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

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD)</i>	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>
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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	271.218	37.054	60.793	104.731	-	104.731	119.530	110.199	106.369	67.790	Continuing	Continuing
0267: <i>Mine Improvements</i>	236.836	16.574	30.468	45.234	-	45.234	70.262	68.707	61.224	21.739	Continuing	Continuing
2993: <i>Encapsulated Effector</i>	34.382	20.480	30.325	59.497	-	59.497	49.268	41.492	45.145	46.051	Continuing	Continuing

A. Mission Description and Budget Item Justification

Project 0267 adjustments are associated with the development of the Long Range Aerial Delivered Maritime Mine (LRADMM). Project 2993 adjustments are associated with sensor upgrades to allow the Hammerhead system to prosecute additional targets.

The Mines Improvement PE provides resources to develop naval mine systems used to establish and maintain control of essential sea areas. Naval mines are used to deny sea areas or inflict damage on adversary shipping to hinder, disrupt, and deny adversary operations. Naval mining is employed to reduce the adversary's threat to friendly forces and preserve access. Mining complements and performs an essential part of other warfare areas; particularly strike, anti-submarine, and anti-surface warfare. Resources are utilized for developing and deploying improvements to the portfolio of naval mines. Different lines of effort are focused on specific aspects of the mission sequence, to enable offensive, defensive, and protective maritime mining across all water depths and phases of conflict. Major lines of effort include:

- 1) Development of maritime mines to enable safe standoff distances, including integration with aircraft and undersea unmanned systems
- 2) Adding command and control of deployed minefields
- 3) Improving target detection against modern threat vessels

B. Program Change Summary (\$ in Millions)

	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024 Base</u>	<u>FY 2024 OCO</u>	<u>FY 2024 Total</u>
Previous President's Budget	37.758	60.793	62.032	-	62.032
Current President's Budget	37.054	60.793	104.731	-	104.731
Total Adjustments	-0.704	0.000	42.699	-	42.699
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.704	0.000			
• Program Adjustments	0.000	0.000	10.000	-	10.000
• Rate/Misc Adjustments	0.000	0.000	32.699	-	32.699

Change Summary Explanation

FY 2022: reflects a net decrease of \$0.704M for SBIR assessments.

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FY 2023: No adjustments FY 2024: reflects an increase of \$7.211M for Quickstrike ER testing. There is also an increase of \$24.970M to fund Long Range Aerial Delivered Maritime Mine (LRADMM) and an increase of \$10M to fund Hammerhead sensor improvements. \$0.518M for misc adjustments.		

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy										Date: March 2023		
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>				Project (Number/Name) 0267 / <i>Mine Improvements</i>			
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
0267: <i>Mine Improvements</i>	236.836	16.574	30.468	45.234	-	45.234	70.262	68.707	61.224	21.739	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

FY 2024 reflects an increase associated with the development of the Long Range Aerial Delivered Maritime Mine (LRADMM).

Naval mines are used to deter or control adversary movements, including surface ships and submarines. Funding supports the capability to maintain effectiveness of mines facing new threat targets with increasing emphasis on major regional conflicts and great power competition. The three major project areas are:

- 1) Aerial delivery development efforts address capabilities required by a Joint Emergent Operational Needs Statement (JEONS). QS-ER adds GPS-guidance and glide flight gear to the Quickstrike (QS) series to reduce risk to delivery aircraft by introducing precision placement and mid-range standoff. LRADMM adds long range stand-off distance and maintains the precision placement capability.
- 2) Clandestine Delivered Mine MK68 (CDM MOD 0) provides a required capability by converting legacy mining systems for delivery by Extra Large Unmanned Undersea Vehicles (XLUUV) and/or surface platform in support of a JEONS. This capability allows access to contested environments and reduces risk by using unmanned platforms. Upgrades to CDM incorporate the programmable Targe Detection Device (DD) MK-71, adds remote control arming (MOD 1), and reversible arming (MOD 2) functions through future upgrades for increased operational flexibility and safety for emplaced minefields. Additional efforts include transitioning an explosive section design into the CDM program that is in development under the Compact Encapsulated Effector (C- ENCAP) effort that is managed by the Office of Naval Research (ONR).
- 3) Quickstrike Mod 3 improves effectiveness of existing mines against modern threats by using a programmable TDD MK-71. Quickstrike Mod 3 utilizes modeling and analysis to improve target detection and response by developing optimized mine settings and firing algorithms. Minefield planning improvements include new targeting algorithms, mine settings, and corresponding damage data for weapon/target pairs into existing minefield planning software.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Product Development	10.776	21.889	38.788	0.000	38.788
Articles:	-	-	-	-	-
FY 2023 Plans:					
Quickstrike Mod 3:					
- Continue modeling and generating operational data for target detection algorithm for minefield planning improvements, based on updated fleet priority targets.					
- Establish improved target detecting device requirements documents, to include additional sensing modalities and improved performance.					
Quickstrike-ER:					

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy	Date: March 2023
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Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>	Project (Number/Name) 0267 / <i>Mine Improvements</i>
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
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- Complete Operational Flight Profile (OFP) and Wing Kit TDP
 - Complete Non-Functional Wing kit test articles fabrication
 - Initiate development Functional Wing Kit test articles
 - Complete Universal Load Adapter test articles fabrication

CDM:
 - Complete development of safe and arming device in support of CDM reversible arming
 - Provide support for explosive section design (C-ENCAP Future Naval Capability (FNC))
 - Complete ACOMMs system development

FY 2024 Base Plans:
 Quickstrike Mod 3:
 -Continue target detection algorithm development for minefield planning improvements, based on updated fleet priority targets.
 - Deliver Air Cushioned Vehicle (ACV) detection algorithm

Quickstrike-ER:
 - Complete Functional Wing Kit Test Articles
 - Award LRIP Option 1 and commence bomb and wing kit production
 - Complete initial BLU-117 production
 - Complete Load Adapter Production

Long Range Aerial Delivered Maritime Mine (LRADMM):
 - Develop design and performance specifications and statement of work
 - Award LRADMM Contract
 - New explosive fill development for LRADMM warhead.

CDM:
 - Begin integration of explosive section for FNC effort to CDM
 - Receive approval from Weapons System Explosive Safety Review Board (WSESRB) for CDM MOD 1 fielding
 - Commence CDM MOD 1 Kit Assembly

FY 2024 OCO Plans:

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
N/A					
FY 2023 to FY 2024 Increase/Decrease Statement: FY 2023 to FY 2024 increase associated with completion of QS-ER wing kit development in FY 24.					
Title: Management	1.029	0.872	0.621	0.000	0.621
Articles:	-	-	-	-	-
FY 2023 Plans: - Continue to provide programmatic and financial support for CDM programs.					
FY 2024 Base Plans: - Continue to provide programmatic and financial support for CDM and QS programs.					
FY 2024 OCO Plans: N/A					
FY 2023 to FY 2024 Increase/Decrease Statement: No significant change.					
Title: Test and Evaluation	4.769	7.707	5.825	0.000	5.825
Articles:	-	-	-	-	-
FY 2023 Plans: Quickstrike Mod 3: - TDD MK 71 Target Detection Algorithm testing and evaluation.					
Quickstrike-ER: - Complete Operational Demonstration 4 - Continue mine component qualification, load adapter qualification, safety and operational flight-testing for certification aboard B-52.					
CDM: - Begin CDM MOD 1 test and evaluation.					
FY 2024 Base Plans: Quickstrike Mod 3: - Conduct B-52 and B-1 Flight Certification events for QS MK62/MK63					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Quickstrike-ER: - Complete MK64 MOD 5/B-52 Flight certification test events - Conduct Quick Reaction Assessment (QRA)/Developmental Test (DT)					
CDM: - Complete CDM MOD 1 test and evaluation.					
FY 2024 OCO Plans: N/A					
FY 2023 to FY 2024 Increase/Decrease Statement: No significant change.					
Accomplishments/Planned Programs Subtotals	16.574	30.468	45.234	0.000	45.234

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024 Base</u>	<u>FY 2024 OCO</u>	<u>FY 2024 Total</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• WPN 3231: <i>Maritime Mines</i>	8.567	9.282	58.800	-	58.800	77.765	79.150	81.382	83.572	0.000	485.420

Remarks

D. Acquisition Strategy

In order to meet accelerated timelines, the QS-ER wing kit is being developed under a sole source contract with Boeing. QS-ER leak resistant bomb bodies are being developed and will be procured through an active NAVAIR contract vehicle. QS MOD 3 and CDM mine kits, including target detecting devices, adapters, and other hardware components are procured via various small contract vehicles or developed internally by the Government. All QS and CDM software is developed and maintained by Government activities.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy												Date: March 2023			
Appropriation/Budget Activity					R-1 Program Element (Number/Name)					Project (Number/Name)					
1319 / 5					PE 0604601N / Mine Development					0267 / Mine Improvements					
Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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
CDM: Primary Hardware Development	WR	NSWC PC : Panama City, FL	124.625	1.290	Oct 2021	4.770	Oct 2022	2.314	Oct 2023	-		2.314	Continuing	Continuing	Continuing
CDM: Primary Hardware Development	WR	NSWC IH : Indian Head, MD	16.668	0.130	Oct 2021	4.328	Oct 2022	3.125	Oct 2023	-		3.125	Continuing	Continuing	Continuing
CDM: Primary Hardware Development	C/CPFF	JHU/APL : Baltimore, MD	10.209	0.260	Nov 2021	0.500	Nov 2022	0.688	Nov 2023	-		0.688	Continuing	Continuing	Continuing
CDM: System Safety	WR	NUWC NPT : Newport, RI	0.549	0.410	Oct 2021	0.100	Oct 2022	0.000		-		0.000	0.000	1.059	-
QS Mod 3: Ancillary Hardware Development	Various	Various : Various	8.956	1.185	Oct 2021	2.139	Oct 2022	0.000		-		0.000	Continuing	Continuing	Continuing
QS Mod 3: Software Development	WR	NSWC PC : Panama City, FL	30.366	1.724	Oct 2021	1.200	Oct 2022	0.750	Oct 2023	-		0.750	Continuing	Continuing	Continuing
QS-ER: Hardware Development	WR	NSWC IH : Indian Head, MD	6.031	0.420	Oct 2021	0.000		0.000		-		0.000	0.000	6.451	-
QS-ER: Hardware Development	WR	NSWC PC : Panama City, FL	4.078	4.747	Oct 2021	0.000		0.000		-		0.000	0.000	8.825	-
QS-ER: Hardware Development	C/CPFF	Boeing : St. Charles, MO	9.780	0.000		7.267	Oct 2022	6.941	Oct 2023	-		6.941	Continuing	Continuing	Continuing
QS-ER: Hardware Development	WR	Eglin AFB : Okaloosa, FL	1.250	0.200	Oct 2021	0.440	Oct 2022	0.000		-		0.000	0.000	1.890	-
QS-ER: Hardware Development	WR	NUWC NPT : Newport, RI	0.240	0.200	Oct 2021	0.164	Oct 2022	0.000		-		0.000	0.000	0.604	-
QS-ER: Hardware Development	C/CPAF	NAVAIR : Pax River, MD	3.000	0.210	Oct 2021	0.981	Oct 2022	0.000		-		0.000	0.000	4.191	-
LRADMM: Hardware Development	C/CPFF	Various : Various	0.000	0.000		0.000		16.000	Jun 2024	-		16.000	0.000	16.000	-
LRADMM: Engineering Support	WR	NSWC PC : Panama City, FL	0.000	0.000		0.000		4.000	Oct 2023	-		4.000	0.000	4.000	-
LRADMM: Engineering Support	WR	NSWC IH : Indian Head, MD	0.000	0.000		0.000		4.970	Oct 2023	-		4.970	0.000	4.970	-
Subtotal			215.752	10.776		21.889		38.788		-		38.788	Continuing	Continuing	N/A

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Appropriation/Budget Activity						R-1 Program Element (Number/Name)				Project (Number/Name)					
1319 / 5						PE 0604601N / Mine Development				0267 / Mine Improvements					
Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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
QS-ER: Engineering Support	C/CPFF	JHU/APL : Baltimore, MD	0.860	0.000	Oct 2021	0.000		0.000		-		0.000	0.000	0.860	-
Subtotal			0.860	0.000		0.000		0.000		-		0.000	0.000	0.860	N/A
Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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
Developmental Test & Evaluation (DT&E)	WR	NSWC IH-CDM : Indian Head, MD	3.159	2.619	Oct 2021	1.900	Oct 2022	1.995	Oct 2023	-		1.995	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	WR	NSWC PC-QSM3 : Panama City, FL	10.867	1.294	Oct 2021	1.700	Oct 2022	2.730	Oct 2023	-		2.730	0.000	16.591	-
Developmental Test & Evaluation (DT&E)	WR	Eglin, AFB-QSER : Eglin AFB, FL	1.344	0.428	Oct 2021	2.667	Oct 2022	0.400	Oct 2023	-		0.400	0.000	4.839	-
Developmental Test & Evaluation (DT&E)	WR	Tinker AFB-QSER : Oklahoma City, OK	2.000	0.428	Oct 2021	1.440	Oct 2022	0.700	Oct 2023	-		0.700	0.000	4.568	-
Subtotal			17.370	4.769		7.707		5.825		-		5.825	Continuing	Continuing	N/A
Management Services (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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
CDM: Program Management Support	C/CPAF	Various : Various	2.585	0.760	Oct 2021	0.641	Oct 2022	0.390	Oct 2023	-		0.390	Continuing	Continuing	Continuing
QS-ER: Program Management Support	C/CPAF	Various : Various	0.269	0.269	Oct 2021	0.231	Oct 2022	0.231	Oct 2023	-		0.231	0.000	1.000	-
Subtotal			2.854	1.029		0.872		0.621		-		0.621	Continuing	Continuing	N/A
Project Cost Totals			236.836	16.574		30.468		45.234		-		45.234	Continuing	Continuing	N/A

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy	Date: March 2023
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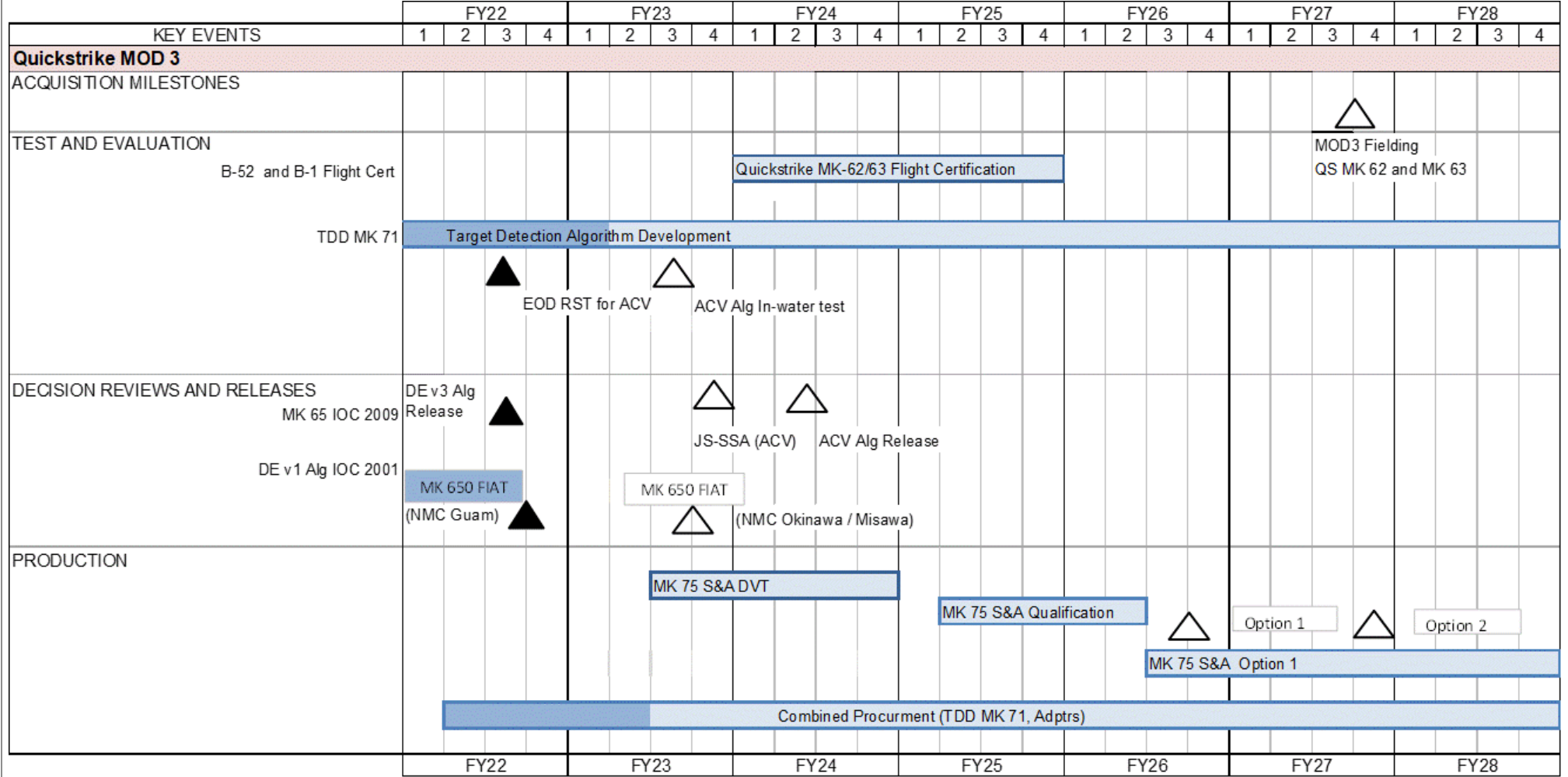
	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
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<u>Remarks</u>									
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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy **Date:** March 2023

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>	Project (Number/Name) 0267 / <i>Mine Improvements</i>
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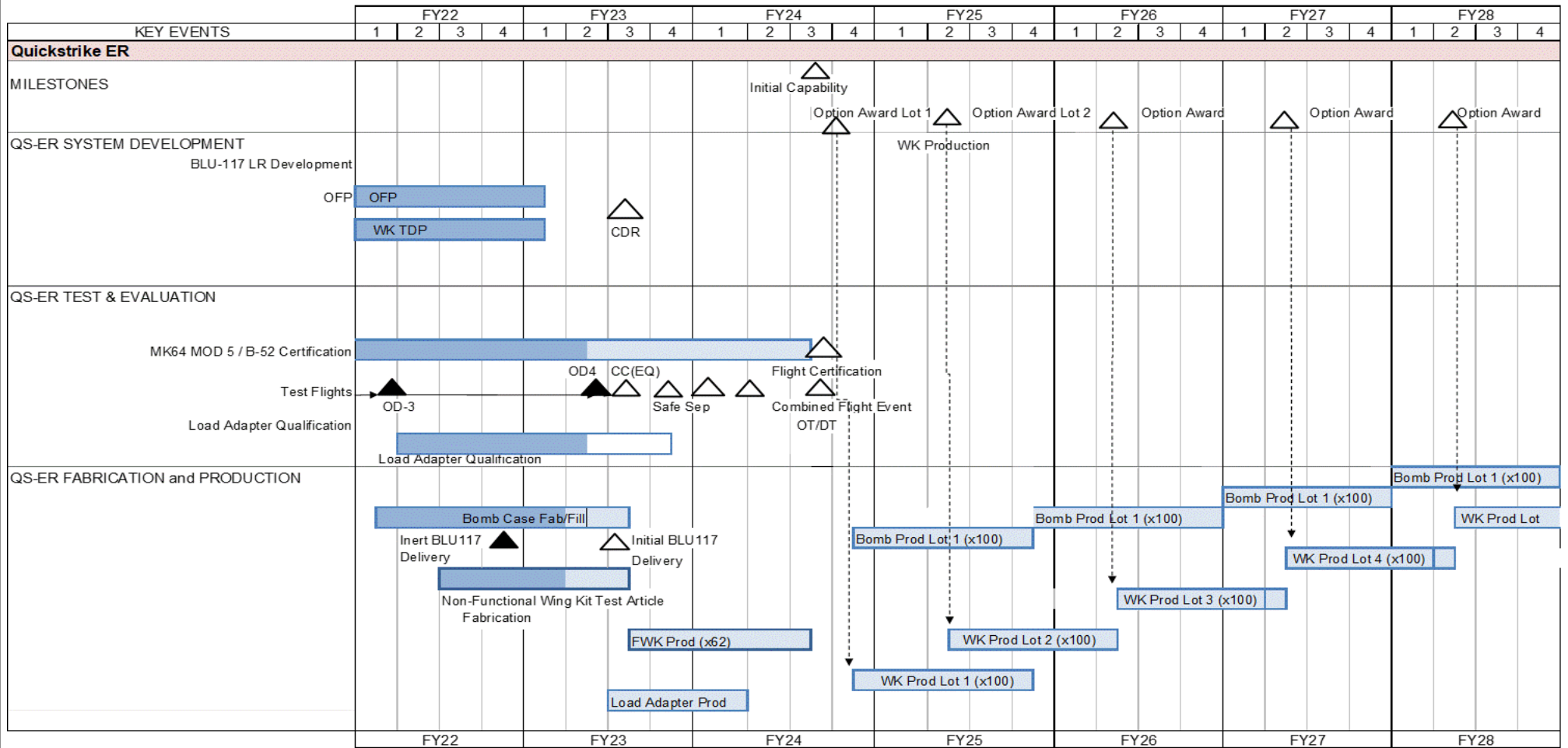
Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy

Date: March 2023

Appropriation/Budget Activity
1319 / 5

R-1 Program Element (Number/Name)
PE 0604601N / Mine Development

Project (Number/Name)
0267 / Mine Improvements



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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy **Date:** March 2023

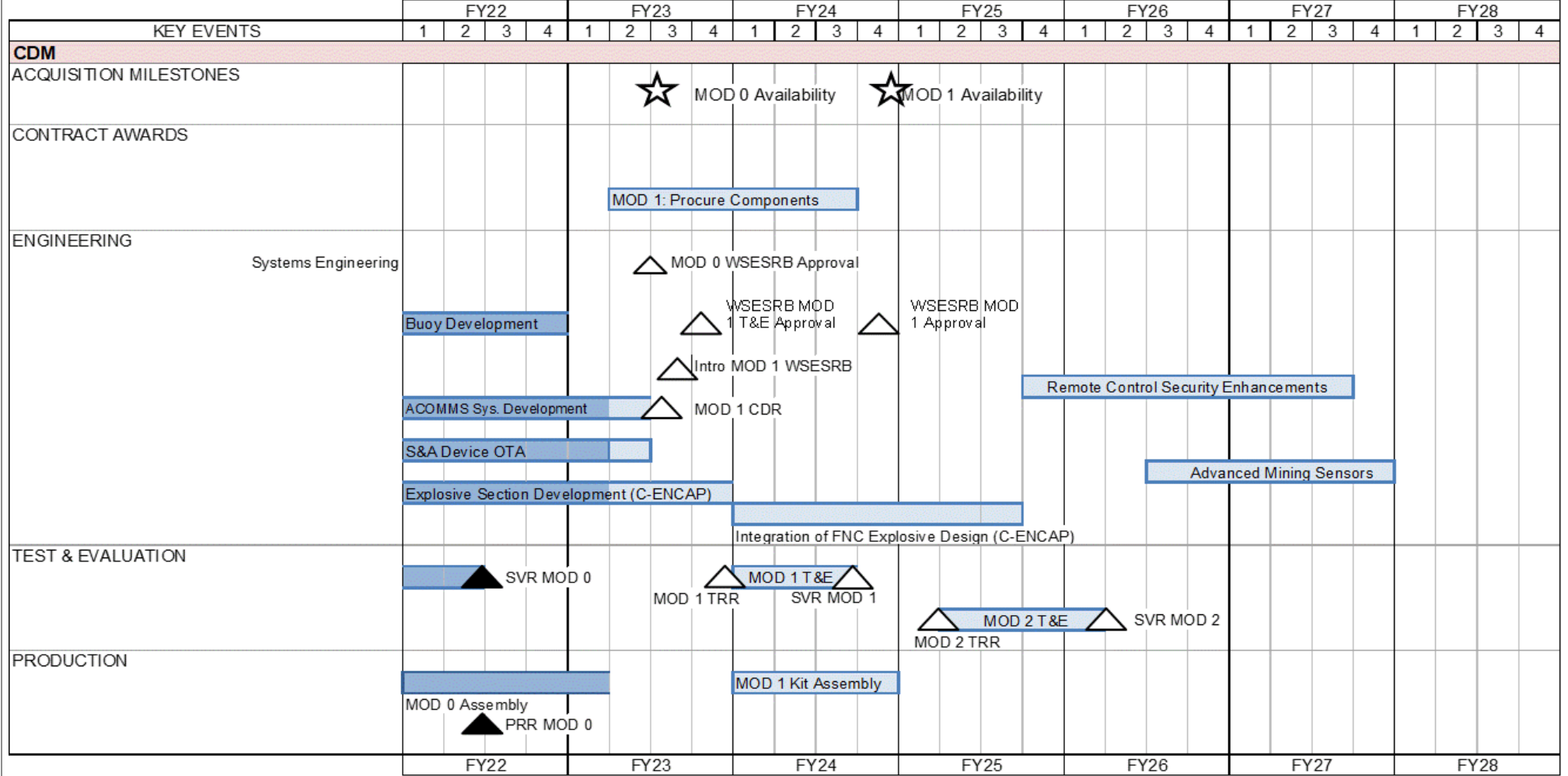
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / Mine Development	Project (Number/Name) 0267 / Mine Improvements
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KEY EVENTS	FY24				FY25				FY26				FY27				FY28			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
LRADMM																				
MILESTONES			★ Contract Award			△ SRR/SFR	△ PDR	△ CDR												★ IOC
SYSTEM DEVELOPMENT	SOW/Spec development				System Design															
	Explosive Fill Qualification																			
TEST & EVALUATION									DT								OT			
FABRICATION and PRODUCTION									EDMLRIP Manufacturing											
	FY24				FY25				FY26				FY27				FY28			

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy **Date:** March 2023

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

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Quickstrike				
Acquisition: Quickstrike Mod 3: QS MK 62 & MK 63 Fielding	4	2027	4	2027
Acquisition: Quickstrike Extended Range: Initial Capability	3	2024	3	2024
Acquisition: Quickstrike Extended Range: Non-Functional Wing Kit Fabrication	3	2022	3	2023
Acquisition: Quickstrike Extended Range: Functional Wing Kit Fabrication	3	2023	3	2024
Acquisition: Quickstrike Extended Range: Load Adapter Fabrication	3	2023	4	2024
Acquisition: Quickstrike Extended Range: Incremental WK Production Lots	4	2024	4	2028
System Development: Quickstrike Mod 3: Incremental Algorithm Releases	2	2022	2	2024
System Development: Quickstrike Extended Range: QS-ER System Development Events	1	2022	2	2023
System Development: Quickstrike Extended Range: WK TDP	1	2022	1	2023
Testing & Evaluation: Quickstrike Mod 3: Flight Certification	1	2024	4	2024
Testing & Evaluation: Quickstrike Mod 3: TDD MK 71 Test & Evaluation	1	2022	4	2028
Testing & Evaluation: Quickstrike Mod 3: EOD RST for Air Cushion Vehicle	3	2022	3	2022
Testing & Evaluation: Quickstrike Extended Range: MK 64 Mod 5 / B-52 Certification	1	2022	3	2024
Testing & Evaluation: Quickstrike Extended Range: Incremental Test Flight Events	1	2022	3	2024
Testing & Evaluation: Quickstrike Extended Range: Adapter Qualification	2	2022	4	2023
Testing & Evaluation: Quickstrike Extended Range: Quick Reaction Assessment	3	2024	3	2024
LRADMM				
Acquisition: Award LRADMM Contract	3	2024	3	2024
System Development: Explosive Fill Qualification	1	2024	4	2025
Clandestine Mining				
Acquisition Milestones: System Development: Explosive Fill Qualification	1	2024	4	2025

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

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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Acquisition Milestones: Clandestine Mining: MOD 0 Availability	3	2023	3	2023
Acquisition Milestones: Clandestine Mining: MOD 1 Availability	4	2024	4	2024
Acquisition Milestones: Procure MOD 1 Components	2	2023	3	2024
Acquisition Milestones: MOD 0 PRR	2	2022	2	2022
Acquisition Milestones: MOD 0 Assembly	1	2022	1	2023
Acquisition Milestones: MOD 1 Assembly	1	2024	4	2024
System Development: MOD 0 WSESRB Approval	3	2023	3	2023
System Development: MOD 1 ACOMMs Systems Development	1	2022	2	2023
System Development: WSESRB MOD 1 T&E Approval	2	2023	2	2023
System Development: WSESRB MOD 1 Approval	2	2024	2	2024
System Development: Intro MOD 1 WSESRB	1	2023	1	2023
System Development: Remote Control Security Enhancements	4	2025	3	2027
System Development: Integration of FNC Explosive Design (C-ENCAP)	1	2024	3	2025
System Development: Advanced Mining Sensors	3	2026	4	2027
Testing & Evaluation: Clandestine Mining: Testing MOD 0	1	2022	2	2022
Testing & Evaluation: Systems Verification Review MOD 0	2	2022	2	2022
Testing & Evaluation: Clandestine Mining Testing MOD 1	3	2023	1	2024
Testing & Evaluation: Systems Verification Review MOD 1	1	2024	1	2024
Testing & Evaluation: Clandestine Mining: Testing MOD 2	2	2025	1	2026
Testing & Evaluation: Systems Verification Review MOD 2	1	2026	1	2026

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Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>				Project (Number/Name) 2993 / <i>Encapsulated Effector</i>			
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
2993: <i>Encapsulated Effector</i>	34.382	20.480	30.325	59.497	-	59.497	49.268	41.492	45.145	46.051	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

FY 2024 adjustment of \$10M is associated with sensor upgrades to allow the Hammerhead system to prosecute additional targets.

The Encapsulated Effector, aka Hammerhead, program complements existing shallow-water mines by providing maritime mining capability in deeper water depths. Based on the urgency of the requirement, the Hammerhead program utilizes Section 804 authority to streamline acquisition of an initial capability. The system uses existing kinetic payloads to engage enemy targets, and provides a wide area of coverage per each weapon. The program uses a self-contained, propelled weapon to engage the target when a target is detected. The system uses modern sensing and processing technology to enable accurate targeting at increased range and maintains minefield resilience even as weapons are expended against targets. The result is expanded operating areas to restrict or deny adversary access to the intended area while using fewer weapons than traditional mines. Additional efforts include transitioning an encapsulation system with different end effectors under the Compact Encapsulated Effector (C-ENCAP) future naval capability (FNC) that is managed by the Office of Naval Research (ONR).

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Product Development	17.349	25.919	46.386	0.000	46.386
Articles:	-	-	-	-	-
FY 2023 Plans:					
<ul style="list-style-type: none"> - Conduct Preliminary Design Review to allocate system functions to system design. - Conduct Critical Design Review establishing the initial product baseline. - Begin fabrication of the Hammerhead prototypes in support of contractor and developmental testing. - Continue torpedo software and hardware updates to enable underwater launch. - Begin surface launch development and integration. 					
FY 2024 Base Plans:					
<ul style="list-style-type: none"> - Begin development and integration of Future Naval Capability (FNC) End Effector and Encapsulation System - Begin development of sensor upgrades to prosecute additional targets - Begin software updates to support prosecution of additional targets - Delivery of Government prototypes to support of Quick Reaction Assessment and Developmental Testing - Conduct Test Readiness Review - Conduct Systems Verification Review 					
FY 2024 OCO Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023			
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>	Project (Number/Name) 2993 / <i>Encapsulated Effector</i>				
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)						
		FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
N/A						
FY 2023 to FY 2024 Increase/Decrease Statement: FY 2023 to FY 2024 increase associated with Compact Encapsulated Effector (C-ENCAP) Future Naval Capabilities (FNC) effort and sensor upgrades to prosecute additional targets						
Title: Support		0.100	0.100	0.580	0.000	0.580
	Articles:	-	-	-	-	-
FY 2023 Plans: - Continue engineering support of Hammerhead mine design and development.						
FY 2024 Base Plans: - Continue engineering support of Hammerhead mine design and development. - Begin engineering support of FNC End Effector and Encapsulation System (C-ENCAP)						
FY 2024 OCO Plans: N/A						
FY 2023 to FY 2024 Increase/Decrease Statement: FY 2023 to FY 2024 increase supports additional systems engineering support for FNC and sensor upgrade efforts (MOD 2).						
Title: Management		0.223	0.640	0.640	0.000	0.640
	Articles:	-	-	-	-	-
FY 2023 Plans: - Continue to provide programmatic and financial support.						
FY 2024 Base Plans: - Continue to provide programmatic and financial support.						
FY 2024 OCO Plans: N/A						
FY 2023 to FY 2024 Increase/Decrease Statement: N/A						
Title: Test and Evaluation		2.808	3.666	11.891	0.000	11.891
	Articles:	-	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>	Project (Number/Name) 2993 / <i>Encapsulated Effector</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
<p><i>FY 2023 Plans:</i> - Conduct contractor testing and continue weapon software and hardware testing. Effort includes test assets and range support to verify weapon modifications.</p> <p><i>FY 2024 Base Plans:</i> - Complete contractor testing - Conduct Developmental Testing - Conduct Quick Reaction Assessment - Begin regression tests</p> <p><i>FY 2024 OCO Plans:</i> N/A</p> <p><i>FY 2023 to FY 2024 Increase/Decrease Statement:</i> FY 2023 to FY 2024 increase associated with developmental testing, QRA</p>					
Accomplishments/Planned Programs Subtotals	20.480	30.325	59.497	0.000	59.497

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

N/A

Remarks

D. Acquisition Strategy

The Hammerhead program leveraged Navy warfare center expertise to perform requirements analysis and engineering architecture design to develop system requirements. The system requirements and interface requirements documents are used by the prime contractor to develop, test, integrate, and produce Hammerhead mines. The contractor is responsible for the final design to optimize producibility, manufacture engineering design models to be used during testing, and test planning and execution to gather the required data to support a production decision. Hammerhead will utilize existing lightweight torpedo inventory and incorporate modifications to enable underwater launch. The program follows an evolutionary acquisition approach by providing incremental performance updates to the system.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy **Date:** March 2023

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>	Project (Number/Name) 2993 / <i>Encapsulated Effector</i>
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Product Development (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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			
Primary Hardware Development	WR	NSWC PC : Panama City, FL	9.006	3.404	Oct 2021	3.542	Oct 2022	9.497	Oct 2023	-		9.497	Continuing	Continuing	Continuing
Weapon Interfaces & Modifications	WR	NUWC NPT : Newport, RI	4.972	1.500	Oct 2021	1.052	Oct 2022	9.800	Oct 2023	-		9.800	Continuing	Continuing	Continuing
System Safety	WR	NUWC NPT : Newport, RI	0.723	0.100	Oct 2021	0.097	Oct 2022	0.300	Oct 2023	-		0.300	0.000	1.220	-
System Development & Integration	C/CPFF	GDMS : Various	15.390	12.345	Jan 2022	21.228	Jan 2023	22.372	Nov 2023	-		22.372	Continuing	Continuing	Continuing
Primary Hardware Development	Various	Various : Various	0.000	0.000		0.000		3.750	Jan 2024	-		3.750	0.000	3.750	-
Weapon Interfaces & Modifications	Reqn	PSU-ARL : PSU-ARL	0.000	0.000		0.000		0.250	Jan 2024	-		0.250	0.000	0.250	-
Primary Hardware Development	Reqn	JHU-APL : JHU-APL	0.000	0.000		0.000		0.417	Jan 2024	-		0.417	0.000	0.417	-
Subtotal			30.091	17.349		25.919		46.386		-		46.386	Continuing	Continuing	N/A

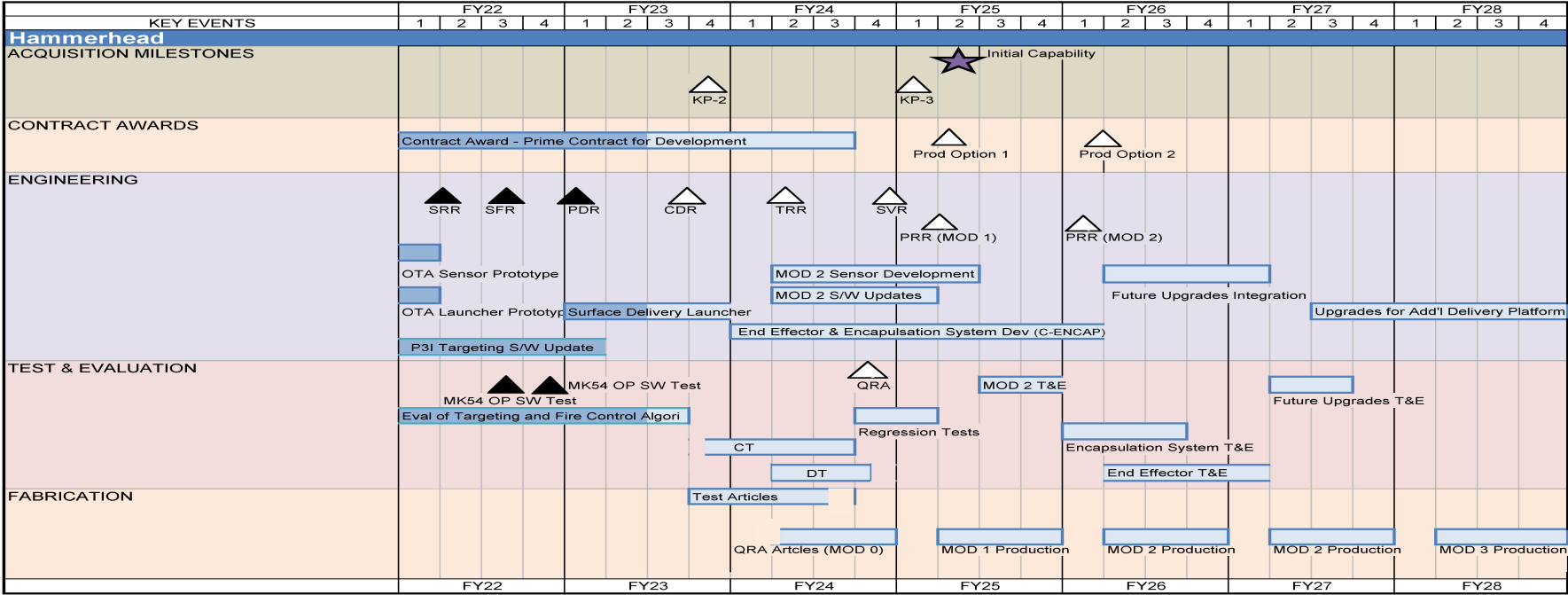
Support (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering Support	TBD	ISPA Technology : Panama City, FL	0.170	0.100	Nov 2021	0.100	Nov 2022	0.580	Nov 2023	-		0.580	Continuing	Continuing	Continuing
Subtotal			0.170	0.100		0.100		0.580		-		0.580	Continuing	Continuing	N/A

Test and Evaluation (\$ in Millions)				FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 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 Test & Evaluation (DT&E)	WR	NSWC PC : Panama City, FL	2.630	1.058	Oct 2021	1.564	Oct 2022	9.687	Oct 2023	-		9.687	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	WR	NUWC NPT : Newport, RI	0.145	0.125	Oct 2021	0.170	Oct 2022	0.204	Oct 2023	-		0.204	Continuing	Continuing	Continuing

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Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy **Date:** March 2023

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>	Project (Number/Name) 2993 / <i>Encapsulated Effector</i>
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ACRONYMS					
CDR	Critical Design Review	LRIP	Low Rate Initial Production	RFP	Request for Proposal
CT	Contractor Test	ONR	Office of Naval Research	RPP	Request for Prototyping Proposal
DT	Developmental Test	OTA	Other Transaction Authority	S/W	Software
DRRP	Draft RPP	P3I	Pre-planned Product Improvement	SFR	System Functional Review
H/W	Hardware	PDR	Preliminary Design Review	SRR	System Requirements Review
KP	Knowledge Point	QRA	Quick Reaction Assessment		

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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>	Project (Number/Name) 2993 / <i>Encapsulated Effector</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Encapsulated Effector</i>				
Acquisition Milestones: Knowledge Point 2	4	2023	4	2023
Acquisition Milestones: Knowledge Point 3	1	2025	1	2025
Acquisition Milestones: Initial Capability	2	2025	2	2025
Engineering: Surface Delivery Launch	1	2023	4	2023
Engineering: Preliminary Design Review	1	2023	1	2023
Engineering: TRR	2	2024	2	2024
Engineering: SVR	4	2024	4	2024
Engineering: SRR	2	2022	2	2022
Engineering: SFR	3	2022	3	2022
Engineering: PRR	1	2025	1	2025
Engineering: Critical Design Review	3	2023	3	2023
Engineering: End Effector & Encapsulation System Development	1	2024	1	2026
Engineering: MOD 1 Sensor Development	2	2024	2	2025
Engineering: MOD 1 Software Updates	2	2024	1	2025
Engineering: Future Technology Upgrade	2	2026	1	2027
Engineering: Upgrades for Additional Delivery Platform	3	2027	4	2028
Engineering: PRR MOD 0	1	2025	1	2025
Engineering: PRR MOD 1	1	2026	1	2026
Test and Evaluation: MK54 OP SW Test	3	2022	4	2022
Test and Evaluation: Targeting & Fire Control Algorithm Evaluation	1	2022	3	2023
Test and Evaluation: Contractor Testing (CT)	4	2023	3	2024
Test and Evaluation: Developmental Testing (DT)	2	2024	4	2024

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

Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604601N / <i>Mine Development</i>	Project (Number/Name) 2993 / <i>Encapsulated Effector</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Test and Evaluation: Quick Reaction Assessment	4	2024	4	2024
Test and Evaluation: Encapsulation System Testing	1	2026	3	2026
Test and Evaluation: End Effector System Testing	2	2026	1	2027
Test and Evaluation: Regression Tests	4	2024	1	2025
Test and Evaluation: MOD 1 T&E	3	2025	4	2025
Test and Evaluation: Future Technology Upgrade T&E	2	2027	3	2027
Fabrication: Test Articles	4	2023	2	2024
Fabrication: QRA Articles (MOD 0)	2	2024	4	2024
Fabrication: MOD 0 Production	2	2025	4	2025
Fabrication: MOD 1 Production	2	2026	4	2026
Fabrication: MOD 1 Production Part 2	2	2027	4	2027
Fabrication: MOD 2 Production	2	2028	4	2028