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Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Army **Date:** March 2023

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development	R-1 Program Element (Number/Name) PE 0203744A / Aircraft Modifications/Product Improvement Programs
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
Total Program Element	0.000	10.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	10.000
EB6: MQ-1C Gray Eagle MODS	-	10.000	-	-	-	-	-	-	-	-	0.000	10.000

A. Mission Description and Budget Item Justification

The MQ-1C Gray Eagle provides the Army with an extended range, multi-purpose (ERMP) Unmanned Aircraft System (UAS); capable of executing reconnaissance, security, attack, and intelligence collection missions in the range of military operations (ROMO). Sensors/payloads include an Electro-Optical/Infrared/Laser Designator (EO/IR/LD), Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI), Signals Intelligence (SIGINT), and HELLFIRE missiles; providing a near all-weather mission capability. MQ-1C Gray Eagle is a dedicated, assured, multi-mission UAS fielded to all Army Divisions, Intelligence and Security Command and Army Special Operations Command in support of the commander's warfighting priorities within multi-domain battle operations.

Currently MQ-1C Gray Eagle high fuel efficiency engines are undergoing a propulsion reliability effort which will reduce MQ-1C Gray Eagle Return to Base events and decrease the likelihood of engine related aircraft mishaps. This modernization effort will increase operational readiness and posture Gray Eagle to support multi-domain.

The Ground Based Sense And Avoid (GBSAA) System provides an alternative means of compliance with FAR Part 91.113 requirement for an aircraft to "see and avoid" other aircraft while in the National Airspace System. This capability enhances the warfighter's ability to train with the Gray Eagle at CONUS fielding locations.

B. Program Change Summary (\$ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	10.000	0.000	0.000	-	0.000
Current President's Budget	10.000	0.000	0.000	-	0.000
Total Adjustments	0.000	0.000	0.000	-	0.000
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-	-			

Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: EB6: MQ-1C Gray Eagle MODS

Congressional Add: Ground Based Sense And Avoid (GBSAA)

FY 2022	FY 2023
10.000	-

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Congressional Add Details (\$ in Millions, and Includes General Reductions)

	FY 2022	FY 2023
Congressional Add Subtotals for Project: EB6	10.000	-
Congressional Add Totals for all Projects	10.000	-

Change Summary Explanation

FY22 Congressional plus-up of \$10.0M will be used to increase the capability of the Ground Based Sense And Avoid (GBSAA) System to provide better support for training activities, to investigate new solutions aimed at addressing hardware obsolescence, and to increase flexibility and useability of GBSAA system by allowing quicker configuration/setup and SATCOM capability."

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Army **Date:** March 2023

Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203744A / Aircraft Modifications/Product Improvement Programs	Project (Number/Name) EB6 / MQ-1C Gray Eagle MODS
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COST (\$ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
EB6: MQ-1C Gray Eagle MODS	-	10.000	-	-	-	-	-	-	-	-	0.000	10.000
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

FY22 Congressional plus-up of \$10.0M will be used to increase the capability of the Ground Based Sense And Avoid (GBSAA) System to provide better support for training activities, to investigate new solutions aimed at addressing hardware obsolescence, and to increase flexibility and useability of GBSAA system by allowing quicker configuration/setup and SATCOM capability.

A. Mission Description and Budget Item Justification

The MQ-1C Gray Eagle provides the Army with an extended range, multi-purpose (ERMP) Unmanned Aircraft System (UAS); capable of executing reconnaissance, security, attack, and intelligence collection missions in the range of military operations (ROMO). Sensors/payloads include an Electro-Optical/Infrared/Laser Designator (EO/IR/LD), Synthetic Aperture Radar/Moving Target Indicator (SAR/MTI), Signals Intelligence (SIGINT), and HELLFIRE missiles; providing a near all-weather mission capability. MQ-1C Gray Eagle is a dedicated, assured, multi-mission UAS fielded to all Army Divisions, Intelligence and Security Command and Army Special Operations Command in support of the commander's warfighting priorities within multi-domain battle operations.

Currently the MQ-1C Gray Eagle high fuel efficiency engine is undergoing a propulsion reliability effort, which will reduce MQ-1C Gray Eagle Return to Base events and decrease the likelihood of engine related aircraft mishaps. Additionally, this effort will increase operational readiness for the Operational Commander.

The Ground Based Sense And Avoid (GBSAA) System provides an alternative means of compliance with FAR Part 91.113 requirement for an aircraft to "see and avoid" other aircraft while in the National Airspace System. This capability enhances the warfighter's ability to train with the Gray Eagle at CONUS fielding locations.

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

	FY 2022	FY 2023
Congressional Add: Ground Based Sense And Avoid (GBSAA)	10.000	-
FY 2022 Accomplishments: FY22 Congressional plus-up of \$10.0M will be used to increase the capability of the GBSAA System to provide better support for training activities, to investigate new solutions aimed at addressing hardware obsolescence, and to increase flexibility and useability of GBSAA system by allowing quicker configuration/setup and SATCOM capability.		
Congressional Adds Subtotals	10.000	-

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

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• AA6601: Gray Eagle Mods2	123.143	133.038	14.959	-	14.959	3.916	5.138	5.668	10.782	0.000	296.644

Remarks

D. Acquisition Strategy

An ERMP Operational Requirement Document (ORD) was approved by the Joint Requirement Oversight Council (JROC) 6 Apr 2005. Milestone B occurred on 20 Apr 2005, and the System Development and Demonstration contract was awarded 8 Aug 2005, as a result of a competitive solicitation which included a vendor system capabilities demonstration. A Capabilities Production Document (CPD) was approved 14 Mar 2009. MQ-1C Gray Eagle completed Follow-On Test and Evaluation (FOTE) on 12 Jun 2015.

This RDTE element funds a propulsion reliability improvement with the development of the Heavy Fuel Engine (HFE) 2.0 engine system. The current MQ-1C aircraft engine has experienced material failures that have resulted in aircraft mishaps (loss of aircraft) and a high number lost flight hours due to Return to Base (RTB) events. HFE 2.0 implements aviation grade components and focused reliability improvements that will address previous material failures and RTB drivers. Additionally, the Army was notified by the original equipment manufacturer (OEM) that the current engine core is obsolete and the current manufacture will no longer supply the engine core. HFE 2.0 also resolves this obsolescence/supply issue. In 2018, the Army issued an RFI to industry to assess the state of engine technology and availability of a COTS/ NDI engine solution that could meet MQ-1C capability needs and requirements. The primary goal of the RFI was to establish an alternative engine for MQ-1C that is reliable and could be integrated and qualified in a two year timeframe to resolve critical reliability and supply issues with the current engine. Upon completion of the RFI evaluations, HFE 2.0 engine systems will be procured and fielded through attrition. As a result of the Army's RFI and Industry day event, it was determined that the HFE 2.0 was the only engine to meet requirements for an alternative MQ-1C engine. Funded RDTE elements will support completion of integration, test, and qualification of the HFE 2.0 engine system on the MQ-1C aircraft. This effort will secure engine supply and result in greater propulsion system reliability and increased operational readiness to the commander in the field. Funds are planned for award on the Gray Eagle Technical Services contract as a Technical Services Memorandum (TSM) task order, and as a Military Interdepartmental Purchase Requisitions (MIPRs) to various other Government agencies. Upon completion of qualification, HFE 2.0 engine systems will be procured under the PBL contract and fielded through attrition.

This RDTE effort funds increased capability for the Ground Based Sense And Avoid (GBSAA) system to include better performance in a terminal environment, alternative methods of obtaining telemetry data which will enable operations with classified systems, and address new hardware - which will provide better performance while also addressing system obsolescence issues. The current GBSAA system is not able to support classified operations, and by including an "ADS-B as ownship" solution in the software development, support for classified operations will be possible. During the 5+ years of operation of the GBSAA system at 5 fielding sites, issues with excessive alerts in congested airspace have been noticed. Part of the Block 2 effort will refine the maneuver algorithms to adjust for areas where air traffic is allowed to be in a closer proximity to other air traffic. Units currently utilizing the GBSAA system have requested the ability to conduct a quicker set up and operation of the system for systems with transportable radars systems. A portion of this funding will be used to investigate and implement the best way to accomplish this task.

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Army		Date: March 2023
Appropriation/Budget Activity 2040 / 7	R-1 Program Element (Number/Name) PE 0203744A / Aircraft Modifications/Product Improvement Programs	Project (Number/Name) EB6 / MQ-1C Gray Eagle MODS

Event Name	FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028			
	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
Propulsion Reliability	[REDACTED]				[REDACTED]																							
Ground Based Sense And Avoid (GBSAA) System Enhancements	[REDACTED]				[REDACTED]																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Army		Date: March 2023
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
Alternate Munitions Integration	2	2017	4	2020
Engineering and Software Development - MQ-1 Gray Eagle	2	2017	4	2020
Training Development and Software/System Testing - MQ-1 Gray Eagle	3	2017	4	2020
Survivability	2	2018	4	2020
Propulsion Reliability	2	2020	3	2023
Ground Based Sense And Avoid (GBSAA) System Enhancements	3	2022	3	2024