

**UNCLASSIFIED**

<b>Exhibit R-2, RDT&amp;E Budget Item Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development							
<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>
Total Program Element	-	35.211	1.927	17.155	-	17.155	13.596	11.055	2.997	0.000	Continuing	Continuing
EW9: Aviation Rocket System Product Improvement and Dev	-	35.211	1.927	17.155	-	17.155	13.596	11.055	2.997	0.000	Continuing	Continuing

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

The Aviation Rockets and Small Guided Munitions Product Improvement and Development line funds the development, integration and test of current and future munitions and launchers, and their interface to platforms. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system. The current Hydra-70 2.75 inch rocket system requires performance improvements to comply with 1) US Code - Title 10, Chapter 141, Section 2389 "Ensuring Safety regarding Insensitive Munitions", 2) Department of Defense (DoD) Directive 5000.1, Chairman of the Joint Chiefs of Staff (CJCS) Instruction 3170.01C, Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD (AT&L)) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to Insensitive Munitions (IM) Requirements", 3) validated Lightweight Precision Munition (LPM) Operational Needs Statement (ONS) 16-21556 and 15 Dec 2017 Directed Requirement, 4) signed Initial Capability Document (ICD) for Army Aviation Weapons, Sub systems and Munitions (AAWSSM), 5) Air Launched Effects (ALE) Initial Capability Refinement Document (ICRD) dated 21 October 2019, and 6) existing/emerging Headquarters, Department of the Army (HQDA) G-3/5/7 and U.S. Army Training and Doctrine Command (TRADOC) aviation weapon requirements for guided and unguided rocket systems. Improvements to existing rocket systems and munitions will include design, qualification and integration of precision guidance capability, increased lethality, improved target suppression, increased standoff range, reduced minimum engagement range, improved pre-launch constraints and munitions communications/programmability, increased stowed kills, increased product reliability, improved hardness against unplanned stimuli, reduced war fighter workload, and reduced environmental impact for both manned and unmanned applications.

**B. Program Change Summary (\$ 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>
Previous President's Budget	38.452	24.221	17.171	-	17.171
Current President's Budget	35.211	1.927	17.155	-	17.155
Total Adjustments	-3.241	-22.294	-0.016	-	-0.016
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-22.294			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.241	-			
• SBIR/STTR Transfer	-	-			
• Adjustments to Budget Years	-	-	-0.016	-	-0.016

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army										<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7					<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development				<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev			
<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>
EW9: Aviation Rocket System Product Improvement and Dev	-	35.211	1.927	17.155	-	17.155	13.596	11.055	2.997	0.000	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

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

The Aviation Rockets and Small Guided Munitions Product Improvement and Development line funds the development, integration and test of current and future munitions and launchers, and their interface to platforms. Additionally, it will fund a range of improvement initiatives to modernize the Hydra-70 2.75 Inch rocket and launcher system. The current Hydra-70 2.75 inch rocket system requires performance improvements to comply with 1) US Code - Title 10, Chapter 141, Section 2389 "Ensuring Safety regarding Insensitive Munitions", 2) Department of Defense (DoD) Directive 5000.1, Chairman of the Joint Chiefs of Staff (CJCS) Instruction 3170.01C, Under Secretary of Defense for Acquisition, Technology, and Logistics (OUSD (AT&L)) Memorandum of January 26, 1999, "Exemption for Existing Inventory Items to Insensitive Munitions (IM) Requirements", 3) validated Lightweight Precision Munition (LPM) Operational Needs Statement (ONS) 16-21556 and 15 Dec 2017 Directed Requirement, 4) signed Initial Capability Document (ICD) for Army Aviation Weapons, Sub systems and Munitions (AAWSSM), 5) Air Launched Effects (ALE) Initial Capability Refinement Document (ICRD) dated 21 October 2019, and 6) existing/emerging Headquarters, Department of the Army (HQDA) G-3/5/7 and U.S. Army Training and Doctrine Command (TRADOC) aviation weapon requirements for guided and unguided rocket systems. Improvements to existing rocket systems and munitions will include design, qualification and integration of precision guidance capability, increased lethality, improved target suppression, increased standoff range, reduced minimum engagement range, improved pre-launch constraints and munitions communications/programmability, increased stowed kills, increased product reliability, improved hardness against unplanned stimuli, reduced war fighter workload, and reduced environmental impact for both manned and unmanned applications.

**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> Guided Air-to-Ground Rockets (AGR) variants (Advanced Precision Kill Weapon System (APKWS))	0.906	0.499	0.748	-	0.748
<b>Description:</b> These funds will be used to optimize current and future AGR variant integration on the Apache and for activities required to obtain an Army Full Materiel Release (FMR). This effort will include design and build of all-up-round (AUR) containers and test assets, conduct environmental qualification testing, perform ground firings, update aviation platform software, support Apache weapon survey firings, provide technical support to platform integration and testing, and development and revision of training/maintenance materiel.					
<b>FY 2020 Plans:</b> Continued efforts to optimize fire control integration on the AH-64 Apache for guided variants.					
<b>FY 2021 Base Plans:</b> 1. Complete efforts to optimize fire control integration on the AH-64 Apache for rotary wing guided variants.					

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army			<b>Date:</b> February 2020		
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev			
<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>
2. Begin efforts to optimize fire control integration for single software variant guided rockets. <b>FY 2020 to FY 2021 Increase/Decrease Statement:</b> Decrease due to completion of Air-to-Ground Rockets integration and qualification activities.					
<b>Title:</b> Modernized Rocket Launcher Increment 1 <b>Description:</b> This effort provides the interface with aircraft and emerging munitions utilizing non-proprietary, open systems architecture allowing easy compatibility when integrating with aircrafts. This inherent flexibility of an open architecture serves as a building block for future weapons systems and is the basis for an Integrated Munitions Launcher (IML). This effort evaluates launcher-to-munition electrical and mechanical interfaces for a fully capable smart munition and launcher system for the legacy fleet, as well as reduces both programmatic and technical risk. The effort informs requirements for a government owned, non-proprietary physical interface definition.	9.519	-	-	-	-
<b>Title:</b> Smart Digital Interface <b>Description:</b> The Smart Digital Interface program is an effort to support both the LPM Directed Requirement and the future smart, two-way digital communications capability to be included in the fully capable IML. This effort will evaluate launcher-to-munition physical interface technologies for the fully capable smart munition and launcher system to reduce both programmatic and technical risk, as well as to inform requirements for a government owned, nonproprietary physical interface definition.	6.264	-	-	-	-
<b>Title:</b> Army Aviation Weapons <b>Description:</b> These funds will be used for Army Aviation modular weapon systems and their interface to launchers and platforms. These efforts will include technical assessments, concept studies, perform risk reduction efforts, technology maturation, demonstration, engineering design, engineering / manufacturing development, test, integration and document preparation for Army Aviation manned and unmanned platforms. Evaluation of the Smart Digital Interface technologies will be leveraged to facilitate satisfaction of Lightweight Precision Munition (LPM) ONS and Directed Requirement. The LPM efforts will be utilized to identify deficiencies and define future requirements to include the AAWSSM Capability Development Document. <b>FY 2020 Plans:</b> 1. Continued technical assessments, concept studies, performed risk reduction efforts and prepared appropriate documentation for emerging AAWSM. Initial Capability Document requirements.	18.522	1.428	0.762	-	0.762

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army				<b>Date:</b> February 2020	
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development		<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev	
<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>					
2. Continued Lighweight Precision Munitions technology maturity and risk reduction efforts with industry to include fabrication of munition/launch system prototypes, evaluated mature existing systems to meet validated ONS 16-21556 and 15 Dec 2017 Directed Requirement, integration and test efforts on the MQ-1C Gray Eagle.					
<b>FY 2021 Base Plans:</b>					
1. Continue technical assessments, concept studies, perform risk reduction efforts and prepare appropriate documentation for AAWSM Initial Capability Document and subordinately derived requirements.					
2. Perform analysis to support emerging efforts such as extended range propulsion technology, sensors, and inertial guidance					
.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>					
Decrease due to completion of preliminary tasks, awaiting additional munition requirements.					
<b>Title:</b> Integrated Munitions Launcher (IML)					
<b>Description:</b> These funds will be used to design, develop, and qualify a future launcher with standard interfaces to support current and future munitions outlined in the AAWSM ICD, dated 17 July 2018 and the Air Launched Effects (ALE) Initial Capability Refinement Document (ICRD) dated 21 Oct 2019. This effort allows the government to align technology enabling solutions with the AAWSSM ICD, maturing technological developments of IML prototypes at the subsystem level to mitigate Apache helicopter and Gray Eagle Unmanned Aerial System launcher obsolescence limitations.					
The IML effort will define and provide the interface between aircraft and emerging munitions utilizing a non-proprietary, open systems architecture allowing easy compatibility when integrating on to aviation platforms. The inherent flexibility of an open architecture serves as a building block for future weapons systems. This effort includes the design of a launcher with future smart, two-way digital communications capability and the capability to launch current and future weapons from aviation aircraft.					
<b>FY 2021 Base Plans:</b>					
Continue IML architecture design and structure concept development. Design and build IML prototypes at the subsystem level. Perform safety testing to address release retention force methodology and the coupling to launch transient events.					
<b>FY 2020 to FY 2021 Increase/Decrease Statement:</b>					
	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
	-	-	15.645	-	15.645

**UNCLASSIFIED**

<b>Exhibit R-2A, RDT&amp;E Project Justification:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev

<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>
Decrease due to completion of preliminary tasks.					
<b>Accomplishments/Planned Programs Subtotals</b>	35.211	1.927	17.155	-	17.155

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<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>
• E37300: Rocket, Hydra 70, All Types	275.685	250.453	125.915	33.880	159.795	88.507	147.482	100.696	78.649	Continuing	Continuing

**Remarks**

**D. Acquisition Strategy**

The Acquisition Strategy is to utilize in-house expertise, Other Government Agencies, defense industry capabilities, and when appropriate utilize Other Transactional Agreement. The strategy allows the Government the ability to support urgent operational needs and unanticipated incidents, which require immediate and expert attention. This strategy will allow for the Government to maintain the Hydra-70 all-up-round rocket, its variants, Small Guided Munitions and posture for emerging requirements while leveraging new authorities and bringing along as many technologies as funding allows.

**UNCLASSIFIED**

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Army												Date: February 2020			
Appropriation/Budget Activity 2040 / 7				R-1 Program Element (Number/Name) PE 0607142A / Aviation Rocket System Product Improvement and Development				Project (Number/Name) EW9 / Aviation Rocket System Product Improvement and Dev							
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
System Engineering/ Project Management	SS/ Various	Various : Performers	0.225	8.131	Oct 2018	0.489	Oct 2019	0.859	Oct 2020	-		0.859	Continuing	Continuing	-
<b>Subtotal</b>			0.225	8.131		0.489		0.859		-		0.859	Continuing	Continuing	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
Advanced Precision Kill Weapon System (APKWS)	MIPR	CCDC : Redstone Arsenal, AL	0.482	0.906	Nov 2018	0.254	Nov 2019	0.710	Nov 2020	-		0.710	0.000	2.352	-
Modernized Rocket Launcher Increment 1	MIPR	CCDC : Redstone Arsenal, AL	1.164	5.877	Nov 2018	-		-		-		-	0.000	7.041	-
Smart Digital Interface	MIPR	CCDC : Redstone Arsenal, AL	7.791	6.264	Jan 2019	-		-		-		-	0.000	14.055	-
Army aviation weapons	MIPR	Various : Various Performers	-	11.839	Nov 2018	1.184	Jan 2020	0.724	Jan 2021	-		0.724	Continuing	Continuing	-
Integrated Munitions Launcher	MIPR	CCDC : Redstone Arsenal, AL	-	-		-		14.862	Dec 2020	-		14.862	Continuing	Continuing	-
<b>Subtotal</b>			9.437	24.886		1.438		16.296		-		16.296	Continuing	Continuing	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
Research Studies	MIPR	CCDC : Redstone Arsenal, AL	-	2.076	Dec 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	2.076		-		-		-		-	Continuing	Continuing	N/A

**UNCLASSIFIED**

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

<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev
--	---	---

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			
Developmental Testing	C/Variou	TBD : TBD	-	0.118	Dec 2018	-		-		-		-	Continuing	Continuing	-
<b>Subtotal</b>			-	0.118		-		-		-		-	Continuing	Continuing	N/A
<b>Project Cost Totals</b>			9.662	35.211		1.927		17.155		-		17.155	Continuing	Continuing	N/A

**Remarks**  
The decrease in Fiscal Year (FY) 2021 is due to completion of activities associated with the validated ONS 16-21556 and Directed Requirement for Lightweight Precision Munitions.

**UNCLASSIFIED**

<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2021 Army</b>		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev

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						
APKWS	[Redacted]																																	
Modernized Rocket Launcher Increment 1	[Redacted]				[Redacted]				[Redacted]																									
Smart Digital Interface	[Redacted]				[Redacted]				[Redacted]																									
Integrated Munitions Launcher	[Redacted]				[Redacted]				[Redacted]				[Redacted]																					
Army aviation weapons	[Redacted]																																	
LPM Operational Assessment	[Redacted]				[Redacted]				[Redacted]																									
LPM Flight Test	[Redacted]				[Redacted]				[Redacted]				[Redacted]																					

**UNCLASSIFIED**

<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2021 Army		<b>Date:</b> February 2020
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0607142A / Aviation Rocket System Product Improvement and Development	<b>Project (Number/Name)</b> EW9 / Aviation Rocket System Product Improvement and Dev

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
APKWS	3	2018	2	2021
Modernized Rocket Launcher Increment 1	3	2018	4	2019
Smart Digital Interface	3	2018	4	2019
Integrated Munitions Launcher	1	2020	1	2022
Army aviation weapons	2	2019	4	2028
LPM Operational Assessment	4	2019	2	2021
LPM Flight Test	2	2021	2	2021

**Note**  
 APKWS: Advanced Precision Kill Weapon System  
 AAWSSM ICD: Army Aviation Weapons, Sub-systems and Munitions Initial Capability Document  
 LPM: Lightweight Precision Munition