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Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Army Date: March 2019

Appropriation/Budget Activity 2040: Research, Development, Test & Evaluation, Army / BA 7: Operational Systems Development					R-1 Program Element (Number/Name) PE 0203744A / Aircraft Modifications/Product Improvement Programs							
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
Total Program Element	-	34.228	17.684	16.486	-	16.486	13.904	11.307	9.187	7.188	Continuing	Continuing
EB6: MQ-1C Gray Eagle MODS	-	34.228	17.684	16.486	-	16.486	13.904	11.307	9.187	7.188	Continuing	Continuing

## 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.

The Fiscal Year (FY) 2020 Aircraft Modification/Product Improvement funding of \$16.486 million will integrate alternate munitions, support GPS denied development and testing, improve aircraft survivability, and improve propulsion reliability.

<b>B. Program Change Summary (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Previous President's Budget	39.358	17.706	6.686	-	6.686
Current President's Budget	34.228	17.684	16.486	-	16.486
Total Adjustments	-5.130	-0.022	9.800	-	9.800
• Congressional General Reductions	-0.032	-0.022			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-3.557	-			
• SBIR/STTR Transfer	-1.541	-			
• Adjustments to Budget Years	-	-	9.800	-	9.800

## Change Summary Explanation

FY 2020 Current President's Budget increase of \$9.8M provides additional funding to support investments in propulsion reliability. This effort 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. A portion of the increase will be used to develop alternate navigation technologies.

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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			
COST (\$ in Millions)	Prior Years	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
EB6: MQ-1C Gray Eagle MODS	-	34.228	17.684	16.486	-	16.486	13.904	11.307	9.187	7.188	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		
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.												
FY 2020 Aircraft Modification/Product Improvement funding of \$16.486 million integrates alternate munitions and related weapons support functionality. Additionally, funding supports GPS denied development and testing, aircraft survivability improvements, propulsion reliability development.												
B. Accomplishments/Planned Programs (\$ in Millions)								FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: Global Positioning System (GPS) Denied								3.917	4.000	4.000	-	4.000
Description: GPS Denied												
FY 2019 Plans: Funding continues development of an electronic warfare capability that provides the system the ability to continue operations during periods of GPS outage as well as the ability to identify Global Positioning System (GPS) jammer position location. Funding will support re-architecture of system processor modules that support current and future GPS-Denied enhancements and alternative navigation technology, for example vision-based navigation.												
FY 2020 Base Plans: Funding continues support to system processor re-architecture, as well as development of an alternate navigation technology that enables operations during periods of GPS outage using terrestrial and/or celestial data to include engineering support activities.												
Title: Universal Ground Control Station (UGCS) Improvement								7.454	-	-	-	-
Description: UGCS Improvement												
Title: Alternate Munitions Integration								14.379	3.987	2.643	-	2.643

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B. Accomplishments/Planned Programs (\$ in Millions)		FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
<b>Description:</b> Alternate Munitions Integration  <b>FY 2019 Plans:</b> Funding supports Longbow integration. Funding also initiates development of a Universal Armament Interface / Universal Payload Interface (UAI/UPI), enabling a faster and more cost effective method of integrating future weapons and payloads. Funding also supports weapons Decision Aids development.  <b>FY 2020 Base Plans:</b> Funding continues Universal Armament Interface/Universal Payload Interface development.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Completed Longbow flight test event in FY 2019.						
<b>Title:</b> Ground Base Sense and Avoid (GBSAA) Block II  <b>Description:</b> GBSAA Block II  <b>FY 2019 Plans:</b> Funding supports the development and Integration for Block II to provide GBSAA display moved to Ground Control Station (GCS). Maneuver Recommendation to Aircraft Operator (AO).  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Effort completed.		8.330	6.699	-	-	-
<b>Title:</b> Survivability  <b>FY 2019 Plans:</b> Funding for survivability requirements for the MQ-1C Gray Eagle will be used to develop prototype solutions against known threat vulnerabilities. The prime contractor will be funded to provide survivability solutions for both software and hardware features. Funding will support re-architecture of system processor modules that support current and future Survivability enhancements, datalinks modernization, and modular open-system architecture requirements.  <b>FY 2020 Base Plans:</b> Funding continues development of system processor modules that support current and future Survivability enhancements, datalinks modernization, and modular open-system architecture requirements.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b>		0.148	2.350	2.943	-	2.943

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<b>B. Accomplishments/Planned Programs (\$ in Millions)</b>	<b>FY 2018</b>	<b>FY 2019</b>	<b>FY 2020 Base</b>	<b>FY 2020 OCO</b>	<b>FY 2020 Total</b>
Funding remains constant.					
<b>Title:</b> Propulsion Reliability <b>Description:</b> Propulsion Reliability  <b>FY 2020 Base Plans:</b> Funding provides development , testing, and qualification of various propulsion reliability improvements aimed at reducing Return to Base events and decreasing propulsion related aircraft mishaps.  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase due to initiating a propulsion reliability improvement program.	-	-	6.900	-	6.900
<b>Title:</b> FY2019 SBIR STTR Transfer <b>Description:</b> SBIR STTR Transfer  <b>FY 2019 Plans:</b> SBIR STTR Transfer  <b>FY 2019 to FY 2020 Increase/Decrease Statement:</b> Increase to SBIR STTR transfer.	-	0.648	-	-	-
<b>Accomplishments/Planned Programs Subtotals</b>	34.228	17.684	16.486	-	16.486

  

<b>C. Other Program Funding Summary (\$ in Millions)</b>											
<u>Line Item</u>	<u>FY 2018</u>	<u>FY 2019</u>	<u>FY 2020 Base</u>	<u>FY 2020 OCO</u>	<u>FY 2020 Total</u>	<u>FY 2021</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• A00005: MQ-1 UAV	224.506	163.326	0.000	54.000	54.000	54.000	-	-	-	0.000	495.832
• AA6601: Gray Eagle Mods2	74.291	129.781	14.699	-	14.699	14.089	1.662	1.548	1.495	Continuing	Continuing
• 0305219A: MQ-1 Gray Eagle UAV	10.531	-	0.000	-	0.000	-	-	-	-	0.000	10.531
<b>Remarks</b>											
<b>D. Acquisition Strategy</b>											
An Extended Range Multi-Purpose (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											

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<p>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.</p> <p>The RDTE funded elements for GPS Denied, Alternate Munitions Integration, Survivability, and Propulsion Reliability addressed in this submission are planned for award on the Gray Eagle Technical Services contract as a Technical Services Memorandum (TSM) task order, and as Military Interdepartmental Purchase Requisitions (MIPRs) to various other Government Agencies. The purpose of the TSMs are to mature the respective designs to a level that Engineering Change Requests (ECR) are submitted to the Government via the Configuration Control Board (CCB). Following successful completion of the TSM and CCB approval, a contract modification to retrofit and/or cut-in the respective engineering change will be awarded on the appropriate Performance Based Logistics (PBL) or production contract.</p> <p><b>E. Performance Metrics</b> N/A</p>		

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Army												Date: March 2019			
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					
Management Services (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
FY2019 SBIR/STTR Transfer	TBD	HQDA : Washington D.C	-	-		0.648	Jan 2019	-		-		-	0.000	0.648	-
Subtotal			-	-		0.648		-		-		-	0.000	0.648	N/A
Product Development (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Global Positioning System (GPS) Denied	SS/CPFF	General Atomics/ ASI : San Diego, CA	2.741	3.917	May 2018	4.000	Mar 2019	4.000	Jan 2020	-		4.000	Continuing	Continuing	-
Universal Ground Control Station (UGCS) Improvements	SS/CPFF	General Atomics/ ASI : San Diego, CA	7.825	7.454	Aug 2018	-		-		-		-	0.000	15.279	-
Alternate Munitions Integration	SS/CPFF	General Atomics- ASI : Poway, CA	8.577	10.029	Jan 2018	3.452	Mar 2019	2.643	Jan 2020	-		2.643	0.000	24.701	-
Ground Base Sense and Avoid Block II	SS/CPFF	Various : Various	10.688	8.330	Oct 2017	6.699	Oct 2018	-		-		-	0.000	25.717	-
Survivability	MIPR	Various : Various	-	0.148	Apr 2018	2.350	Mar 2019	2.943	Nov 2019	-		2.943	Continuing	Continuing	-
Propulsion Reliability	SS/CPFF	General Atomics/ ASI : San Diego, CA	-	-		-		6.900	Mar 2020	-		6.900	Continuing	Continuing	-
Subtotal			29.831	29.878		16.501		16.486		-		16.486	Continuing	Continuing	N/A
Support (\$ in Millions)				FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support - GBSAA	MIPR	Various : Various	2.163	-		-		-		-		-	0.000	2.163	-
Subtotal			2.163	-		-		-		-		-	0.000	2.163	N/A

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<b>Exhibit R-3, RDT&amp;E Project Cost Analysis:</b> PB 2020 Army												<b>Date:</b> March 2019			
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<b>Test and Evaluation (\$ in Millions)</b>				<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</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>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
Development Testing and Software Testing Block II - GBSAA	MIPR	Various : Various	0.403	-		-		-		-		-	0.000	0.403	-
Flight Test and Analysis	SS/ Various	White Sands Missile Range testing : White Sands New Mexico	-	4.350		0.535	Jan 2019	-		-		-	0.000	4.885	-
<b>Subtotal</b>			0.403	4.350		0.535		-		-		-	0.000	5.288	N/A
			<b>Prior Years</b>	<b>FY 2018</b>		<b>FY 2019</b>		<b>FY 2020 Base</b>		<b>FY 2020 OCO</b>		<b>FY 2020 Total</b>	<b>Cost To Complete</b>	<b>Total Cost</b>	<b>Target Value of Contract</b>
<b>Project Cost Totals</b>			32.397	34.228		17.684		16.486		-		16.486	Continuing	Continuing	N/A
<b>Remarks</b>															

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<b>Exhibit R-4, RDT&amp;E Schedule Profile: PB 2020 Army</b>			<b>Date:</b> March 2019		
<b>Appropriation/Budget Activity</b> 2040 / 7		<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/ Product Improvement Programs		<b>Project (Number/Name)</b> EB6 / MQ-1C Gray Eagle MODS	

Event Name	FY 2018				FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024			
	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
Engineering and Manufacturing Development - GBSAA																												
Alternate Munitions Integration																												
Universal Ground Control Station Improvements																												
Global Positioning System Denied																												
Engineering and Software Development - MQ-1 Gray Eagle																												
Engineering and Software Development - GBSAA																												
Training Development and Software/System Testing - MQ-1 Gray Eagle																												
Critical Design Review - GBSAA																												
Training Development and Software/System Testing- GBSAA																												
Materiel Release - GBSAA																												
Survivability																												
First Unit Equipped - GBSAA																												
Propulsion Reliability																												



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<b>Exhibit R-4A, RDT&amp;E Schedule Details:</b> PB 2020 Army			<b>Date:</b> March 2019
<b>Appropriation/Budget Activity</b> 2040 / 7	<b>R-1 Program Element (Number/Name)</b> PE 0203744A / Aircraft Modifications/ Product Improvement Programs	<b>Project (Number/Name)</b> EB6 / MQ-1C Gray Eagle MODS	

**Schedule Details**

<b>Events</b>	<b>Start</b>		<b>End</b>	
	<b>Quarter</b>	<b>Year</b>	<b>Quarter</b>	<b>Year</b>
Engineering and Manufacturing Development - GBSAA	4	2017	2	2018
Alternate Munitions Integration	2	2017	4	2021
Universal Ground Control Station Improvements	2	2017	4	2018
Global Positioning System Denied	2	2017	4	2024
Engineering and Software Development - MQ-1 Gray Eagle	2	2017	4	2024
Engineering and Software Development - GBSAA	1	2018	1	2019
Training Development and Software/System Testing - MQ-1 Gray Eagle	3	2017	4	2024
Critical Design Review - GBSAA	3	2018	3	2018
Training Development and Software/System Testing- GBSAA	4	2018	4	2019
Materiel Release - GBSAA	4	2018	4	2019
Survivability	2	2018	4	2024
First Unit Equipped - GBSAA	4	2019	4	2019
Propulsion Reliability	2	2020	4	2021