warfare/Barrier - Eng Dev Project 415 Mine Neutralization and Detection is the engineering development follow-on to this funding line, and is a shared project line. The above profile represents the total line and all combined efforts.

**D. Acquisition Strategy**

The Husky Mounted Detection System (HMDS) program is pursuing an acquisition approach that delivers capability increments - Increment A, Configuration 1 (A1) to the Warfighter by leveraging the Quick Reaction Capability (QRC) Ground Penetrating Radar (GPR) currently deployed in support of Operation Enduring Freedom (OEF) and Operation Inherent Resolve (OIR). In FY 2020, the program will complete execution of an Engineering Change Proposals (ECP) to add a wire detection capability to address evolving threat, and Infrared illumination to enable nighttime operation, improve operational availability of the HMDS during inclement weather and address obsolescence and Cyber Security deficiencies.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020				
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)								
2040 / 4				PE 0603619A / Landmine Warfare and Barrier - Adv Dev				606 / Cntrmn/Barrier Adv Dev								
Management Services (\$ 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				
Program Management - HMDS	MIPR	PM Terrestrial Sensors : Fort Belvoir, VA	0.300	-		-		-		-		-	0.000	0.300	-	
<b>Subtotal</b>			0.300	-		-		-		-		-	0.000	0.300	N/A	
Product Development (\$ 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				
HMDS To Be Determined	TBD	TBD : TBD	0.780	-		-		-		-		-	0.000	0.780	-	
<b>Subtotal</b>			0.780	-		-		-		-		-	0.000	0.780	N/A	
Support (\$ 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				
HMDS Explosive Hazard Detection - Technology Analysis	MIPR	TRADOC : Ft. Eustis, VA	0.488	-		-		-		-		-	0.000	0.488	-	
HMDS Explosive Hazard Detection - Engineering Support	MIPR	CERDEC NVESD : Ft. Belvoir, VA	1.115	-		-		-		-		-	0.000	1.115	-	
HMDS Explosive Hazard Detection - System Analysis and Test Design	FFRDC	IDA : Alexandria, VA	0.230	-		-		-		-		-	0.000	0.230	-	
FREHD	MIPR	Various : Various	-	2.869	Mar 2019	-		-		-		-	0.000	2.869	-	
<b>Subtotal</b>			1.833	2.869		-		-		-		-	0.000	4.702	N/A	



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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> 606 / <i>Cntrmn/Barrier Adv Dev</i>	

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
HMDS/FREHD																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> 606 / <i>Cntrmn/Barrier Adv Dev</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
HMDS/FREHD	1	2018	4	2019

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>				<b>Project (Number/Name)</b> BU5 / <i>Standoff Volcano Obstacle (SAVO) Adv Tech</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>
BU5: <i>Standoff Volcano Obstacle (SAVO) Adv Tech</i>	-	0.000	12.983	6.956	-	6.956	0.000	0.000	0.000	0.000	0.000	19.939
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Project BU5 Standoff Activated Volcano Obstacle (SAVO) provides an Anti-Vehicle (AV) capability to address the Army's directed close tactical obstacle capability gap and has been identified as a part of the Army Modernization Strategy. SAVO will utilize a Middle Tier of Acquisition approach for Rapid Prototyping and Fielding in accordance with Section 804 of the 2016 National Defense Authorization Act (NDAA). SAVO supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) ONS # 18-22702 as well as a revision to the Multiple Delivery Mine System (Volcano) Joint Service Operational Requirement (JSOR) # 0683. This capability will allow for a formation of pre-emplaced directed obstacles that can be initiated remotely via fielded wired or wireless initiation systems. If the emplaced obstacle is not initiated, SAVO can be recovered for future re-deployment. SAVO consists of a newly developed base plate from which the existing stock of National Landmine Policy compliant munitions (M87A1 Volcano canisters) can be launched. SAVO can be initiated via three fielded systems; the M7 Spider Networked Munition System, the MK152/M156 Remote Activation Munition Systems (RAMS), or the CD450-4J Blasting Machine. Fiscal Year (FY) 2021 funding resources the continued execution of the SAVO Rapid Prototyping activities in preparation for transition to the Rapid Fielding phase.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Title:</b> SAVO Rapid Prototyping</p> <p><b>Description:</b> SAVO system Rapid Prototyping phase.</p> <p><b>FY 2020 Plans:</b> Performed SAVO system Rapid Prototyping phase to include; Initiation of new start effort, development of system design, conducted requirements review, development of test and evaluation hardware configurations and fabrication of prototype systems for test and evaluation.</p> <p><b>FY 2021 Plans:</b> Continue to perform the SAVO system Rapid Prototyping phase to include: continuation of Rapid Prototyping efforts, completion of design review, qualification testing, and operational assessment.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding decrease supports the budget being aligned to an independent cost estimate for the scope of work.</p>	-	9.303	3.103
<p><b>Title:</b> Engineering Support</p> <p><b>Description:</b> Provide Engineering Support.</p>	-	0.202	2.614

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> BU5 / <i>Standoff Volcano Obstacle (SAVO) Adv Tech</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b><i>FY 2020 Plans:</i></b> Performed OGA and contract engineering support to the Integrated Product Team supporting the Rapid Prototyping effort.</p> <p><b><i>FY 2021 Plans:</i></b> Continue to perform OGA and contract engineering support to the Integrated Product Team supporting the continued Rapid Prototyping effort.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2021 funding increase supports plan testing and operational assessment.</p>				
<p><b><i>Title:</i></b> SAVO Management Services</p> <p><b><i>Description:</i></b> Program Management and Support</p> <p><b><i>FY 2020 Plans:</i></b> Performed program management of the SAVO program.</p> <p><b><i>FY 2021 Plans:</i></b> Continue to perform program management of the SAVO program.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2021 funding decrease aligns with anticipated level of effort.</p>		-	1.285	0.318
<p><b><i>Title:</i></b> SAVO Test &amp; Evaluation</p> <p><b><i>Description:</i></b> Provides support to Contractor/Government test activities.</p> <p><b><i>FY 2020 Plans:</i></b> Performed test and evaluation activities such as development of test and evaluation strategy and conduction of initial testing on the prototype systems.</p> <p><b><i>FY 2021 Plans:</i></b> Continue to perform test and evaluation activities and conduction of testing on the prototype systems.</p> <p><b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> FY 2021 funding decrease aligns with anticipated level of effort.</p>		-	1.603	0.921
<p><b><i>Title:</i></b> FY 2020 SBIR/STTR Transfer</p> <p><b><i>Description:</i></b> Funding transferred in accordance with Title 15 USC ?638</p>		-	0.590	-

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b><i>FY 2020 Plans:</i></b> Funding transferred in accordance with Title 15 USC ?638			
<b><i>FY 2020 to FY 2021 Increase/Decrease Statement:</i></b> Funding transferred in accordance with Title 15 USC ?638			
<b>Accomplishments/Planned Programs Subtotals</b>	-	12.983	6.956

**C. Other Program Funding Summary (\$ in Millions)**

N/A

**Remarks**

**D. Acquisition Strategy**

SAVO will utilize a Middle Tier of Acquisition approach for Rapid Prototyping and Fielding acquisition approach in accordance with Section 804 of the 2016 NDAA. The Rapid Prototyping phase will utilize Other Transaction Authority. Prototypes will undergo a series of qualification and operational tests ahead of Initial Operational Capability scheduled for FY 2023.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity				R-1 Program Element (Number/Name)				Project (Number/Name)							
2040 / 4				PE 0603619A / Landmine Warfare and Barrier - Adv Dev				BU5 / Standoff Volcano Obstacle (SAVO) Adv Tech							
Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
SAVO Program Management TDY and Support	MIPR	PM Close Combat Systems : Picatinny Arsenal, NJ	-	-		1.315	Jan 2020	0.240	Dec 2020	-		0.240	0.000	1.555	-
SAVO Contractor Support	C/FFP	BOWHEAD : Alexandria VA	-	-		-		0.078	Mar 2021	-		0.078	0.000	0.078	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		0.590		-		-		-	0.000	0.590	-
<b>Subtotal</b>			-	-		1.905		0.318		-		0.318	0.000	2.223	N/A
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
DOTC Manufacture Support	C/CPFF	TBD : TBD	-	-		6.332	Nov 2019	3.103	Oct 2020	-		3.103	0.000	9.435	-
<b>Subtotal</b>			-	-		6.332		3.103		-		3.103	0.000	9.435	N/A
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
CCDC Army Research Laboratory Human Research & Engineering (HRED) MANPRINT Support	MIPR	CCDC Army Research Laboratory - HRED : Aberdeen, MD	-	-		0.050	Jan 2020	0.015	Dec 2020	-		0.015	0.000	0.065	-
Contract Test and Engineering Support	C/CPFF	To Be Determined : To Be Determined	-	-		0.182	Jan 2020	-		-		-	0.000	0.182	-
SAVO - CCDC Armaments Center Engineering Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	-	-		2.882	Jan 2020	2.599	Dec 2020	-		2.599	0.000	5.481	-
<b>Subtotal</b>			-	-		3.114		2.614		-		2.614	0.000	5.728	N/A



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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> BU5 / <i>Standoff Volcano Obstacle (SAVO) Adv Tech</i>

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																											
Rapid Prototyping Decision Review					▲ 1																																																		
OTA Rapid Prototyping																																																							
Focus Assesment															▲ 2																																								
User Jury																					▲ 3																																		
Design Review																											▲ 4																												
Qualification Testing																																																							
Operational Assesment																																					▲ 5																		
SAVO Production Contract																																																							
Rapid Fielding Decision Review																																													▲ 6										
Initial Operational Capability																																																					▲ 7		

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> BU5 / <i>Standoff Volcano Obstacle (SAVO) Adv Tech</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Rapid Prototyping Decision Review	1	2020	1	2020
OTA Rapid Prototyping	1	2020	4	2021
Focus Assesment	3	2020	3	2020
User Jury	4	2020	4	2020
Design Review	2	2021	2	2021
Qualification Testing	2	2021	4	2021
Operational Assesment	4	2021	4	2021
SAVO Production Contract	2	2022	2	2026
Rapid Fielding Decision Review	2	2022	2	2022
Initial Operational Capability	3	2023	3	2023
Full Operational Capability	2	2026	2	2026

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>				<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</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>
<i>EK7: Area Denial Capability Development</i>	-	37.386	69.932	57.136	-	57.136	44.621	55.896	39.859	6.488	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

Project EK7 Area Denial Capability Development provides for the advanced capability development of terrain shaping obstacle systems and develops modernized alternatives to the Family of Scatterable Mines.

The project will evaluate integrated technologies and develop prototype systems in a realistic operating environment for the next generation of Terrain Shaping Obstacles (TSO). TSO will deny the enemy terrain and freedom of action in a joint, multi-domain, high-intensity conflict while allowing friendly forces to maneuver freely within the same battle space. TSO may include multiple methods of defeat to include top attack and bottom attack and provide controlled scalable effects against mounted enemy forces that disrupt, turn, fix, delay or block their ability to maneuver. TSO enables the Combatant Commander to shape the battle space without exposing friendly forces to enemy engagement. This capability supports Army Modernization priorities as a critical enabler for soldier lethality and creates targets for long range precision fires within the engagement area. TSO will utilize an open system and modular architecture to facilitate future development, maintenance, repair, and product improvements. TSO supports a United States Army Europe (USAREUR) Operational Needs Statement (ONS) # 18-22702.

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

	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<b>Title:</b> Terrain Shaping Obstacles Capability Development	24.115	39.409	41.496
<b>Description:</b> Develop, build, and demonstrate Terrain Shaping Obstacle common munitions system. Demonstrate system in an operationally relevant environment.			
<b>FY 2020 Plans:</b> Conducted system level design, matured munitions technologies, matured obstacle delivery methods, integrated munitions into delivery system, matured system technology and reduced program technical and cost risk.			
<b>FY 2021 Plans:</b> Continue working towards the completion of common munition and dispenser launch module design, integrate munition with launcher, complete design verification and critical design review.			
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Fiscal Year (FY) 2021 funding decrease due to a change in acquisition strategy.			
<b>Title:</b> Engineering Support	9.154	4.446	7.310

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>		
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>		<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
<p><b>Description:</b> Provide engineering support for Terrain Shaping Capability.</p> <p><b>FY 2020 Plans:</b> Provided engineering support for system development, integration, contractor developmental testing, system performance modeling and simulation, and risk reduction efforts.</p> <p><b>FY 2021 Plans:</b> Continue to provide engineering support for Terrain Shaping Obstacle common munition design, dispenser launch module design, integration, design verification, and design qualification.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding decrease due to a change in acquisition strategy.</p>				
<p><b>Title:</b> Program Management and Oversight</p> <p><b>Description:</b> Program management and oversight of Terrain Shaping Obstacle Capability development and system evaluation.</p> <p><b>FY 2020 Plans:</b> Provided program management and oversight for system development, integration, contractor developmental testing, system performance modeling and simulation, and risk reduction efforts. Conducted long-range program planning, risk analysis, and program oversight.</p> <p><b>FY 2021 Plans:</b> Continue to provide program management and oversight for munition development, dispenser launcher module development, integration, design verification, and design qualification.</p> <p><b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding decrease due to a change in acquisition strategy.</p>		4.117	3.678	0.930
<p><b>Title:</b> Test &amp; Evaluation</p> <p><b>Description:</b> Conduct testing and evaluation of Terrain Shaping Obstacle Capability performance.</p> <p><b>FY 2020 Plans:</b> Supported contractor led sub-system integration testing and prototype testing as needed. Conducted Preliminary Design Review (PDR).</p> <p><b>FY 2021 Plans:</b></p>		-	1.688	6.400

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>

<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2019</b>	<b>FY 2020</b>	<b>FY 2021</b>
Continue conducting government qualification testing to evaluate system capabilities and limitations for design qualification, reliability, and safety assessment. Conduct Critical Design Review (CDR). <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding increase supports test hardware build and qualification testing of top attack capability.			
<b>Title:</b> TSO Future Capability Evaluation <b>Description:</b> Develop, build, and demonstrate technologies for future Terrain Shaping Obstacle (TSO) capabilities. <b>FY 2020 Plans:</b> Completed technology maturation and prototype development, investigated system and subsystem technology for advanced Terrain Shaping Obstacles (TSO) capability insertions. <b>FY 2021 Plans:</b> Continue to complete technology maturation and prototype development, investigate system and subsystem technology for advanced Terrain Shaping Obstacles (TSO) capability insertions. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> FY 2021 funding increase due to planned execution of multiple future capability insertions.	-	17.535	1.000
<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	-	3.176	-
<b>Accomplishments/Planned Programs Subtotals</b>	37.386	69.932	57.136

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• E76740: <i>Close Terrain Shaping Obstacle</i>	-	-	4.995	-	4.995	30.369	47.953	37.963	10.989	0.000	132.269

**Remarks**

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>

**D. Acquisition Strategy**

The Dominating Mobility through Terrain Shaping and Engagement (DMTTS&E) Initial Capabilities Document (ICD) was approved by the Joint Requirements Oversight Council (JROC) on 3 October 2014. The DMTTS&E ICD documents Terrain Shaping Obstacle (TSO) capabilities at all operational ranges including those within line-of-sight and those that are beyond line-of-sight. The Army completed an Analysis of Alternatives and intends to initially develop a hand-emplaced Top Attack capability to be fielded at close operational ranges. The Army previously awarded two initiatives which developed and demonstrated prototypes of the top attack system concept. The Army will award a single contract to complete development and qualification of the initial top attack capability. To achieve the full capability, the Army intends to develop an improved top attack capability followed by a modernized bottom attack capability. The top attack and bottom attack systems will then be integrated and networked through the full network capability development. The munitions developed during the top attack and bottom attack phases will serve as the basis for the future mid-range and deep-range employed TSO capabilities.

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>
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<b>Management Services (\$ 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>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Program Management	MIPR	PM-CCS : Picatinny Arsenal, NJ	1.535	1.893	Feb 2019	0.088	Jul 2020	0.337	Nov 2020	-		0.337	Continuing	Continuing	-
Scorpion Contract Closeout	MIPR	General Dynamics : TBD	-	0.305	Feb 2019	-		-		-		-	0.000	0.305	-
FY 2020 SBIR/STTR Transfer	TBD	Various : Various	-	-		3.176		-		-		-	0.000	3.176	-
<b>Subtotal</b>			1.535	2.198		3.264		0.337		-		0.337	Continuing	Continuing	N/A

<b>Product Development (\$ 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>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Cost Category Item</b>	<b>Contract Method &amp; Type</b>	<b>Performing Activity &amp; Location</b>	<b>Prior Years</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>	<b>Award Date</b>	<b>Cost</b>			
Top Attack Prototype Development A	SS/CPFF	Northrop Grumman Innovation Systems : Plymouth, MN	0.852	3.500	Mar 2019	-		-		-		-	0.000	4.352	-
Top Attack Prototype Development B	SS/CPFF	Textron Defense Systems : Wilmington, MA	0.949	13.360	Jul 2019	-		-		-		-	0.000	14.309	-
Technology Maturation Risk Reduction (TMRR) Development A	C/FFP	CCDC Armaments Research Center : Picatinny Arsenal, NJ	-	0.036	Feb 2019	-		-		-		-	0.000	0.036	-
Technology Maturation Risk Reduction (TMRR) Development B	C/FFP	CCDC Armaments Research Center : Picatinny Arsenal, NJ	-	0.036	Feb 2019	-		-		-		-	0.000	0.036	-
Common Component Communications Study	SS/CPFF	NAL Research Corporation : Manassas, Virginia	3.454	-		0.406	Feb 2020	-		-		-	0.000	3.860	-
Secure Communications Network	SS/CPFF	NGMS : Redondo Beach, CA	14.488	2.488		-		-		-		-	0.000	16.976	-
Common Secure Network Architecture	SS/CPFF	Textron Defense Systems : Wilmington, MA	14.488	3.477	Sep 2019	-		-		-		-	0.000	17.965	-

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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 0603619A / Landmine Warfare and Barrier - Adv Dev	<b>Project (Number/Name)</b> EK7 / Area Denial Capability Development
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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			
User Evaluation Prototypes	C/FFP	CCDC Armaments Research Center : Picatinny Arsenal, NJ	-	0.214	Jun 2019	-		-		-		-	0.000	0.214	-
Top Attack Capability Development	C/CPFF	TBD : TBD	-	1.004		39.186		41.496	Dec 2020	-		41.496	0.000	81.686	-
Future Capability Evaluation	SS/FFP	CCDC Armaments Research Center : Picatinny Arsenal, NJ	-	-		17.944	Jun 2020	1.000		-		1.000	0.000	18.944	-
<b>Subtotal</b>			34.231	24.115		57.536		42.496		-		42.496	0.000	158.378	N/A

<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			
CCDC Armaments Center Engineering Support	MIPR	CCDC Armaments Center : Picatinny Arsenal, NJ	5.578	6.808	Dec 2018	4.939	Jan 2020	5.160	Dec 2020	-		5.160	Continuing	Continuing	-
CCDC C5ISR Center Engineering Support	MIPR	CCDC C5ISR Center : Fort Belvoir, VA	0.889	1.000	Jan 2019	0.073	Jan 2020	0.260	Jan 2021	-		0.260	Continuing	Continuing	-
Mitre Engineering Support (C4)	FFRDC	Mitre : McLean, VA	-	0.634	Aug 2019	0.885	Aug 2020	1.145	Aug 2021	-		1.145	Continuing	Continuing	-
Fibertek, INC. Operational Contractor Support	C/CPFF	FIBERTEK, INC. : Herndon, VA	0.130	-		-		-		-		-	0.000	0.130	-
General Program Support	C/FFP	Millennium Corporation : Picatinny Arsenal, NJ	0.411	-		-		-		-		-	0.000	0.411	-
General Program Support	C/FFP	Bowhead : Picatinny Arsenal, NJ	-	0.556	Jun 2019	0.349	May 2020	0.593	Jun 2021	-		0.593	0.000	1.498	-
CCDC Army Research Laboratory Engineering Support	MIPR	CCDC Army Research Laboratory : Adelphi, MD	0.777	0.712	Jan 2019	0.578	Jan 2020	0.545	Jan 2021	-		0.545	Continuing	Continuing	-

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>
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<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			
Milestone Document Development Support	SS/FFP	Booze Allen Hamilton : Picatinny Arsenal, NJ	2.484	1.173	Feb 2019	0.293		-		-		-	0.514	4.464	-
CCDC C5ISR Center NVESD Engineering Support	MIPR	CCDC C5ISR Center : Fort Belvoir, VA	-	-		0.373	Jan 2020	-		-		-	Continuing	Continuing	-
Air Worthiness Certification	MIPR	AMRDEC : Redstone Arsenal, AL	-	0.010	Dec 2018	-		-		-		-	0.000	0.010	-
Integrated Logistics Support	MIPR	TACOM ILSC : Warren, MI	-	0.156	Jan 2019	-		-		-		-	0.000	0.156	-
Polaris Contractor Support	C/FFP	MSCOE : Ft Leonard Wood - MO	-	0.024	Aug 2019	-		-		-		-	0.000	0.024	-
Milestone Document Development Support	C/FFP	TBD : TBD	-	-		-		0.200		-		0.200	0.000	0.200	-
<b>Subtotal</b>			10.269	11.073		7.490		7.903		-		7.903	Continuing	Continuing	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			
Prototype Development Demonstration	MIPR	USAF 96th Test Squadron / OGEX : Eglin AFB, FL	-	-		0.773		6.400		-		6.400	Continuing	Continuing	-
Target Vehicle Refurbishment	MIPR	Yuma Proving Ground : Yuma Proving Ground, AZ	-	-		0.346	Jan 2020	-		-		-	0.000	0.346	-
TSO High Performance Computing, Common Scene Generator, Target Modeling	MIPR	Aberdeen Proving Ground : Aberdeen, MD	-	-		0.523	Jan 2020	-		-		-	0.000	0.523	-
<b>Subtotal</b>			-	-		1.642		6.400		-		6.400	Continuing	Continuing	N/A





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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>

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																
Limited User Test													6 ▲ Limited User Test																															
Top Attack Fielding Decision													8 ▲ Top Attack Fielding Decision																															
Top Attack Production																																												
Top Attack Initial Operational Capability													9 ▲ Top Attack Initial Operational Capability																															
<b>TSO Future Capability Evaluation</b>																																												
TSO Development of Alternative Methods of Defeat																																												
<b>Improved Top Attack Capability Development</b>																																												
Improved Top Attack Rapid Prototype Decision													7 ▲ Improved Top Attack Rapid Prototype Decision																															
Improved Top Attack Rapid Prototype Phase																																												
Soldier Touch Point 2																																												
Soldier Touch Point 3													10 ▲ Soldier Touch Point 3																															
Improved Top Attack Qualification Testing																																												
Improved Top Attack Rapid Fielding Decision	12 ▲ Improved Top Attack R																																											

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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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>

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
Improved Top Attack Rapid Fielding Phase																												
Bottom Attack Capability Development																												
Bottom Attack Rapid Prototype Decision																												
Bottom Attack Rapid Prototype Phase																												

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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</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 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Interim Top Attack Capability Development	2	2025	2	2025
Materiel Development Decision	4	2015	4	2015
Model and Simulation Development	1	2016	4	2018
Concept Prototype Agreements Award(s)	2	2016	2	2016
Concept Prototype Build	2	2016	4	2016
Concept Prototype Test and Evaluation	1	2017	1	2017
Analysis of Alternatives	1	2016	4	2016
Materiel Solution Analysis	1	2017	3	2019
Munitions Delivery System Analysis	4	2018	4	2019
Development Decision	3	2019	3	2019
Top Attack Capability Development Award	4	2019	4	2019
Soldier Touch Point	4	2019	4	2019
Top Attack System Development	4	2019	3	2022
Prototype Testing	1	2020	2	2020
SubSystem Integreation Testing	2	2020	2	2021
Preliminary Design Review	3	2020	3	2020
Government Qualification Testing	2	2021	2	2022
Critical Design Review	2	2021	2	2021
Top Attack Manufacturing Development	2	2021	1	2023
Limited User Test	2	2022	2	2022
Top Attack Fielding Decision	3	2022	3	2022
Top Attack Production	3	2022	2	2025

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**Exhibit R-4A, RDT&E Schedule Details:** PB 2021 Army **Date:** February 2020

<b>Appropriation/Budget Activity</b> 2040 / 4	<b>R-1 Program Element (Number/Name)</b> PE 0603619A / <i>Landmine Warfare and Barrier - Adv Dev</i>	<b>Project (Number/Name)</b> EK7 / <i>Area Denial Capability Development</i>
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Events	Start		End	
	Quarter	Year	Quarter	Year
Top Attack Initial Operational Capability	4	2023	4	2023
TSO Future Capability Evaluation	2	2020	2	2022
TSO Development of Alternative Methods of Defeat	2	2020	2	2022
Improved Top Attack Capability Development	2	2022	3	2029
Improved Top Attack Rapid Prototype Decision	2	2022	2	2022
Improved Top Attack Rapid Prototype Phase	3	2022	2	2025
Soldier Touch Point 2	3	2023	3	2023
Soldier Touch Point 3	3	2024	3	2024
Improved Top Attack Qualification Testing	3	2024	3	2025
Improved Top Attack Rapid Fielding Decision	3	2025	3	2025
Improved Top Attack Rapid Fielding Phase	3	2025	3	2029
Bottom Attack Capability Development	2	2025	2	2029
Bottom Attack Rapid Prototype Decision	2	2025	2	2025
Bottom Attack Rapid Prototype Phase	3	2025	3	2028