Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy

Date: March 2019

Appropriation/Budget Activity

R-1 Program Element (Number/Name)

1319: Research, Development, Test & Evaluation, Navy I BA 5: System

PE 0605450N I Joint Air-to-ground Missile (JAGM)

Development & Demonstration (SDD)

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	219.280	14.457	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	233.737
2211: Joint Air-to-Ground Missile	219.280	14.457	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	233.737

**Program MDAP/MAIS Code:** 

Project MDAP/MAIS Code(s): P355

#### Note

Navy

Starting in FY 2019, funding for Joint Air-to-Ground Missile (JAGM) was realigned to PE 0605450M.

### A. Mission Description and Budget Item Justification

The Joint Air-to-Ground Missile (JAGM) is an air-launched missile system that will utilize dual-mode seeker technology providing advanced line-of-sight and beyond-line-of-sight capabilities, including precision point and fire-and-forget seeker targeting and increased lethality against soft, hardened, moving, stationary, land, maritime threats. JAGM will additionally provide robust capability in adverse weather, day or night and in obscured/countermeasure environments. The JAGM Increment 1 system will replace aviation-launched; tube-launched, optically-tracked, wire-guided (TOW), and Helicopter Launched Fire-&-Forget Missile (HELLFIRE) Systems. JAGM is an Army-led joint program that addresses rotary wing, fixed wing, and unmanned aerial vehicle requirements. The Department of Navy threshold platform is the AH-1Z. The JAGM system includes missile, trainers, containers, support equipment and software modifications to the M-299 launcher.

The JAGM program is part of the Navy's Integrated Fire Control (IFC) approach to address advanced threat capabilities in the Anti-Access/Area-Denial (A2AD) environment. IFC solutions enable individual system capabilities to be leveraged across an effects chain, placing the full spectrum of tactical capability in the hands of the warfighter. IFC solutions that push engagement distances beyond the launch platform's radar horizon and allow the United States Navy to operate in, and control, contested battle space in littoral waters and A2/AD environments are increasingly critical as more and more scenarios require compressed and coordinated fire control timelines.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under system development and demonstration because it includes those projects that have passed Milestone B approval and are conducting engineering and manufacturing development tasks aimed at meeting validated requirement prior to full-rate production decision.

PE 0605450N: Joint Air-to-ground Missile (JAGM)

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R-1 Line #164

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy

Date: March 2019

Appropriation/Budget Activity

1319: Research, Development, Test & Evaluation, Navy I BA 5: System

Development & Demonstration (SDD)

# R-1 Program Element (Number/Name)

PE 0605450N I Joint Air-to-ground Missile (JAGM)

B. Program Change Summary (\$ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	15.473	0.000	0.000	-	0.000
Current President's Budget	14.457	0.000	0.000	-	0.000
Total Adjustments	-1.016	0.000	0.000	-	0.000
<ul> <li>Congressional General Reductions</li> </ul>	-	-			
<ul> <li>Congressional Directed Reductions</li> </ul>	-	-			
<ul> <li>Congressional Rescissions</li> </ul>	-	-			
<ul> <li>Congressional Adds</li> </ul>	-	-			
<ul> <li>Congressional Directed Transfers</li> </ul>	-	-			
<ul> <li>Reprogrammings</li> </ul>	-	-			
SBIR/STTR Transfer	-0.416	0.000			
<ul> <li>Congressional Directed Reductions</li> </ul>	-0.600	-	-	-	-
Adjustments					

### **Change Summary Explanation**

Navy

Starting in FY 2019, funding for Joint Air-to-Ground Missile (JAGM) was realigned to PE 0605450M.

PE 0605450N: Joint Air-to-ground Missile (JAGM)

UNCLASSIFIED Page 2 of 9

Exhibit R-2A, RDT&E Project Ju	stification:	PB 2020 N	lavy							Date: Marc	ch 2019	
Appropriation/Budget Activity 1319 / 5					R-1 Progra PE 060545 (JAGM)		•	,	Project (N 2211 / Join		ne) und Missile	
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
2211: Joint Air-to-Ground Missile	219.280	14.457	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	233.737
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: P355

#### Note

Starting in FY 2019, funding for Joint Air-to-Ground Missile (JAGM) was realigned to PE 0605450M.

### A. Mission Description and Budget Item Justification

The Joint Air-to-Ground Missile (JAGM) is an air-launched missile system that will utilize dual-mode seeker technology providing advanced line-of-sight and beyond-line-of-sight capabilities, including precision point and fire-and-forget seeker targeting and increased lethality against soft, hardened, moving, stationary, land, maritime threats. JAGM will additionally provide robust capability in adverse weather, day or night and in obscured/countermeasure environments. The JAGM Increment 1 system will replace aviation-launched; tube-launched, optically-tracked, wire-guided (TOW), and Helicopter Launched Fire-&-Forget Missile (HELLFIRE) Systems. Later increments of JAGM will be fixed wing compatible. JAGM is an Army-led joint program that addresses rotary wing, fixed wing and unmanned aerial vehicle requirements. The Department of Navy threshold platform is the AH-1Z. The JAGM system includes missile, trainers, containers, support equipment and software modifications to the M-299 launcher.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: JAGM Engineering and Manufacturing Development (EMD) Phase  Articles:	14.457 -	0.000	0.000	0.000	0.000
<b>FY 2019 Plans:</b> N/A					
FY 2020 Base Plans: N/A					
FY 2020 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	14.457	0.000	0.000	0.000	0.000

PE 0605450N: Joint Air-to-ground Missile (JAGM)

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R-1 Line #164

Navy

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy			Date: March 2019
'	,	, ,	umber/Name) nt Air-to-Ground Missile

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

			FY 2020	FY 2020	FY 2020					<b>Cost To</b>	
Line Item	FY 2018	FY 2019	Base	OCO	<u>Total</u>	FY 2021	FY 2022	FY 2023	FY 2024	Complete	<b>Total Cost</b>
• RDT&E ARMY, 0605450A: J	4 <i>GM</i> 28.539	11.773	9.500	-	9.500	8.900	2.163	2.314	3.000	Continuing	Continuing
• MPA, ARMY, C70302: <i>JAC</i>	<i>M</i> 178.432	276.462	233.353	-	233.353	213.608	220.900	213.611	208.833	0.000	1,671.948
• WPN, NAVY, 2248: <i>JAGI</i>	<i>A</i> 3.789	24.109	0.000	90.966	90.966	49.431	50.418	76.246	77.770	1,204.238	1,598.889
• RDT&E NAVY, 0605450M: <i>J</i>	4 <i>GM</i> 0.000	6.759	18.393	-	18.393	12.713	0.220	0.224	0.228	0.000	38.537

#### Remarks

Navy

### D. Acquisition Strategy

The Joint Air-to-Ground Missile (JAGM) system is an ACAT-1C Joint Army/Navy Major Defense Acquisition Program (MDAP) with the Army designated as lead service. Milestone B was achieved in July 2015 with Milestone C achieved June 2018. The Engineering, Manufacturing and Development contract was a full and open competition and was awarded July 2015. The vendor, Lockheed Martin, is responsible for the production of a technically mature and fully producible JAGM Guidance Section (GS) as well as the integration of the GS with the current HELLFIRE-R missile warhead and motor section for Increment 1 capability. The Army is responsible for the development and production of the JAGM missile and integration on the AH-64 Apache. The Navy is responsible for integration of the JAGM on the United States Marine Corps AH-1Z with an Initial Operational Capability (IOC) in FY 2020.

#### **E. Performance Metrics**

Milestone C in FY 2018; IOC in FY 2020

PE 0605450N: Joint Air-to-ground Missile (JAGM)

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R-1 Line #164

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy

Appropriation/Budget Activity R-1 Program Element (Number/Name) Project (Number/Name)

1319 / 5 PE 0605450N / Joint Air-to-ground Missile (JAGM) 2211 / Joint Air-to-Ground Missile

FY 2020 FY 2020 FY 2020 **Product Development (\$ in Millions) FY 2018** FY 2019 Base oco Total Contract Target Method Performing Prior Award Award Award Award **Cost To** Total Value of **Cost Category Item** & Type Activity & Location **Years** Cost Date Cost Date Cost Date Cost Date Complete Cost Contract Cost NAWCWD: China Systems Engineering WR 52.876 1.014 Nov 2017 0.000 0.000 0.000 0.000 53.890 Lake, CA NAWCAD: Patuxent WR 2.139 0.459 Nov 2017 0.000 0.000 0.000 2.598 Systems Engineering 0.000 River, MD NAWCAD: Patuxent WR 10.337 0.563 Nov 2017 0.000 0.000 Aircraft Integration 0.000 0.000 10.900 River. MD NAWCWD : China Aircraft Integration (AH-1Z) Various 6.818 2.040 Nov 2017 0.000 0.000 0.000 0.000 8.858 Lake, CA Contractor Aircraft Northrup Grumman: Various 14.030 3.436 Sep 2018 0.000 0.000 0.000 0.000 17.466 Integration (AH-1Z) Woodlawn Hills, CA JAMS: Huntsville, 1.576 Jan 2018 0.000 Integration & Test Various 29.510 0.000 0.000 0.000 31.086 Prior year cost Prod Dev no longer funded in the Various: Various 24.503 0.000 0.000 0.000 0.000 0.000 Various 24.503 **FYDP** 

0.000

0.000

#### Remarks

Contractor Aircraft Integration (AH-1Z) - Funding in this line includes software support associated with the integration of JAGM on the AH-1Z. Integration & Test - Funding in this line includes integration & test support, modeling & simulation and telemetry kits.

140.213

Subtotal

Contractor Integration & Test - Funding in this line includes hardware and support associated with the Engineering and Manufacturing Development (EMD) contract.

9.088

Support (\$ in Millions	s)			FY 2	2018	FY 2	2019	FY 2 Ba		FY 2		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	Total Cost	Target Value of Contract
Integrated Logistics Support	WR	NAWCWD : China Lake, CA	1.131	0.163	Nov 2017	0.000		0.000		-		0.000	0.000	1.294	-
Integrated Logistics Support	WR	NAWCAD : Patuxent River, MD	0.155	0.076	Nov 2017	0.000		0.000		-		0.000	0.000	0.231	-
Prior year Support cost no longer funded in the FYDP	Various	Various : Various	12.447	0.000		0.000		0.000		-		0.000	0.000	12.447	-

PE 0605450N: Joint Air-to-ground Missile (JAGM) Navy Page 5 of 9

R-1 Line #164

0.000

0.000

149.301

N/A

Exhibit R-3, RDT&E F		<b></b>	OZU Navy	<u> </u>		D 4 D==			/ N I		Duoised		March 20	13	
<b>Appropriation/Budge</b> 1319 / 5	et Activity						5450N / J	ement (N loint Air-to				(Number	Ground	Missile	
Support (\$ in Millions	s)			FY 2	2018	FY 2	019	FY 2 Ba	2020 se		2020 CO	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	Total Cost	Target Value of Contrac
		Subtotal	13.733	0.239		0.000		0.000		-		0.000	0.000	13.972	N/
Test and Evaluation	(\$ in Milli	ions)		FY 2	2018	FY 2	019	FY 2 Ba	2020 se		2020 CO	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
Test & Evaluation	Various	NAWCAD : Patuxent River, MD	4.541	0.451	Nov 2017	0.000		0.000		-		0.000	0.000	4.992	-
Test & Evaluation	Various	NAWCWD : China Lake, CA	0.000	1.627	Nov 2017	0.000		0.000		-		0.000	0.000	1.627	-
Test & Evaluation	Various	USMC : MCAS Yuma, AZ	0.000	1.121	Mar 2018	0.000		0.000		-		0.000	0.000	1.121	-
Test & Evaluation	Various	Various : Various	0.210	0.639	Nov 2017	0.000		0.000		-		0.000	0.000	0.849	-
Prior year T&E cost no longer funded in the FYDP	Various	Various : Various	41.328	0.000		0.000		0.000		-		0.000	0.000	41.328	-
		Subtotal	46.079	3.838		0.000		0.000		-		0.000	0.000	49.917	N/A
Management Service	es (\$ in M	lillions)		FY 2	2018	FY 2	019	FY 2 Ba			2020 CO	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
Contr Eng Supt - ETS (NONFFRDC)	Various	Various : Various	3.486	0.936	Feb 2018	0.000		0.000		-		0.000	0.000	4.422	-
Management Services	Various	NAWCAD : Patuxent River, MD	15.173	0.296	Nov 2017	0.000		0.000		-		0.000	0.000	15.469	-
Travel	Various	NAWCAD : Patuxent River, MD	0.596	0.060	Oct 2017	0.000		0.000		-		0.000	0.000	0.656	-
Prior year Mngt Svcs cost no longer funded in the FYDP	Various	Various : Various	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	19.255	1.292		0.000		0.000		-		0.000	0.000	20.547	N/A

PE 0605450N: Joint Air-to-ground Missile (JAGM) Navy UNCLASSIFIED
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R-1 Line #164

	0 Navy								
Appropriation/Budget Activity						Date	: March 20	19	
1319 / 5				lement (Number/N Joint Air-to-ground		Project (Numb 2211 / Joint Air-		Missile	
Y	Prior 'ears	FY 2018	FY 2019	FY 2020 Base	FY 2	2020 FY 2020 CO Total	Complete	Total Cost	Target Value of Contract
Project Cost Totals 2	19.280	14.457	0.000	0.000	-	0.00	0.000	233.737	N/A

PE 0605450N: Joint Air-to-ground Missile (JAGM) Navy UNCLASSIFIED
Page 7 of 9

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AH1-Z Integration																											
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		E,N) OT Asset	Test t Qty 8																								
r	n AH1-Z Integration DT Ass	DT/IT Test A	MS-C  AH1-Z Integration  DT Assist  DT/IT  M&S  G SIL Testing  DT/IT Test Asset  Qty 44 (RDTE,N)  OT Asse	FY 2018  1Q 2Q 3Q 4Q  MS-C  MS-C  Integration  DT Assist DT/IT  M&S  G SIL Testing  LRIP 1 (Army Only)  LRIP 2 (WPN)  DT/IT Test Asset	FY 2018  1Q 2Q 3Q 4Q 1Q  MS-C  MS-C  Integration  DT Assist DT/IT  M&S  SIL Testing  LRIP 1 (Army Only)  LRIP 2 (WPN)  DT/IT Test Asset Qty 44 (RDTE,N)  OT Test Asset Qty 8	FY 2018	FY 2018  FY	FY 2018  FY 2018  1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q  MS-C  MS-C  Integration  DT Assist  DT/IT  M&S  SIL Testing  LRIP 1 (Army Only)  LRIP 2 (WPN)  DT/IT Test Asset Qty 44 (RDTE,N)  OT Test Asset Qty 8	R-1   PE   (JA   IQ   2Q   3Q   4Q   1Q   1Q   1Q   1Q   1Q   1Q   1	R-1 Pro   PE 0603   (JAGM)	R-1 Progra PE 0605450 (JAGM)  FY 2018 FY 2019 FY 2020 10 20 30 40 10 20 30 40 10 20 30  MS-C MS-C DT/IT M&S  SIL Testing  LRIP 1 (Army Only)  LRIP 2 (WPN)  S DT/IT Test Asset Qty 44 (RDTE,N)  OT Test Asset Qty 8	R-1 Program E PE 0605450N / (JAGM)  FY 2018 FY 2019 FY 2020  1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q  MS-C  MS-C  DT/IT  M&S  SIL Testing  LRIP 1 (Army Only)  LRIP 2 (WPN)  DT/IT Test Asset Qty 44 (RDTE,N)  OT Test Asset Qty 8	R-1 Program Elem PE 0605450N / Join (JAGM)  FY 2018 FY 2019 FY 2020  1Q 2Q 3Q 4Q 1Q 2Q 3Q 4Q 1Q MS-C MS-C MS-C MS-C MS-C MS-C MS-C MS-C	R-1 Program Element   PE 0605450N / Joint A (JAGM)   Toint A (JAGM)   To	R-1 Program Element (Nu PE 0605450N / Joint Air-to (JAGM)  FY 2018 FY 2019 FY 2020 FY 2020  MS-C MS-C MS-C MS-C MS-C MS-C MS-C MS-C	R-1 Program Element (Number PE 0605450N / Joint Air-to-ground (JAGM)   FY 2018	R-1 Program Element (Number/N PE 0605450N / Joint Air-to-ground (JAGM)    FY 2018	R-1 Program Element (Number/Name PE 0605450N / Joint Air-to-ground Miss (JAGM)    FY 2018	R-1 Program Element (Number/Name) PE 0605450N / Joint Air-to-ground Missile (JAGM)  FY 2018 FY 2018 FY 2019 FY 2020 FY 2021 FY 2022 TQ ZQ 3Q 4Q 1Q ZQ 3Q 2Q	R-1 Program Element (Number/Name) PE 0605450N / Joint Air-to-ground Missile (JAGM)  FY 2018 FY 2019 FY 2020 FY 2021 FY 2022  FY 2021  FY 2022  FY 2	R-1 Program Element (Number/Name) PE 0605450N / Joint Air-to-ground Missile (JAGM)  FY 2018 FY 2019 FY 2020 FY 2021 FY 2022  IQ 20 30 40 10 20 30 40 40 10 20 30 40 40 10 20 30 40 40 10 20 30 40 40 10 20 30 40 40 40 40 40 40 40 40 40 40 40 40 40	R-1 Program Element (Number/Name) PE 0605450N / Joint Air-to-ground Missile (JAGM)  FY 2018 FY 2018 FY 2019 FY 2020 FY 2021 FY 2022 FY 2021 MS-C MS-C MS-C MS-C MS-C MS-C MS-C MS-C	R-1 Program Element (Number/Name) PE 0605450N / Joint Air-to-ground Missile (JAGM)  FY 2018 FY 2019 FY 2020 FY 2021 FY 2022 FY 2023 FY 2023 FY 2021 FY 2023 FY 2023 FY 2023 FY 2021 FY 2023 FY	R-1 Program Element (Number/Name) PE 0605450N / Joint Air-to-ground Missile (JAGM)  FY 2018 FY 2019 FY 2020 FY 2021 FY 2022 FY 2023 FY 2024 FY 2023 FY 2023 FY 2024 FY 2023 FY 2023 FY 2023 FY 2024 FY 2023 FY 2024 FY 2023 FY 2023 FY 2023 FY 2024 FY 2023 FY 2023 FY 2023 FY 2023 FY 2023 FY 2024 FY 2023 FY 2024 FY 2023 FY 2024 FY 2024 FY 2023 FY 2024 FY 2024 FY 2023 FY 2024 FY 2024 FY 2025 FY 2023 FY 2023 FY 2024 FY 2024 FY 2024 FY 2024 FY 2025 FY 2023 FY 2024 FY 2024 FY 2025 FY 2023 FY 2024 FY 2024 FY 2025 FY 2025 FY 2025 FY 2023 FY 2024 FY 2025 FY	R-1 Program Element (Number/Name) PE 0605450N / Joint Air-to-ground Missile (JAGM)  Project (Number/Name) PE 0605450N / Joint Air-to-ground Missile 2211 / Joint Air-to-Gro (JAGM)  Pry 2018 FY 2018 FY 2019 FY 2020 FY 2021 FY 2022 FY 2023 MS-C  MS-C  MS-C  MS-C  MS-C  MS-C  DT//TT  M&S  SIL Testing  DT//TT  LRIP (WPN)  DT//TT Test Asset Qty 44 (RDTE,N)  DT/Test Asset Qty 8	R-1 Program Element (Number/Name)   Project (Number/	R-1 Program Element (Number/Name) PE 0605450N / Joint Air-to-ground Missile (JAGM)  FY 2018 FY 2018 FY 2019 FY 2020 FY 2021 10 20 30 40 40 10 20 30 40 40 10 20 30 40 40 10 20 30 40 40 10 20 30 40 40 10 20 30 40 40 10 20 30 40 40 40 40 40 40 40 40 40 40 40 40 40

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Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy			Date: March 2019
Appropriation/Budget Activity 1319 / 5	,	, ,	umber/Name) at Air-to-Ground Missile
	107101117		

## Schedule Details

	Sta	art	En	ıd
Events by Sub Project	Quarter	Year	Quarter	Year
JAGM				
Acquisition Milestones: Milestone C	3	2018	3	2018
Test and Evaluation: AH-1Z Integration: AH-1Z Integration	1	2018	1	2018
Test and Evaluation: Software Development Testing/Integration Testing: DT Assist	1	2018	2	2018
Test and Evaluation: Software Development Testing/Integration Testing: DT/IT Software 8.2.2 Development testing	3	2018	4	2018
Test and Evaluation: Software Development Testing/Integration Testing: DT/IT Software 8.2.3 Development testing	1	2018	4	2018
Test and Evaluation: Software Development Testing/Integration Testing: Modeling & Simulation	1	2018	4	2018
Test and Evaluation: Software Integration Lab Testing: SIL Testing	1	2018	4	2018
Production Milestones: Contract Awards: LRIP 1 (Army Only)	4	2018	4	2018
Production Milestones: Contract Awards: LRIP 2 (WPN)	4	2018	4	2018
Production Milestones: Deliveries: DT/IT Test Asset	1	2018	3	2018
Production Milestones: Deliveries: OT Test Asset	3	2018	4	2018