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Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>
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COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	39.123	5.734	4.017	0.358	-	0.358	2.009	1.670	1.184	1.163	Continuing	Continuing
2038: <i>ADVANCED MINOR CALIBER GUN</i>	25.296	4.333	4.017	0.358	-	0.358	2.009	1.670	1.184	1.163	Continuing	Continuing
3401: <i>Guided Projectile</i>	13.827	1.401	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.228

A. Mission Description and Budget Item Justification

Project 2038: The 25mm MK 38 MOD 2 and MOD 3 Machine Gun Systems (MGS) provide Anti-Surface Warfare (ASUW) and Anti-terrorism and Force Protection (AT/FP) capability as a simple, stabilized, low cost solution to outfit near-term deployers to counter small boat threats. Over 360 U.S. Navy-owned systems are installed on U.S. Navy AS, CG, CVN, DDG, LCC, LHA, LHD, LSD, OSV, PC class ships, MK VI Patrol Boats and U.S. Coast Guard Fast Response Cutters. Established in order to respond to Joint Urgent Operational Need Statement (JUONS) CC-0558 for Counter Unmanned Aerial Systems (C-UAS), the MK 38 MOD 3 MGS's electro-optical/infra-red sensor, hardware, and software are being upgraded to counter emerging unmanned aerial threats. Initial C-UAS capability was fielded in Q1FY20. Incremental improvements are being made to this C-UAS capability, for cybersecurity and to address operability issues. The 30mm MK 38 MOD 4 Gun Weapon System, will introduce greater accuracy, lethality, and effective range for C-UAS and Counter Unmanned Surface Vehicle (C-USV) capability with integration to highly accurate fire control system, 30mm gun, targeting sensor and AEGIS combat system. The MOD 4 will be fielded on all DDG 51 Flight IIA and Flight III AEGIS Destroyers. Project 2038 provides qualification and logistics development of the 30mm MK 38 MOD 4. This will include Function Integration Testing, Functional Acceptance Testing, AEGIS Light-off, Structural Test Firing, and an at-sea Quick Reaction Assessment (on board DDG 91). Upgrading fielded 25mm MK 38 MGS to MOD 3 with C-UAS and concurrently developing and fielding the MOD 4 GWS on all current and future DDG 51 Flight IIA and Flight III Destroyers is the fastest and most cost-effective way to field critical C-UAS ship self-defense capability.

Projects 3401: The Gun Launched Guided Projectile (GLGP) program concluded in FY2021.

B. Program Change Summary (\$ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	7.254	4.017	0.000	-	0.000
Current President's Budget	5.734	4.017	0.358	-	0.358
Total Adjustments	-1.520	0.000	0.358	-	0.358
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-1.400	0.000			
• SBIR/STTR Transfer	-0.120	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000

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Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>
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• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	0.358	-	0.358

Change Summary Explanation

 FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>				Project (Number/Name) 2038 / <i>ADVANCED MINOR CALIBER GUN</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
2038: <i>ADVANCED MINOR CALIBER GUN</i>	25.296	4.333	4.017	0.358	-	0.358	2.009	1.670	1.184	1.163	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 2038: The 25mm MK 38 MOD 2 and MOD 3 Machine Gun Systems (MGS) provide Anti-Surface Warfare (ASUW) and Anti-terrorism and Force Protection (AT/FP) capability as a simple, stabilized, low cost solution to outfit near-term deployers to counter small boat threats. Over 360 U.S. Navy-owned systems are installed on U.S. Navy AS, CG, CVN, DDG, LCC, LHA, LHD, LSD, OSV, PC class ships, MK VI Patrol Boats and U.S. Coast Guard Fast Response Cutters. Established in order to respond to Joint Urgent Operational Need Statement (JUONS) CC-0558 for Counter Unmanned Aerial Systems (C-UAS), the MK 38 MOD 3 MGS's electro-optical/infra-red sensor, hardware, and software are being upgraded to counter emerging unmanned aerial threats. Initial C-UAS capability was fielded in Q1FY20. Incremental improvements are being made to this C-UAS capability, for cybersecurity and to address operability issues. The 30mm MK 38 MOD 4 Gun Weapon System, will introduce greater accuracy, lethality, and effective range for C-UAS and Counter Unmanned Surface Vehicle (C-USV) capability with integration to highly accurate fire control system, 30mm gun, targeting sensor and AEGIS combat system. The MOD 4 will be fielded on all DDG 51 Flight IIA and Flight III AEGIS Destroyers. Project 2038 provides qualification and logistics development of the 30mm MK 38 MOD 4. This will include Function Integration Testing, Functional Acceptance Testing, AEGIS Light-off, Structural Test Firing, and an at-sea Quick Reaction Assessment (on board DDG 91). Upgrading fielded 25mm MK 38 MGS to MOD 3 with C-UAS and concurrently developing and fielding the MOD 4 GWS on all current and future DDG 51 Flight IIA and Flight III Destroyers is the fastest and most cost-effective way to field critical C-UAS ship self-defense capability.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Systems Engineering and Testing	4.333	4.017	0.358	0.000	0.358
Articles:	-	-	-	-	-
FY 2022 Plans:					
- Continue qualification of prototype 30mm MK 38 MOD 4 Gun Weapon System (GWS)					
- Continue development of integrated logistics artifacts for 30mm MK 38 MOD 4 GWS					
- Start Functional Integration Test of 30mm MK 38 MOD 4 GWS					
- Start Functional Acceptance Test of 30mm MK 38 MOD 4 GWS					
- Qualify and certify follow-on C-UAS software build for MK 38 MOD 3					
- Continue planning for Quick Reaction Assessment of prototype 30mm MK 38 MOD 4 GWS					
- Continue Evaluation of 30mm Ammunition Candidate for GWS Integration					
- Test and field tracker improvements and train Fleet					
FY 2023 Base Plans:					
- Continue Functional Integration Test of 30mm MK 38 MOD 4 GWS					

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy	Date: April 2022
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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>	Project (Number/Name) 2038 / <i>ADVANCED MINOR CALIBER GUN</i>
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
- Continue planning for Quick Reaction Assessment of prototype 30mm MK 38 MOD 4 GWS FY 2023 OCO Plans: N/A FY 2022 to FY 2023 Increase/Decrease Statement: The decrease from FY22 (\$4.017M) to FY23 (\$0.358M) is due to the completion of most 30mm MK 38 MOD 4 GWS qualification events (environmental and land-based testing), 30mm MK 38 MOD 4 integrated logistics development, and qualification/certification of latest C-UAS upgrade to the 25mm MK 38 MOD 3 system by FY22. In FY23, 30mm MK 38 MOD 4 GWS efforts will focus on continuation of fire control testing events and planning for future Quick Reaction Assessment.					
Accomplishments/Planned Programs Subtotals	4.333	4.017	0.358	0.000	0.358

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

Remarks

D. Acquisition Strategy

Engineering and technical services to support qualification and ILS development for the 30mm MK 38 MOD 4 GWS in FY22-24 is being procured from Naval Surface Warfare Center (NSWC) Dahlgren (VA), NSWC Indian Head Picatinny, and NSWC Crane.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>	Project (Number/Name) 2038 / <i>ADVANCED MINOR CALIBER GUN</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Counter-UAS (JUONS CC-0558) Primary Product Integration	SS/BOA	BAE Systems : Minneapolis MN	15.824	0.000		0.000		0.000		-		0.000	0.000	15.824	-
30mm MK 38 MOD 4 Electro-optical Sensor/ Gun Mount Performance Demonstration	C/CPFF	BAE Systems : Minneapolis, MN	1.641	0.000		0.000		0.000		-		0.000	0.000	1.641	-
30mm MK 38 MOD 4 Electro-optical Sensor/ Gun Mount Performance Demonstration	C/CPFF	MSI-Defence Systems : Rock Hill, SC	0.575	0.000		0.000		0.000		-		0.000	0.000	0.575	-
Subtotal			18.040	0.000		0.000		0.000		-		0.000	0.000	18.040	N/A

Remarks
-

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Government Engineering Services	WR	NSWC, DD : Dahlgren, VA	5.778	4.090	Jan 2021	3.367	Nov 2021	0.358	Nov 2022	-		0.358	Continuing	Continuing	Continuing
Government Engineering Services	WR	NSWC, IHD : Picatinny, NJ	1.150	0.168	Jan 2021	0.450	Nov 2021	0.000		-		0.000	Continuing	Continuing	Continuing
Government Engineering Services	WR	NSWC, CR : Crane, IN	0.328	0.075	Dec 2021	0.200	Nov 2021	0.000		-		0.000	Continuing	Continuing	Continuing
Subtotal			7.256	4.333		4.017		0.358		-		0.358	Continuing	Continuing	N/A

Remarks
Government Engineering Services: NSWC Dahlgren provides engineering services for gun weapon system technical direction and test engineering. NSWC IHD provides engineering services for gun weapon system configuration management, logistics, and in-service engineering. NSWC Crane provides engineering services for electro-optical sensor technical direction and test engineering.

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>	Project (Number/Name) 2038 / <i>ADVANCED MINOR CALIBER GUN</i>
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

Proj 2038																												
Counter-UAS (JUONS CC-0558): Software Fixes for Capability Improvements																												
Counter-UAS (JUONS CC-0558): Develop and Test Follow-on Software Baseline with Cybersecurity Compliant Operating Systems																												
Counter-UAS (JUONS CC-0558): Qualification and Certification of Follow-on Software Baseline																												
30mm MK 38 MOD 4 GWS: Evaluation of Gun Mount candidates																												
30mm MK 38 MOD 4 GWS: Evaluation of EOS candidates																												
30mm MK 38 MOD 4 GWS: Limited Qualification of Prototype Gun Weapon System																												
30mm MK 38 MOD 4 GWS: Preliminary logistics development																												
30mm MK 38 MOD 4 GWS: Functional Integration Test																												
30mm MK 38 MOD 4 GWS: Plan Quick Reaction Assessment																												
30mm MK 38 MOD 4 GWS: Evaluate 30mm Ammunition Candidate for GWS Integration																												

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>	Project (Number/Name) 2038 / <i>ADVANCED MINOR CALIBER GUN</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 2038				
Counter-UAS (JUONS CC-0558): Software Fixes for Capability Improvements	1	2021	4	2021
Counter-UAS (JUONS CC-0558): Develop and Test Follow-on Software Baseline with Cybersecurity Compliant Operating Systems	1	2021	3	2022
Counter-UAS (JUONS CC-0558): Qualification and Certification of Follow-on Software Baseline	3	2022	4	2022
30mm MK 38 MOD 4 GWS: Evaluation of Gun Mount candidates	1	2021	1	2021
30mm MK 38 MOD 4 GWS: Evaluation of EOS candidates	1	2021	1	2021
30mm MK 38 MOD 4 GWS: Limited Qualification of Prototype Gun Weapon System	3	2021	2	2022
30mm MK 38 MOD 4 GWS: Preliminary logistics development	2	2021	2	2022
30mm MK 38 MOD 4 GWS: Functional Integration Test	4	2022	2	2023
30mm MK 38 MOD 4 GWS: Plan Quick Reaction Assessment	3	2021	4	2024
30mm MK 38 MOD 4 GWS: Evaluate 30mm Ammunition Candidate for GWS Integration	1	2021	4	2022

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy										Date: April 2022		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>				Project (Number/Name) 3401 / <i>Guided Projectile</i>			
COST (\$ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
3401: <i>Guided Projectile</i>	13.827	1.401	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	15.228
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Projects 3401: The Gun Launched Guided Projectile (GLGP) program leverages Hypervelocity Projectile (HVP) technology developed under each of the respective Strategic Capabilities Office (SCO) and Office of Naval Research (ONR) Future Naval Capabilities (FNC) programs to provide gun-based Anti-Ship Cruise Missile (ASCM) defense. The Gun Launched Guided Projectile program is cancelled in FY2022 due to cost and is concluded in FY2021.

Gun-based ASCM defense capability increases both ship's weapon capacity against ASCM raids and battle persistence in successive ASCM raids. The performance improvement is achieved without relying on Vertical Launch System (VLS) cells for weapon deployment. This effectively deepens the ship's magazine for raid defense and supports larger allocation of VLS cells to offensive capability. In addition to improved capacity and battle persistence, gun-based ASCM defense solutions provide a cost effective response to an ASCM attack due to the unit cost of the projectile relative to missiles. The introduction of gun-based ASCM defense for large caliber guns is made possible by recent advancements in microelectronics, sensors, and energetic systems that enable precision guidance and tailored lethality. GLGP incorporates these HVP technologies into an aerodynamically streamlined sub-caliber airframe to achieve a highly maneuverable projectile. When launched from the MK 45 Gun Weapon System (GWS) at high velocities, GLGP's high maneuverability combined with high kinetic energy at the intercept yields effectiveness against ASCMs. Initial HVP technology demonstration focused on land-based system integration and implementation. Shipboard integration requires some modifications to the initial concept of operations to implement the technology effectively and affordably. This project matures critical enabling technologies needed to integrate HVP technology on Navy ships and executes the requisite acquisition, systems engineering, and test planning activities to initiate a development effort.

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

	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: Systems Engineering and Testing	1.401	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2022 Plans: N/A					
FY 2023 Base Plans: N/A					
FY 2023 OCO Plans: N/A					
Accomplishments/Planned Programs Subtotals	1.401	0.000	0.000	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy	Date: April 2022
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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>	Project (Number/Name) 3401 / <i>Guided Projectile</i>
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C. Other Program Funding Summary (\$ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Gun Launched Guided Projectile (GLGP) program concluded in FY2021.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>	Project (Number/Name) 3401 / <i>Guided Projectile</i>
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Product Development (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
5 Inch Cartridge Case Process Modification	C/CPFF	Rock Island : Rock Island, IN	0.684	0.000		0.000		0.000		-		0.000	0.000	0.684	-
Interface Development	WR	NSWC Dahlgren : Dahlgren, VA	1.085	0.000		0.000		0.000		-		0.000	0.000	1.085	-
Tech Maturation	FFRDC	MIT : Boston, MA	0.350	0.000		0.000		0.000		-		0.000	0.000	0.350	-
Tech Maturation	WR	NSWC IH : Indian Head, MD	4.452	0.000		0.000		0.000		-		0.000	0.000	4.452	-
Tech Maturation	FFRDC	APL : Laurel, MD	0.312	0.000		0.000		0.000		-		0.000	0.000	0.312	-
Combat System and Terminal Guidance Analyses	C/CPFF	APL : Laurel, MD	0.500	0.150	Nov 2020	0.000		0.000		-		0.000	0.000	0.650	-
Systems Engineering, Cyber, T&E, Software Guidance, and Electronic Engineering	WR	NSWC DD : Dahlgren, VA	3.795	0.880	Nov 2020	0.000		0.000		-		0.000	0.000	4.675	-
Fuzing Warhead, Propellant Charge	WR	NSWC IHD : indian Head, MD	0.270	0.138	Nov 2020	0.000		0.000		-		0.000	0.000	0.408	-
CM/Data Management Acquisition Support Logistics	WR	NSWC IH : Picatinny, NJ	0.730	0.146	Nov 2020	0.000		0.000		-		0.000	0.000	0.876	-
Subtotal			12.178	1.314		0.000		0.000		-		0.000	0.000	13.492	N/A

Support (\$ in Millions)				FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 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			
Program Office Contractor Services	C/CPFF	Various : Arlington, VA	1.445	0.087	Nov 2020	0.000		0.000		-		0.000	0.000	1.532	-
Program Support Services	FFRDC	MITRE : McLean, VA	0.089	0.000		0.000		0.000		-		0.000	0.000	0.089	-
Program Support Services	WR	NPS : Monterey, CA	0.090	0.000		0.000		0.000		-		0.000	0.000	0.090	-
Subtotal			1.624	0.087		0.000		0.000		-		0.000	0.000	1.711	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>	Project (Number/Name) 3401 / <i>Guided Projectile</i>
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FY 2021				FY 2022				FY 2023				FY 2024				FY 2025				FY 2026				FY 2027			
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

<i>Proj 3401</i>	
EMD planning	████████████████████
Technology Maturation and studies	████████████████████

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Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy **Date:** April 2022

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603795N / <i>Land Attack Tech</i>	Project (Number/Name) 3401 / <i>Guided Projectile</i>
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Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
<i>Proj 3401</i>				
EMD planning	1	2021	4	2021
Technology Maturation and studies	1	2021	4	2021