

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy **Date: May 2021**

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>
---	---

COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
Total Program Element	233.913	256.668	199.673	132.181	-	132.181	-	-	-	-	-	-
4032: <i>NAV/COMMS</i>	4.649	4.128	0.807	0.000	-	0.000	-	-	-	-	-	-
4033: <i>M-Code</i>	20.922	27.797	15.765	17.222	-	17.222	-	-	-	-	-	-
4034: <i>Maritime Strike</i>	169.486	179.430	125.029	69.568	-	69.568	-	-	-	-	-	-
4035: <i>JMEWS</i>	16.376	28.007	45.321	36.826	-	36.826	-	-	-	-	-	-
4036: <i>TTWCS TMPC PPPI</i>	22.480	17.306	12.751	8.565	-	8.565	-	-	-	-	-	-

Program MDAP/MAIS Code:
Project MDAP/MAIS Code(s): 289

A. Mission Description and Budget Item Justification

The Block V is a modernized TACTOM missile which includes the Navigation / Communications (NAV/COMMs) upgrade. Funds support development of the Tomahawk Weapons System (TWS) encompassing Tactical Tomahawk upgrades including baseline improvements into the Block V missile All-Up Round (AUR), Tactical Tomahawk Weapons Controls System (TTWCS), Theater Mission Planning Center (TMPC) upgrades and other missile system improvements to maintain pace with threats. The TWS provides a long range cruise missile attack capability against fixed and mobile targets. Tomahawk is capable of being deployed from both submarines and surface ships and significantly increases the total capability of joint forces.

JUSTIFICATION FOR BUDGET ACTIVITY: This program is funded under Operational Systems Development because it includes development efforts to upgrade systems that have been fielded or have received approval for Full Rate Production (FRP) and anticipate funding in the current or subsequent fiscal year.

B. Program Change Summary (\$ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	273.036	200.308	131.110	-	131.110
Current President's Budget	256.668	199.673	132.181	-	132.181
Total Adjustments	-16.368	-0.635	1.071	-	1.071
• Congressional General Reductions	-	-0.635			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-6.000	0.000			
• SBIR/STTR Transfer	-10.368	0.000			
• Program Adjustments	0.000	0.000	2.963	-	2.963

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
---	-----------------------

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy I BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0204229N I <i>Tomahawk Mssn Planning Ctr</i>
---	---

• Rate/Misc Adjustments	0.000	0.000	-1.892	-	-1.892
-------------------------	-------	-------	--------	---	--------

Change Summary Explanation

Financial: The FY2022 funding request was increased by a total of \$1.071M.

The FY 2022 budget increased by \$1.333M for program adjustments, for the Maritime Strike Tomahawk (MST) RDC's transition to a Program of Record. Also, Project 4034 Maritime Strike decreased by \$3.0M in FY22 to account for the availability of prior year execution balances, and Project 4033 M-Code was increased by \$4.63M to re-phase funds from FY20 to FY22 on the Raytheon Engineering and Manufacturing Development (EMD) contract; collective increase of an additional \$1.63M to the Program Element. The FY 2022 budget decreased by \$1.892M for other rate and miscellaneous adjustments. Additionally, \$6.0M was reprogrammed out of FY 2020, PU 4034 Maritime Strike via Below Threshold Reprogramming action to fund higher Navy priorities.

Technical: Not applicable

Schedule:

PU 4032:

NAV/COMMS FRP Kit Award Lot-3 thru Lot-7 updated to NAV/COMMS FRP Kit Award Lot-1 thru Lot-2
NAV/COMMS FRP Kit Award Lot-6 added

PU 4033:

N/A

PU 4034:

Added KP Modeling & Simulation Production Readiness Review

Removed KP Critical Design Review
Removed KP Prod Readiness Review
Removed POD Design & Eng
Removed DR2
Removed SKR DVT

UNCLASSIFIED

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 7: Operational Systems Development</i>	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	
<ul style="list-style-type: none">- Recert Contract Modification to Install SKR Kit updated to 2Q 2022 from 1Q 2021- SPIL Design & Dev updated to 2Q 2020-2Q 2022 from 4Q 2019-4Q 2021 due to COVID related delays at the Prime Contractor for software development and hardware delivery- SPIL Development Runs updated to 4Q 2021-2Q 2022 due to COVID related delays at the Prime Contractor for software development and hardware delivery- POM Design & Eng updated to 1Q 2021-1Q 2021 from 1Q 20219-3Q 2020 due to a fire at the engine and power sub-contractor facility that destroyed the facility as well as COVID related delays at the sub-contract which delayed Propulsion and Power Interface Unit hardware design completion and unplanned redesign required due to a sub-component failure discovered during contractor testing- SW & Sim Dev & Test updated to 1Q 2020-4Q 2022 from 1Q 2019-2Q 2023 due to COVID related delays at the Prime Contractor for software development and hardware delivery as well as unplanned redesign required due to a sub-component failure discovered during contractor testing- Inc 1 Segment Test updated to 1Q 2022-2Q 2022 from 4Q 2021-1Q 2022 due to COVID related delays at the Prime Contractor for software development and hardware delivery- SKR EDM Deliveries updated to 4Q 2020-4Q 2022 from 4Q 2019-2Q 2022 due to COVID-related delays at the Prime Contractor and sub-contractor delaying hardware delivery, and unplanned circuit card assembly redesign due to a component failure discovered during contractor testing- TTWCS V5.6.1 FB Segment Tests renamed to TTWCS V5.6.1 FB Development and Segment Tests. Also updated start date to 2Q 2022 from 2Q 2023- LRP 1 Lead Time/Industrial Base Set Up updated to 3Q 2021-4Q 2022 from 1Q 2021-3Q 2022 <p>PU 4035:</p> <p>JMEWS TTWCS SW Dev moved from 3Q FY2020 through 4Q FY2025 to 1Q FY2022 through 3Q FY2024 due to resource conflicts with v5.6.1. JMEWS TTWCS SW line was further defined to provide more fidelity, separating SW Development from SW Test activities for TTWCS 5.7 JMEWS DT moved from 2Q 2023 through 2Q 2024 to 3Q 2021 through 4Q 2022</p> <p>PU 4036:</p> <p>N/A</p>		

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4032 / NAV/COMMS
--	--	--

COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
4032: NAV/COMMS	4.649	4.128	0.807	0.000	-	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 289

A. Mission Description and Budget Item Justification

This project funds NAV/COMMS engineering change proposal (ECP) upgrades to the navigation and communication capabilities of the Tactical Tomahawk (TACTOM). TACTOM navigation modernization will enable launch via a fine alignment solution and navigation using TERCOM/DSMAC/Vertical Update Point in a GPS denied/degraded environment. TACTOM communications development replaces 5Khz DAMA with Advanced Communication Architecture (ACA) leveraging National Technical Means (NTM), replacing the Satellite Data Link Terminal (SDLT) with an Integrated Single Box Solution (ISBS) that combines Dual Transmit and Receive Capability in a single box, and replaces the current antenna with improved antennas.

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Navigation/Communications	4.128	0.807	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2021 Plans: FY 2021 plans include completion of the AUR Operational Test Readiness Review (OTRR) and Operational Flight Test (OFT) to achieve Fleet Release of the NAV/COMMS ECP.					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease from FY 2021 to FY 2022 due to Fleet Release and marking the completion of NAV/COMM development and the transition of the program completely into Production and Deployment.					
Accomplishments/Planned Programs Subtotals	4.128	0.807	0.000	0.000	0.000

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4032 / NAV/COMMS

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

Line Item	FY 2020	FY 2021	FY 2022	FY 2022	FY 2022	FY 2023	FY 2024	FY 2025	FY 2026	Cost To	
			Base	OCO	Total					Complete	Total Cost
• WPN 2301: <i>Tomahawk Mods</i>	0.000	42.562	66.173	-	66.173	-	-	-	-	-	-
• WPN 6120: <i>Spares and Repair Parts</i>	0.000	0.000	0.522	-	0.522	-	-	-	-	-	-
• WPN 2101: <i>Tomahawk</i>	386.157	224.685	124.513	-	124.513	-	-	-	-	-	-

Remarks

NAV/COMMS is an ECP to the ACAT I TACTOM program with other funding associated in WPN BLI 2101 and 2301. Other Program Funding Summaries for WPN BLIs 2101, 2301 and 6120 do not include funding for the Tomahawk Recertification program as there is no RD TEN funding associated with that program.

D. Acquisition Strategy

Tactical Tomahawk communications and navigations were developed through the National Reconnaissance Office (NRO) for the new radios and architecture. The improved antennas were developed through Raytheon Missiles & Defense. NAV/COMM Kits (radios, antennas, cabling, etc.) get procured one year in advance of installation. Kits get installed into missiles inducted for Recertification, or during Block V missile production.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

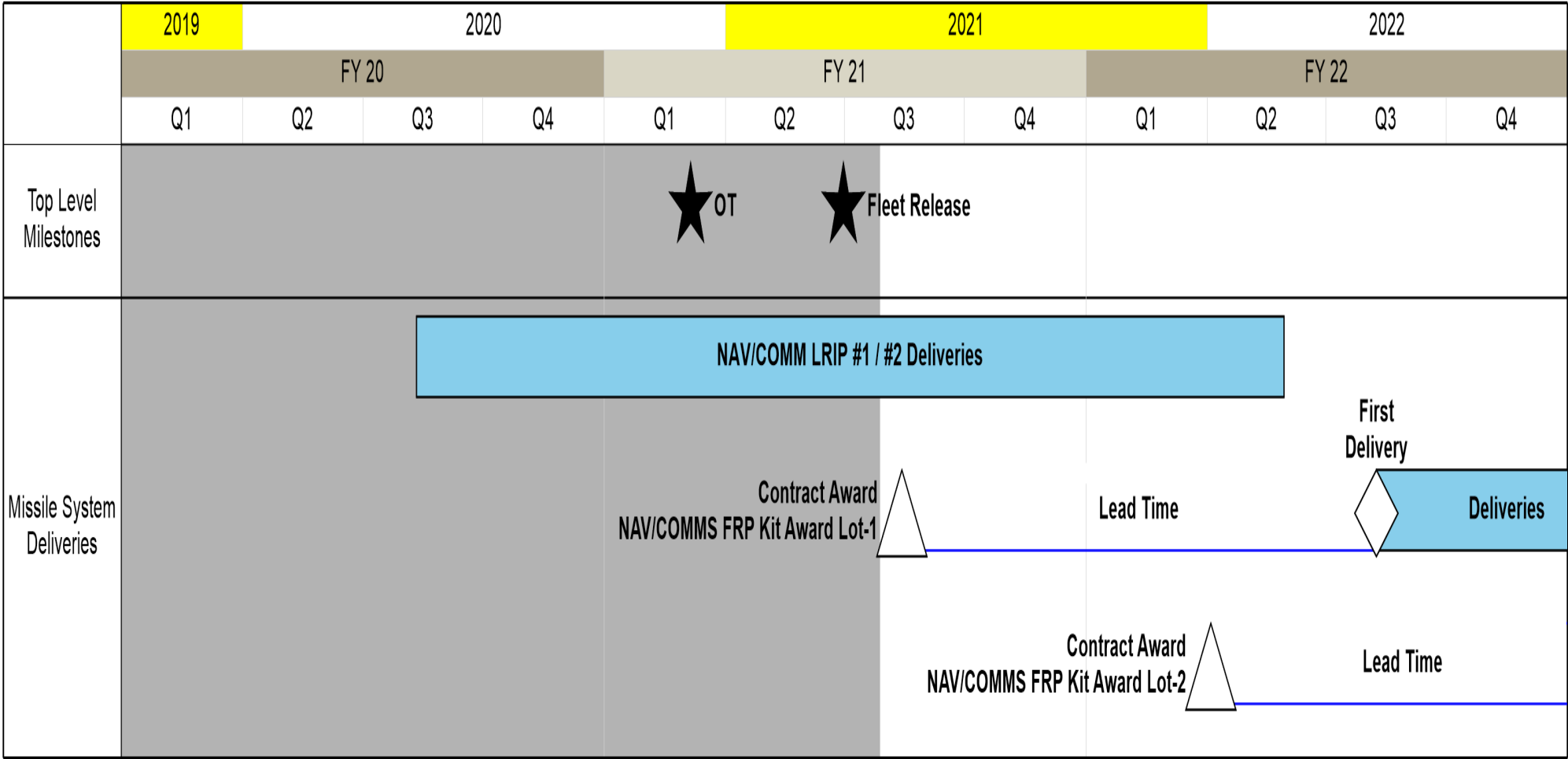
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4032 / NAV/COMMS
--	--	--

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
NAV/COMMS Improvements Prime Integrator	SS/CPFF	Raytheon : Tucson, AZ	1.773	0.000		0.000		0.000		-		0.000	-	-	-
Subtotal			1.773	0.000		0.000		0.000		-		0.000	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
NAV/COMMS Development Support	WR	NAWC-AD : Pax River, MD	0.057	0.165	Nov 2019	0.000		0.000		-		0.000	-	-	-
NAV/COMMS Development Support	WR	NAWC-WD : China Lake, CA	0.909	0.107	Dec 2019	0.000		0.000		-		0.000	-	-	-
NAV/COMMS Development Support	WR	NUWC-NPT : Newport, RI	0.894	0.948	Feb 2020	0.000		0.000		-		0.000	-	-	-
NAV/COMMS Development Support	WR	NSWC-CR : Corona, CA	0.055	0.065	Jan 2020	0.000		0.000		-		0.000	-	-	-
NAV/COMMS Development Support	WR	NSWC-DD : Dahlgren, VA	0.702	0.844	Feb 2020	0.000		0.000		-		0.000	-	-	-
NAV/COMMS Development Support	WR	COTF : Norfolk, VA	0.084	0.050	Nov 2019	0.000		0.000		-		0.000	-	-	-
NAV/COMMS Development Support	SS/CPFF	Precise : Lexington Park, MD	0.175	0.160	Aug 2020	0.000		0.000		-		0.000	-	-	-
NAV/COMMS Development Support	WR	NSWC-PHD : Port Hueneme, CA	0.000	0.276	Jan 2020	0.000		0.000		-		0.000	-	-	-
Subtotal			2.876	2.615		0.000		0.000		-		0.000	-	-	N/A

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy										Date: May 2021		
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr					Project (Number/Name) 4032 / NAV/COMMS		



UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4032 / NAV/COMMS

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
NAV/COMMS				
Acquisition Milestones: Milestones: NAV/COMMS Modernization Blk V Fleet Release	2	2021	2	2021
Test and Evaluation: NAV/COMMS Operational Test	1	2021	1	2021
Production Milestones: Contract Awards: NAV/COMMS FRP Kit Award Lot-1	3	2021	3	2021
Production Milestones: Contract Awards: NAV/COMMS FRP Kit Award Lot-2	1	2022	1	2022

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4033 / M-Code
--	--	---

COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
4033: M-Code	20.922	27.797	15.765	17.222	-	17.222	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The M-Code (ACAT IVT) Increment I program upgrades the Tactical Tomahawk to the next generation Global Positioning System (GPS) satellite constellation required to maintain GPS-provided position, navigation, and timing (PNT) for the missiles and is planned for Milestone C production decision in FY 2023 and Fleet Release in FY 2025. The M-Code mandate and Public Law restricts the purchase of only M-Code-capable GPS User Equipment (MGUE) after FY 2017 unless a waiver is granted by the Secretary of Defense.

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: M-Code	27.797	15.765	17.222	0.000	17.222
Articles:	-	-	-	-	-
FY 2021 Plans: M-Code planned activities include continuation of EMD efforts and completion of Critical Design Review (CDR). EMD efforts include hardware and software development, design, development, integration, and testing of the integrated ASIC chip in the upgraded Tactical Tomahawk (TACTOM) Anti-Jam GPS Receiver.					
FY 2022 Base Plans: M-Code planned activities include continuation of EMD. EMD efforts include hardware and software development, integration, testing, and qualification of an M-Code capable Tactical Tomahawk (TACTOM) Anti-Jam GPS Receiver.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Increase in funding from FY 2021 to FY 2022 due to continued software development, qualification test events, security approval for the Anti-Jam GPS Receiver, Tactical Tomahawk Weapons Control System (TTWCS) v5.x development support, and Submarine Combat & Control System (CCS) testing support.					
Accomplishments/Planned Programs Subtotals	27.797	15.765	17.222	0.000	17.222

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4033 / <i>M-Code</i>

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

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• WPN 2301: <i>Tomahawk Mods</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

Other Program Funding Summary for WPN BLI 2301 does not include funding for the Tomahawk Recertification program as there is no RDTEN funding associated with that program.

D. Acquisition Strategy

The M-Code (ACAT IV) Increment I acquisition strategy includes the development, integration, test, qualification and production of a new GPS receiver which will satisfy Public Law 111-383, sec 913 compliance. Development includes the Tactical Tomahawk M-Code program co-developing the Common Architecture for Assured PNT (CAAP) high anti-jam M-Code Application Specific Integrated Circuit (ASIC) with USAF Small Diameter Bomb (SDB)-II Program Office. M-Code capability enables the missile to maintain GPS integrity in an enhanced spoofing environment. M-Code Milestone B occurred in FY 2019, Milestone C is planned for FY 2023, and the capability will Fleet Release in FY 2025. The M-Code program includes upgrades to the All-Up Round (AUR) missile, Tactical Tomahawk Weapons Control System (TTWCS) v5.x, Submarine Combat & Control System (CCS), and also requires upgrade to the Theater Mission Planning Center (TMPC) program (under PU 4036).

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4033 / M-Code
--	--	---

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
M-Code-AUR	SS/CPFF	Raytheon : Tuscon, AZ	6.190	18.664	Mar 2020	13.438	Mar 2021	13.020	Nov 2021	-		13.020	-	-	-
M-Code - AUR	SS/FFP	Raytheon : Raytheon, AZ/SAS:	9.000	0.000		0.000		0.000		-		0.000	-	-	-
M-Code - TTWCS	SS/CPFF	LMVF : Valley Forge, PA	0.239	0.007	Jun 2020	0.000		0.000		-		0.000	-	-	-
M-Code - TTWCS	SS/CPFF	LMBM : Baltimore, MD	0.371	0.000		0.000		0.000		-		0.000	-	-	-
M-Code - TTWCS	SS/CPFF	BAE Systems : San Diego, CA	0.065	0.000		0.000		0.000		-		0.000	-	-	-
M-Code - AUR	SS/CPFF	UARC APL : Laurel, MD	1.870	2.647	Feb 2020	0.250	Nov 2020	0.927	Dec 2021	-		0.927	-	-	-
Subtotal			17.735	21.318		13.688		13.947		-		13.947	-	-	N/A

Remarks
 FY 2022 M-Code product development funding required to continue Engineering and Manufacturing Development (EMD) phase while continuing design & certification of the Application Specific Integrated Circuit (ASIC), as well as integration, testing and evaluation (T&E), and qualification of an M-Code capable Anti-Jam GPS Receiver (AGR)5. The decrease of FY 2020 funding on the EMD Contract with Raytheon, as compared to PB21, is due to the redirection of \$4.63M to support NWCF surcharge; this funding has been added back to the EMD contract in FY 2022.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
M-Code Development Support	WR	NAWC-WD : China Lake, CA	0.146	0.251	Feb 2020	0.200	Nov 2020	0.485	Nov 2021	-		0.485	-	-	-
M-Code Development Support	WR	NAWC-AD : Patuxent River, MD	0.409	0.800	Dec 2019	1.277	Nov 2020	0.907	Nov 2021	-		0.907	-	-	-
M-Code Development Support	WR	NUWC-NPT : Newport, RI	0.402	0.310	Apr 2020	0.000		0.199	Nov 2021	-		0.199	-	-	-
M-Code Development Support	WR	NSWC-IH : Indian Head, MD	0.644	0.090	Jan 2020	0.250	Nov 2020	0.143	Nov 2021	-		0.143	-	-	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4033 / M-Code
--	--	---

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
M-Code/TTWCS Development Spt	WR	NSWC-DD : Dahlgren, VA	1.263	0.115	Jan 2020	0.000		0.908	Nov 2021	-		0.908	-	-	-
M-Code Development Support	SS/CPFF	Various : Various	0.101	0.000		0.000		0.000		-		0.000	-	-	-
M-Code NWCF Surcharge	WR	NAWC-WD : China Lake, CA	0.000	4.630	Aug 2020	0.000		0.000		-		0.000	-	-	-
Subtotal			2.965	6.196		1.727		2.642		-		2.642	-	-	N/A

Remarks
FY 2022 funding to NUWC-NPT supports Combat & Control System (CCS). FY 2022 funding to NSWC-DD supports TTWCS.

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
M-Code Test & Evaluation	WR	NAWC-AD : Patuxent River	0.000	0.056	May 2020	0.100	Nov 2020	0.138	Jun 2022	-		0.138	-	-	-
M-Code/CCS Test & Evaluation	WR	NUWC-NPT : Newport, RI	0.000	0.000		0.000		0.325	Nov 2021	-		0.325	-	-	-
Subtotal			0.000	0.056		0.100		0.463		-		0.463	-	-	N/A

Remarks
FY 2022 funding to NUWC-NPT supports Combat & Control System (CCS).

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
M-Code	WR	NAWC-AD : Patuxent River	0.222	0.227	Aug 2020	0.250	Nov 2020	0.170	Jun 2022	-		0.170	-	-	-
Subtotal			0.222	0.227		0.250		0.170		-		0.170	-	-	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy								Date: May 2021					
Appropriation/Budget Activity 1319 / 7				R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>				Project (Number/Name) 4033 / <i>M-Code</i>					
	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	20.922	27.797		15.765		17.222		-		17.222	-	-	N/A

Remarks

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4033 / <i>M-Code</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
M-CODE				
Systems Development: Critical Design Reviews: M-Code PDR	4	2020	4	2020
Systems Development: Critical Design Reviews: M-Code CDR	2	2021	2	2021

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4034 / <i>Maritime Strike</i>
--	---	---

COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
4034: <i>Maritime Strike</i>	169.486	179.430	125.029	69.568	-	69.568	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Maritime Strike Tomahawk (MST) modernization effort provides the capability to hit moving maritime targets through mid-course guidance via a third party or seeker mode, to a terminal seeker engagement. MST will begin transitioning to a Program of Record in FY 2023 culminating in a Milestone C and Full Rate Production Decision concurrent with the RDC IOC in FY 2024. Program of Record will consist of a period of initial and follow-on operational test and evaluation, seeker software algorithm updates, and commensurate Weapons Control System (WCS) and Theater Mission Planning Center (TMPC) software updates.

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Maritime Strike Tomahawk	179.430	125.029	69.568	0.000	69.568
Articles:	-	-	-	-	-
FY 2021 Plans:					
Continuation of activities in support of Maritime Strike Tomahawk (MST). Effort includes maturation of software algorithm code, software functionality qualification, establish validation and verification procedures through data collection. Missile OES system test software buildup, Modeling and Simulation capabilities in the lab for missile performance and algorithm maturity, requirement for hardware qualification, and software buildup. System of System Test Environment development, updates, and analyses, simulations to refine software algorithm performance. Complete Tactical Tomahawk Weapons Control System (TTWCS) initial software build. Continue development of logistics, training, and installation products. Continue development of Vertical Launch System (VLS). Upgrade VLS simulation programs for use during multiple certification efforts at multiple labs and on board ship. Refine procedures for induction into recertification line, acceptance test procedures, and automated test equipment. Refine and test interfaces through NAVWAR to support data quality infrastructure. Continue transition to production requirements, telemeter products, develop kitting requirements and containers. Continue development of procedures for induction into recertification line, acceptance test procedures, and automated test equipment. Continue end to end system testing.					
FY 2022 Base Plans:					
Continuation of activities in support of Maritime Strike Tomahawk (MST). Effort includes the transition to testing with the execution of ground test events to include functional ground test, and missile test flights from ground launcher apparatus to assess seeker performance and further mature algorithm refinement. Build-up, check-					

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4034 / <i>Maritime Strike</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>out, and lab test of MST test missiles for surface and subsurface test events. Engagement planning and coordination with other stakeholders and agencies that require MST support. Seeker system safety reviews and preparations for shock and environments testing. Modeling and Simulation (M&S) activity in laboratories to include development runs in the System of Systems Test Environment (SoSTE) Lab and the Signal Processor in the Loop (SPIL) environment to verify data and simulate mission performance. Extensive Missile System Qualification Testing to include vibrations, thermal loads, and environments. Shipping and handling safety analysis will be conducted and recommendations implemented. TTWCS will complete system integration test of the initial version 5.6.1 software build with all weapon system segments and address weapons control software fixes and debugging through a planned corrective build. Training curriculum development for the Fleet user, as well as crew training activities, which will be in concert with test ship availability and MST hardware install and preparation for ship install of MST software.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2021 to FY 2022 decrease is based on hardware, software and algorithm design being largely complete and moving the effort from engineering focused design and integration, to an environment of test, refinement of algorithms, and transition to integration and test.</p>					
Accomplishments/Planned Programs Subtotals	179.430	125.029	69.568	0.000	69.568

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022 Base</u>	<u>FY 2022 OCO</u>	<u>FY 2022 Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• WPN 6120: <i>Spares and Repair Parts</i>	0.000	0.000	1.098	-	1.098	-	-	-	-	-	-
• WPN 2301: <i>Tomahawk Mods</i>	0.000	19.595	54.470	-	54.470	-	-	-	-	-	-

Remarks
Other Program Funding Summaries for WPN BLIs 2301 and 6120 do not include funding for the Tomahawk Recertification program as there is no RD TEN funding associated with that program.

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4034 / <i>Maritime Strike</i>

D. Acquisition Strategy

Maritime Strike Tomahawk (MST) will enable surface warfare engagement capability from U.S. Navy Guided Missile Cruiser (CG), Guided Missile Destroyer (DDG), and Nuclear Powered Fast Attack Submarine (SSN) platforms. The MST program includes upgrades to the All-Up Round (AUR) missile, the Tactical Tomahawk Weapons Control System (TTWCS) and also required upgrades to the Theater Mission Planning Center (TMPC) programs (under PU 4036). MST was designated a DoDI 5000.02 Rapid Deployment Capability (RDC) by the Assistant Secretary of the Navy (Research, Development, and Acquisition) (ASN (RDA)) in Oct 2016. Milestone decision authority ensures program accountability through knowledge points which inform progress on critical design, production readiness, system test readiness, flight readiness, operational test readiness and fielding decision. To facilitate rapid fleet fielding, hardware design was phased to the beginning of the program. Technical Data package for seeker production units completed in 3Q FY 2020 at Knowledge Point 3 which supports procurement in FY 2021. Seeker software development will continue with initial Engineering Design Models. Initial Operational Capability (IOC) will occur in FY 2024 following a Quick Reaction Assessment and characterization of operational performance. This strategy affords the program flexibility in achieving a threshold capability in a timely manner. MST will begin transitioning to a Program of Record in FY 2023 culminating in a Milestone C and Full Rate Production Decision concurrent with the RDC IOC in FY 2024. Program of Record will consist of a period of initial and follow-on operational test and evaluation, seeker software algorithm updates, and commensurate Weapons Control System (WCS) and Theater Mission Planning Center (TMPC) software updates.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4034 / Maritime Strike
--	--	--

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Maritime Strike - AUR	SS/CPPIF	Raytheon : Tucson, AZ	123.592	129.876	Feb 2020	96.851	Dec 2020	51.679	Dec 2021	-		51.679	-	-	-
Maritime Strike - AUR	WR	NAWCWD : China Lake, CA	17.252	1.438	Nov 2019	1.372	Nov 2020	1.288	Nov 2021	-		1.288	-	-	-
Maritime Strike- TTWCS	SS/CPFF	LMVF : Valley Forge, PA	3.771	5.361	Feb 2020	1.820	Dec 2020	1.289	Dec 2021	-		1.289	-	-	-
Maritime Strike- TTWCS	WR	NSWC-DD : Dahlgren, VA	0.671	4.640	Jan 2020	4.948	Oct 2020	2.138	Nov 2021	-		2.138	-	-	-
Maritime Strike- TTWCS	WR	NUWC-DN : Newport, RI	1.003	0.977	Feb 2020	1.477	Oct 2020	0.989	Nov 2021	-		0.989	-	-	-
Maritime Strike - AUR	MIPR	NRO : Chantilly, VA	1.800	1.808	Apr 2020	0.000		0.000		-		0.000	-	-	-
Maritime Strike - AUR	SS/CPFF	UARC APL : Laurel, MD	0.000	0.975	Mar 2020	0.813	Apr 2021	0.587	Apr 2022	-		0.587	-	-	-
Maritime Strike- VLS	SS/CPFF	LM : Baltimore, MD	0.000	1.200	May 2020	0.400	Dec 2020	0.000		-		0.000	-	-	-
Martime Strike-AUR	WR	NSWC-PHD : Port Hueneme, CA	0.000	0.365	Dec 2019	1.183	Oct 2020	0.000		-		0.000	-	-	-
Maritime Strike-AUR	SS/CPFF	ACE Electronics Defense Systems, LLC : Port Hueneme, CA	0.000	0.415	Jun 2020	0.000		0.000		-		0.000	-	-	-
Martime Strike-AUR	WR	NAVWAR : San diego	0.000	1.250	Nov 2019	0.250	Nov 2020	0.000		-		0.000	-	-	-
Subtotal			148.089	148.305		109.114		57.970		-		57.970	-	-	N/A

Remarks
 FY 2022 Maritime Strike funding includes the refinement of software algorithm code. FY 2022 funding supports system test software development evaluation, Quick Reaction Assessment software finalization, System of Systems Test Environment and Signal Processor in the Loop laboratory performance runs and analysis. Tactical Tomahawk Weapons Control System v5.6.1 system integration testing, correction of deficiencies in Fix-it Build (FB) development, training and curriculum development, and entry into FB Segment Test. MST training development, and Tomahawk Mission Planning Center initial Product Acceptance Test and FB complete. Planning for the additional capabilities and the correction of MST deficiencies in TTWCS, V5.7, the follow on derivative software to v5.6.1.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4034 / Maritime Strike
--	--	--

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Maritime Strike Development Support	WR	NAWC-WD : China Lake	2.129	7.719	Nov 2019	0.328	Nov 2020	0.240	Nov 2021	-		0.240	-	-	-
Maritime Strike Development Support	SS/CPFF	UARC APL : Laurel, MD	0.217	0.101	Mar 2020	0.000		0.000		-		0.000	-	-	-
Maritime Strike Development Support	WR	NSWC-DD : Dahlgren, VA	5.708	2.783	Dec 2019	1.040	Oct 2020	0.430	Nov 2021	-		0.430	-	-	-
Maritime Strike Development Support	WR	NAWC-AD : Pax River, MD	1.239	2.336	Nov 2019	1.752	Oct 2020	1.166	Nov 2021	-		1.166	-	-	-
Maritime Strike Development Support	WR	NUWC-NPT : Newport, RI	0.163	0.240	Jan 2020	0.000		0.000		-		0.000	-	-	-
Maritime Strike Development Support	WR	NSWC-PHD : Port Hueneme, CA	1.243	0.584	Dec 2019	0.023	Oct 2020	0.000		-		0.000	-	-	-
Maritime Strike Development Support	C/CPFF	SSC : San Diego, CA	3.392	2.230	Jul 2020	0.000		0.490	Jul 2022	-		0.490	-	-	-
Maritime Strike Development Support	WR	NAVWAR : San Diego, CA	2.980	0.000		0.423	Nov 2020	0.660	Nov 2021	-		0.660	-	-	-
Maritime Strike Development Support	C/CPFF	Sea Corp : Newport, RI	0.383	0.375	Jun 2020	0.333	Mar 2021	0.000		-		0.000	-	-	-
Maritime Strike Development Support	SS/CPFF	Precise : Pax River, MD	1.105	0.489	Aug 2020	0.647	Apr 2021	0.280	Apr 2022	-		0.280	-	-	-
Maritime Strike Development Support	MIPR	US Army : Redstone Arsenal, AL	1.102	0.768	Aug 2020	0.000		0.590	Aug 2022	-		0.590	-	-	-
Maritime Strike Development Support	SS/CPFF	Various : Dahlgren, VA	0.000	0.602	Apr 2020	0.485	Mar 2021	0.380	Apr 2022	-		0.380	-	-	-
Maritime Strike Development Support	MIPR	Other DOD : Various	0.000	0.588	Nov 2019	0.027	Dec 2020	0.000		-		0.000	-	-	-
Maritime Strike Development Support	PO	Naval Research Lab : Washington, DC	0.000	0.608	Mar 2020	0.250	Nov 2020	0.134	Mar 2022	-		0.134	-	-	-
Maritime Strike Development Support	SS/CPFF	Various : Port Hueneme, CA	0.000	0.522	Mar 2020	0.418	Feb 2021	0.438	Mar 2022	-		0.438	-	-	-

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4034 / Maritime Strike
--	--	--

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Martime Strike Development Support	SS/CPFF	Various : Pax River, MD	0.000	0.452	Nov 2019	0.050	Feb 2021	0.044	Feb 2022	-		0.044	-	-	-
Martime Strike Development Support	SS/CPFF	BAE : McLean, VA	0.000	0.035	Feb 2020	0.050	Feb 2021	0.000		-		0.000	-	-	-
Maritime Strike Development Support	WR	NSWC Corona : Corona, CA	0.000	0.128	Jan 2020	0.096	Oct 2020	0.039	Nov 2021	-		0.039	-	-	-
Martime Strike Development Support	WR	NSWC-IHD : Indian Head, MD	0.000	0.060	Nov 2019	0.045	Feb 2021	0.000		-		0.000	-	-	-
Maritime Strike Development Support	SS/CPFF	Keysight Tech : Colorado Springs, CO	0.000	5.101	Apr 2020	0.000		0.000		-		0.000	-	-	-
Subtotal			19.661	25.721		5.967		4.891		-		4.891	-	-	N/A

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
Maritime Strike Test and Evaluation	WR	NAWC-WD : China Lake	1.092	1.970	Nov 2019	5.198	Nov 2020	4.969	Nov 2021	-		4.969	-	-	-
Maritime Strike Test and Evaluation	WR	NAWC-AD : Pax River	0.000	0.000		0.111	Nov 2020	0.234	Nov 2021	-		0.234	-	-	-
Maritime Strike Test and Evaluation	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		1.449	Oct 2020	0.982	Nov 2021	-		0.982	-	-	-
Maritime Strike Test and Evaluation	WR	NSWC-PHD : Port Hueneme, CA	0.644	0.000		0.420	Oct 2020	0.381	Nov 2021	-		0.381	-	-	-
Maritime Strike Test and Evaluation	WR	NSWC-IHD : Indian Head, MD	0.000	0.000		0.069	Oct 2020	0.093	Nov 2021	-		0.093	-	-	-
Martime Strike Test and Evaluation	WR	NUWC-NPT : Newport, RI	0.000	0.000		0.101	Oct 2020	0.048	Nov 2021	-		0.048	-	-	-
Martime Strike Test and Evaluation	MIPR	DLA : Philadelphia, PA	0.000	3.434	Aug 2020	2.600	Jun 2021	0.000		-		0.000	-	-	-
Subtotal			1.736	5.404		9.948		6.707		-		6.707	-	-	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4034 / <i>Maritime Strike</i>
--	---	---

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			

Remarks
 FY 2022 Test and Evaluation Maritime Strike funding required to transition to production representative testing. Efforts to support continued missile Operationally Embedded Software development to support full seeker capabilities and performance requirements; build-up of missiles for test events to include hardware and software integration; continuation of Quick Reaction Assessment (QRA) software build-up, System of Systems Test Environment and Signal Processor in the Loop performance runs and analysis. Tactical Tomahawk Weapons Control System Fix-it Build #1 completion in preparation for Segment Test and QRA. Fleet training and ship install of MST hardware and preparations for ship install of MST software.

	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	169.486	179.430	125.029	69.568	-	69.568	-	-	N/A

Remarks

UNCLASSIFIED

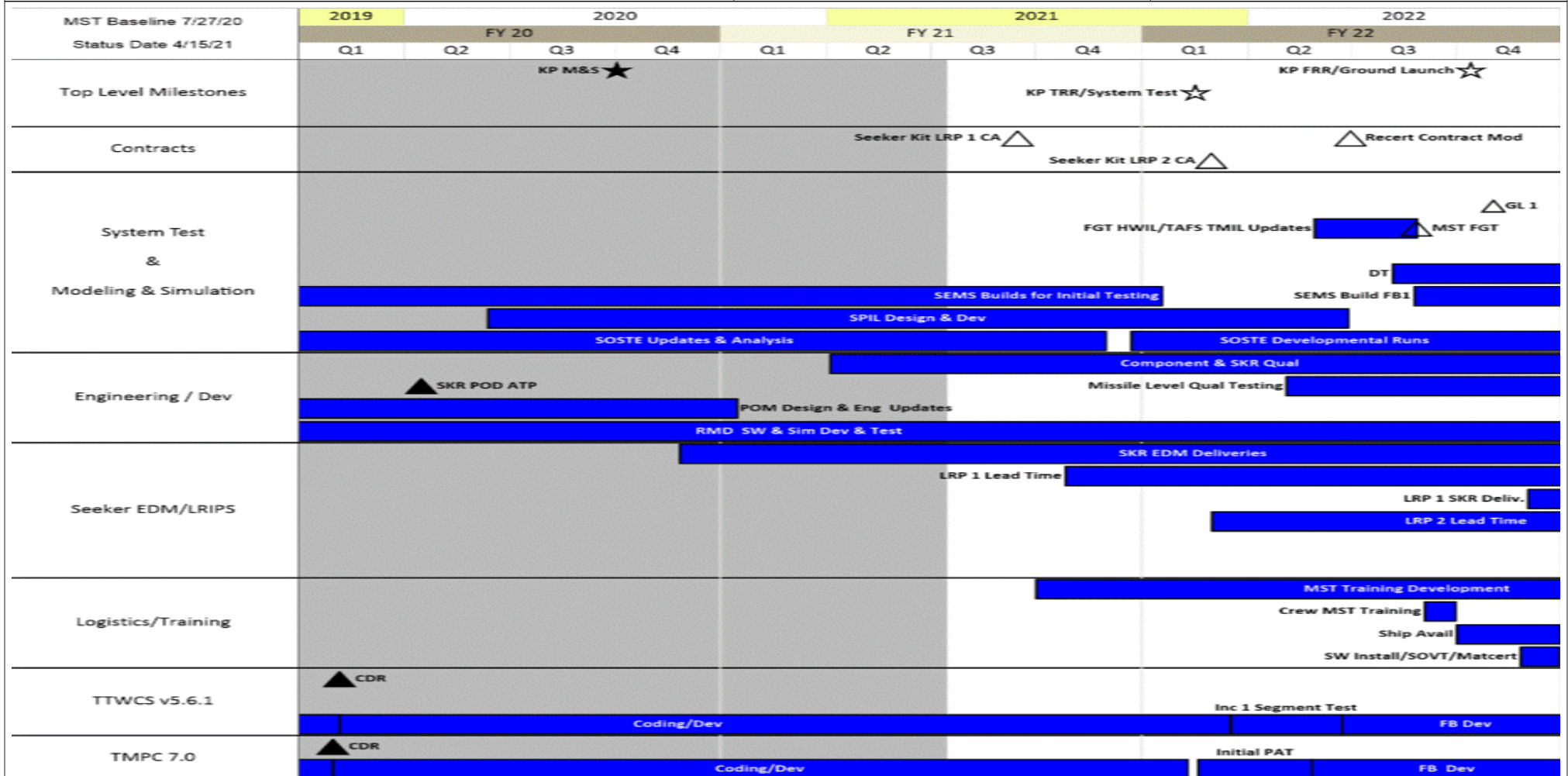
Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy

Date: May 2021

Appropriation/Budget Activity
1319 / 7

R-1 Program Element (Number/Name)
PE 0204229N / Tomahawk Mssn Planning C
tr

Project (Number/Name)
4034 / Maritime Strike



UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4034 / Maritime Strike

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 4034				
Acquisition Milestones: Top Level Milestones: KP Modeling & Simulation Production Readiness Review	4	2020	4	2020
Acquisition Milestones: Top Level Milestones: KP Flight Readiness Review	4	2022	4	2022
Acquisition Milestones: Top Level Milestones: KP Test Readiness Review	1	2022	1	2022
Contracts: Contract Awards: MST Seeker Kit LRIP 1 Contract Award	3	2021	3	2021
Contracts: Contract Awards: Recert Contract Modification to Install SKR Kit	2	2022	2	2022
Contracts: Contract Awards: MST Seeker Kit LRIP 2 Contract Award	1	2022	1	2022
System Test & Modeling & Simulation: SPIL Design & Dev	2	2020	2	2022
System Test & Modeling & Simulation: SoSTE Update & Analysis	1	2020	4	2021
System Test & Modeling & Simulation: SoSTE Development Runs	4	2021	4	2022
System Test & Modeling & Simulation: MST FGT	3	2022	3	2022
System Test & Modeling & Simulation: GL 1	4	2022	4	2022
System Test & Modeling & Simulation: DT	3	2022	4	2022
Reviews: Engineering/Dev: POM Design & Eng Updates	1	2020	1	2021
Reviews: Engineering/Dev: Component & SKR Level Qual Testing	2	2021	4	2022
Reviews: Engineering/Dev: Missile Level Qual Testing	2	2022	4	2022
Reviews: Engineering/Dev: SW & Sim Dev & Test	1	2020	4	2022
Reviews: TTWCS v5.6.1: Coding/Dev	1	2020	1	2022
Reviews: TTWCS v5.6.1: Inc 1 Segment Test	1	2022	2	2022
Reviews: TTWCS v5.6.1: FB Development and Segment Tests	2	2022	4	2022
Seeker EDM/LRIPS: SKR EDM Deliveries	4	2020	4	2022

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4034 / <i>Maritime Strike</i>
--	---	---

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Seeker EDM/LRIPS: LRIP 1 Lead Time 9 Industrial Base Set Up	3	2021	4	2022
Seeker EDM/LRIPS: 15 LRIP 1 SKR Deliveries	4	2022	4	2022
Seeker EDM/LRIPS: LRIP 2 Lead Time	1	2022	4	2022

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4035 / JMEWS
--	--	--

COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
4035: JMEWS	16.376	28.007	45.321	36.826	-	36.826	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Joint Multiple-Effects Warhead System (JMEWS) ACAT III program enables the Tactical Tomahawk to utilize multiple lethal effects to address Hard and Deeply Buried Targets (HDBT) while increasing the Tomahawk Weapon System (TWS) capabilities against Integrated Air Defense Systems (IADS) and Weapons of Mass Destruction (WMD).

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

	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: JMEWS	28.007	45.321	36.826	0.000	36.826
Articles:	-	-	-	-	-
FY 2021 Plans: JMEWS planned activities include the continuation of the EMD phase and completion of Preliminary Design Review (PDR). EMD efforts continue with hardware and software development, Target construction, Insensitive Munitions and Hazard Classification Testing, Arena Testing, fuze and warhead integration, systems engineering reviews, and Safety Review Boards.					
FY 2022 Base Plans: JMEWS planned activities include the continuation of the EMD phase and completion of the Critical Design Review (CDR). EMD efforts continue with hardware and software development, target construction, Insensitive Munition (IM) and Hazard Classification (HC) testing, arena testing, fuze and warhead integration, systems engineering reviews and Safety Review Boards.					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease in funding from FY 2021 to FY 2022 due to completion of PDR and prime contractor competitively down-selecting to a single fuze vendor.					
Accomplishments/Planned Programs Subtotals	28.007	45.321	36.826	0.000	36.826

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4035 / JMEWS

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

<u>Line Item</u>	<u>FY 2020</u>	<u>FY 2021</u>	<u>FY 2022</u> <u>Base</u>	<u>FY 2022</u> <u>OCO</u>	<u>FY 2022</u> <u>Total</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>FY 2026</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• WPN 2301: <i>Tomahawk Mods</i>	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

Other Program Funding Summary for WPN BLI 2301 does not include funding for the Tomahawk Recertification program as there is no RDTEN funding associated with that program.

D. Acquisition Strategy

Joint Multiple Effects Warhead System (JMEWS) (ACAT III) acquisition strategy includes the development, integration, test, qualification and production of a new warhead that will greatly expand the land target set that the Tomahawk missile is capable of defeating by combining the blast and fragmentation capabilities of the current warhead with a new penetration capability and improved mission planning. JMEWS will also be compliant with Insensitive Munitions requirements which improves safety during transportation and storage on land and aboard ships and submarines. JMEWS Milestone B occurred in FY 2020, Milestone C is planned for FY 2024, and the capability will Fleet Release in FY 2027. JMEWS program includes upgrades to the All-Up Round (AUR) missile, the Tactical Tomahawk Weapons Control System (TTWCS) and also required upgrades Theater Mission Planning Center (TMPC) program (under PU 4036).

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4035 / JMEWS
--	--	--

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
JMEWS	SS/CPPIF	Raytheon : Tucson, AZ	1.162	17.884	Mar 2020	25.963	Nov 2020	24.664	Nov 2021	-		24.664	-	-	-
JMEWS	WR	NAWC-WD : China Lake, CA	8.844	0.000		6.700	Dec 2020	6.260	Dec 2021	-		6.260	-	-	-
JMEWS/TTWCS	SS/CPFF	LMVF : Valley Forge, PA	0.026	0.047	Feb 2020	0.000		0.052	Feb 2022	-		0.052	-	-	-
Subtotal			10.032	17.931		32.663		30.976		-		30.976	-	-	N/A

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
JMEWS Development Support	SS/CPFF	UARC-APL : Laurel, MD	0.105	0.020	May 2020	0.100	Dec 2020	0.060	Dec 2021	-		0.060	-	-	-
JMEWS Development Support	WR	NSWC-IH : Indian Head, MD	0.091	0.811	Dec 2019	0.900	Nov 2020	0.182	Nov 2021	-		0.182	-	-	-
JMEWS Development Support	WR	NSWC-DD : Dahlgren, VA	0.360	0.395	Jan 2020	1.458	Nov 2020	0.580	Nov 2021	-		0.580	-	-	-
JMEWS Development Support	WR	NAWC-AD : Patuxent River, MD	0.570	0.315	Dec 2019	0.588	Nov 2020	0.367	Nov 2021	-		0.367	-	-	-
JMEWS Development Support	WR	NAWC-WD : China Lake, CA	0.197	4.688	Nov 2019	0.500	Nov 2020	0.000		-		0.000	-	-	-
JMEWS/TTWCS VLS Dev Support	SS/CPFF	BAE Systems : Dahlgren, VA	0.130	0.100	Apr 2020	0.200	Dec 2020	0.100	Nov 2021	-		0.100	-	-	-
JMEWS Development Support	SS/CPFF	Precise Systems : Lexington Park, MD	0.161	0.000		0.000		0.000		-		0.000	-	-	-
Subtotal			1.614	6.329		3.746		1.289		-		1.289	-	-	N/A

Remarks
FY 2022 JMEWS Development Support funds government oversight efforts of the Engineering and Manufacturing Development phase, including conduct of scheduled technical reviews.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4035 / JMEWS
--	--	--

Test and Evaluation (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
JMEWS T&E	WR	NAWC-WD : China Lake, CA	4.730	3.542	Dec 2019	7.800	Nov 2020	4.461	Dec 2021	-		4.461	-	-	-
JMEWS T&E	WR	NSWC-DD : Dahlgren, VA	0.000	0.000		0.700	Nov 2020	0.000		-		0.000	-	-	-
JMEWS/TTWCS T&E	WR	NUWC-NPT : Newport, RI	0.000	0.000		0.000		0.000		-		0.000	-	-	-
Subtotal			4.730	3.542		8.500		4.461		-		4.461	-	-	N/A

Management Services (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
JMEWS	WR	NAWC-AD : Patuxent River, MD	0.000	0.205	Aug 2020	0.412	Nov 2020	0.100	Nov 2021	-		0.100	-	-	-
Subtotal			0.000	0.205		0.412		0.100		-		0.100	-	-	N/A

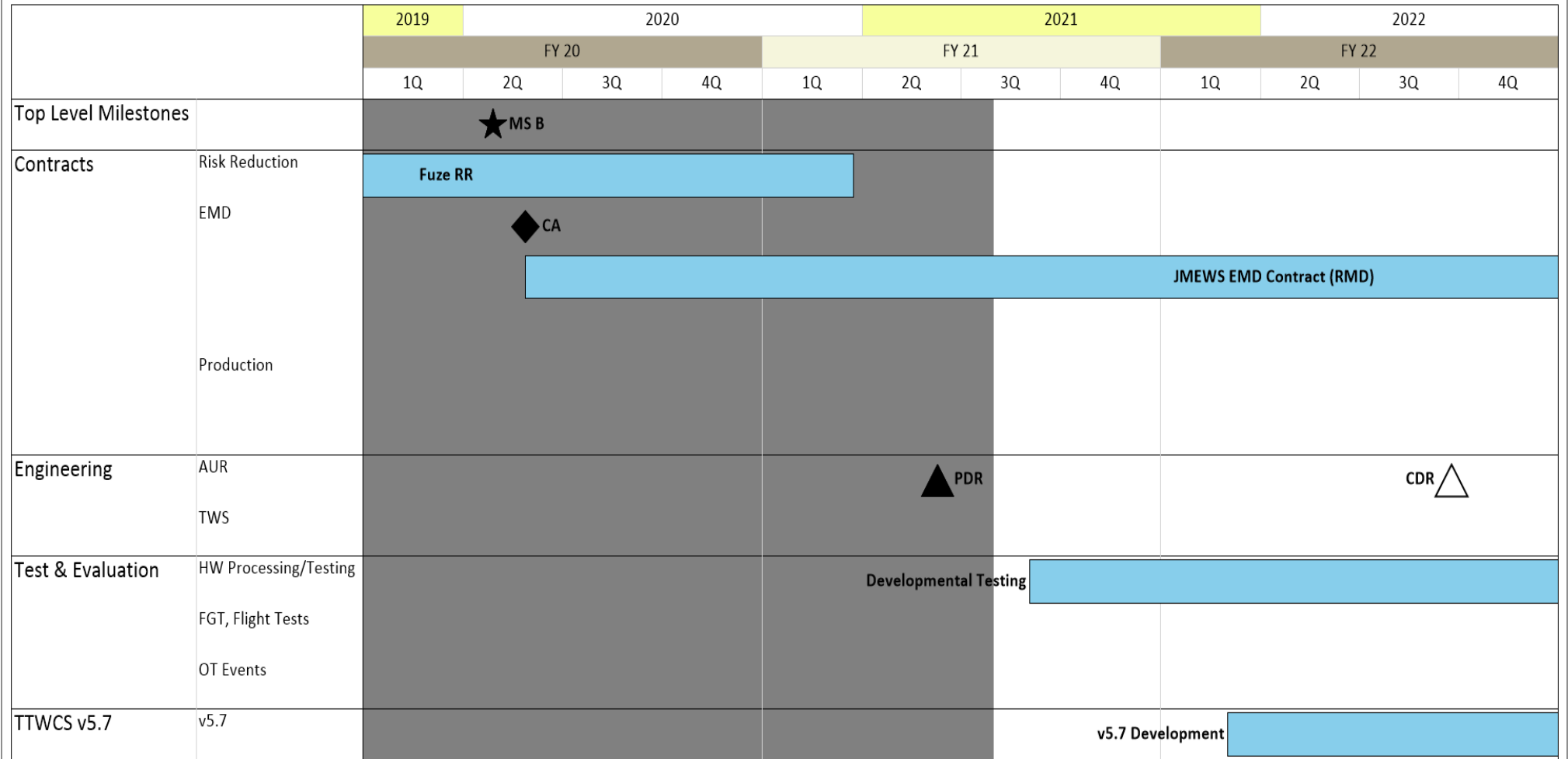
Project Cost Totals	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
	16.376	28.007	45.321	36.826	-	36.826	-	-	N/A

Remarks

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy **Date: May 2021**

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4035 / JMEWS
--	--	--



Snapshot Date: 4/26/2021

FOUO

Version 1.0

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4035 / JMEWS

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
JMEWS				
Acquisition Milestones: Milestones: Milestone B	2	2020	2	2020
Systems Development: Software Development: JMEWS TTWCS SW Dev	1	2022	4	2022
Systems Development: Hardware Development: JMEWS FUZE RISK REDUCTION	1	2020	1	2021
Reviews: Acquisition Reviews: JMEWS PDR	2	2021	2	2021
Reviews: Acquisition Reviews: JMEWS CDR	3	2022	3	2022
Test and Evaluation: JMEWS DT	3	2021	4	2022
Test and Evaluation: Contract Awards: JMEWS EMD Contract Award	2	2020	2	2020

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy										Date: May 2021		
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>				Project (Number/Name) 4036 / <i>TTWCS TMPC PPPI</i>			
COST (\$ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
4036: <i>TTWCS TMPC PPPI</i>	22.480	17.306	12.751	8.565	-	8.565	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Theater Mission Planning Center (TMPC) consists of Commercial and Government Off-The-Shelf (COTS/GOTS) software and COTS hardware. TMPC is the mission planning segment of the Tomahawk Weapon System (TWS) that provides subsystems for the precision targeting, route planning, mission distribution, and strike management of Tomahawk cruise missile missions from sites located ashore and afloat. TMPC optimizes all aspects of the Tomahawk missile mission to successfully engage a target.

TMPC provides mission planning at the theater and operational levels and is designed for high rate mission planning production responsive to national strategic, operational, and tactical requirements. TMPC develops and distributes missions; provides command information services for all variants of the Tomahawk missile; provides strike planning, execution, coordination, control and reporting, and provides Maritime Component Commanders (MCC) the capability to plan or modify conventional TWS missions. TMPC is employed in major joint combat operations and Overseas Contingency Operations. TMPC has evolved into 4 scalable configurations deployed at 191 sites: Cruise Missile Support Activities (CMSAs) (3), Tomahawk Strike Mission Planning Cells (TSMPCs) (3), Carrier Strike Groups (CSGs) (19 Total: 12 Afloat / 7 Shore), and Firing Units (FRUs) (147 - 90 Surface / 57 Subsurface). Additionally, TMPC is installed in Labs (6) and Training Classrooms (13) that contain various combinations of the four configurations. TMPC software development activities support new capabilities for the Tomahawk Weapon System while also decreasing mission planning time, increasing the quality and accuracy of each mission and reducing complexity. TMPC was previously referred to as Tomahawk Command and Control System (TC2S).

The Tactical Tomahawk Weapons Control System (TTWCS) provides launch capability for surface and submarine platforms. Development of the TTWCS provides a common architecture to launch the TACTOM and all variants in inventory. Development of upgrades to the TTWCS is required to meet the Department of Defense Information Technology Standards Registry, to meet FORCEnet compliance and be Internet Protocol Version 6 ready in order to remain interoperable within the Joint Service Architecture and to retain weapons system viability and usability for our Sailors. Additionally, TTWCS provides launch capability for both types of modernization efforts, Navigation/Communications and Maritime, through an incremental approach to software and hardware upgrades. These efforts provide battle-group tactical flexibility and responsiveness while maximizing TWS wartime capability.

Pre-Planned Product Improvement (P3I) funding is required to create an integrated future strategy across the Tomahawk Weapon System. This includes identifying potential capability upgrades, advanced technologies, and new requirements resulting from target and lethality assessments, engine performance analysis, data-fusion studies, campaign planning, mission analysis, fleet experimentation and kill chain analysis. Perform nonrecurring engineering activities, systems and software development, integration and testing of capability upgrades to address emergent threats, Urgent Operational Needs (UONS), fleet gaps, and the Tomahawk Operational Readiness Document (ORD).

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4036 / <i>TTWCS TMPC PPPI</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
<p>Title: Theater Mission Planning Center (TMPC)</p> <p align="right">Articles:</p> <p>FY 2021 Plans: Continue evaluation of TMPC design process to ensure Tomahawk missile performance characteristics are adequately modeled in TMPC. Complete navigation and communications system testing at the TWS level required to support the TWS Modernization program. Continue coding of Maritime Strike Tomahawk capability. Complete requirements definition to support TWS Joint Multiple Effects Warhead System (JMEWS) transition, demonstration and test efforts.</p> <p>FY 2022 Base Plans: Continue evaluation of TMPC design process to ensure Tomahawk missile performance characteristics are adequately modeled in TMPC. Complete software development and integration of the Maritime Strike Tomahawk capability. Commences software development and integration of the TWS Joint Multiple Effects Warhead System (JMEWS). Commences PAT & DT/OT of the Maritime Strike Tomahawk capability.</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement: FY 2021 to FY 2022 decrease is the result of TMPC 6.0 IOC in 2Q FY 2021 as well as MST software and integration activities ramp down as efforts complete in Q4 FY 2022.</p>	15.776	12.716	8.565	0.000	8.565
	-	-	-	-	-
<p>Title: Tactical Tomahawk Weapons Control System (TTWCS)</p> <p align="right">Articles:</p> <p>FY 2021 Plans: Continue to perform nonrecurring engineering activities, systems and software development, integration and testing of capability upgrades.</p> <p>FY 2022 Base Plans: N/A</p> <p>FY 2022 OCO Plans: N/A</p> <p>FY 2021 to FY 2022 Increase/Decrease Statement:</p>	1.530	0.035	0.000	0.000	0.000
	-	-	-	-	-

UNCLASSIFIED

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4036 / <i>TTWCS TMPC PPI</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY 2021 to FY 2022 decrease is based upon completion of TTWCS related engineering, development, integration and testing activities in FY 2021.					
Accomplishments/Planned Programs Subtotals	17.306	12.751	8.565	0.000	8.565

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• OPN 5253: <i>Tomahawk Support Equipment</i>	59.436	77.370	88.726	-	88.726	-	-	-	-	-	-
• OPN 9020: <i>Initial and Vendor Direct Spares</i>	0.229	0.387	0.599	-	0.599	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

TMPC and TTWCS require periodic hardware and software updates to maintain compliance with cybersecurity standards and maintain system relevance against emerging threats. TMPC and TTWCS segments will rely on a blend of industry and government expertise through the remaining life of the program.

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4036 / TTWCS TMPC PPPI
--	--	--

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
TMPC 7.0	SS/CPFF	Perspecta : San Jose, CA	6.657	0.228	Dec 2019	0.292	Dec 2020	0.293	Dec 2021	-		0.293	-	-	-
TMPC 7.0	SS/CPFF	Tapestry : St. Louis, MO	0.238	0.095	Dec 2019	0.095	Jan 2021	0.097	Jan 2022	-		0.097	-	-	-
TMPC 7.0	SS/CPFF	BAE Systems : San Diego, CA	1.200	0.095	Dec 2019	0.095	Dec 2020	0.097	Dec 2021	-		0.097	-	-	-
TMPC 7.0	SS/CPFF	Leidos : California, MD	3.225	4.736	Dec 2019	3.709	Dec 2020	1.426	Dec 2021	-		1.426	-	-	-
TMPC 7.0	SS/CPFF	UARC APL : Laurel, MD	0.887	0.105	Nov 2019	0.114	May 2021	0.105	May 2022	-		0.105	-	-	-
TMPC 7.0	WR	NAWC-AD : Patuxent River, MD	2.432	1.292	Dec 2019	0.531	Nov 2020	0.296	Nov 2021	-		0.296	-	-	-
TMPC 8.0	SS/CPFF	Perspecta : San Jose, CA	0.370	1.137	Dec 2019	1.236	Dec 2020	0.687	Dec 2021	-		0.687	-	-	-
TMPC 8.0	SS/CPFF	Tapestry : St. Louis, MO	0.465	1.398	Nov 2019	1.248	Jan 2021	0.610	Jan 2022	-		0.610	-	-	-
TMPC 8.0	SS/CPFF	BAE Systems : San Diego, CA	0.326	0.791	Nov 2019	0.804	Dec 2020	0.916	Dec 2021	-		0.916	-	-	-
TMPC 8.0	SS/CPFF	Leidos : California, MD	0.618	2.965	Nov 2019	2.313	Dec 2020	2.175	Dec 2021	-		2.175	-	-	-
TMPC 8.0	SS/CPFF	UARC APL : Laurel, MD	0.111	0.890	Nov 2019	0.887	May 2021	0.584	May 2022	-		0.584	-	-	-
TMPC 8.0	WR	NAWC-AD : Patuxent River, MD	0.358	0.948	Nov 2019	0.967	Nov 2020	1.004	Nov 2021	-		1.004	-	-	-
Systems Engineering - TTWCS Improvements (NAV/COMMS)	WR	NSWC : Dahlgren, VA	1.239	0.466	Dec 2019	0.000		0.000		-		0.000	-	-	-
Systems Engineering-TTWCS Software Support Activity (NAV/COMMS)	SS/CPFF	LMVF : Valley Forge, PA	0.760	0.342	Dec 2019	0.035	Dec 2020	0.000		-		0.000	-	-	-
Subtotal			18.886	15.488		12.326		8.290		-		8.290	-	-	N/A

UNCLASSIFIED

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy **Date:** May 2021

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / Tomahawk Mssn Planning Ctr	Project (Number/Name) 4036 / TTWCS TMPC PPPI
--	--	--

Product Development (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			

Remarks
 TMPC 7.0 Implements functionality to support Maritime Strike Tomahawk. Aligns with PU 4034.
 TMPC 8.0 Implements functionality to support JMEWS and additional M-Code capabilities. Aligns with PU 4033 and 4035.

Support (\$ in Millions)				FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 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			
TMPC 6.0	SS/CPFF	Perspecta : San Jose, CA	0.887	0.508	Dec 2019	0.000		0.000		-		0.000	-	-	-
TMPC 6.0	SS/CPFF	Leidos : California, MD	1.896	0.588	Nov 2019	0.425	Nov 2020	0.000		-		0.000	-	-	-
TMPC 7.0	SS/CPFF	Leidos : California, MD	0.000	0.000		0.000		0.275	Dec 2021	-		0.275	-	-	-
PPPI Development Support	SS/CPFF	Precise : Lexington Park, MD	0.709	0.434	Nov 2019	0.000		0.000		-		0.000	-	-	-
Subtotal			3.492	1.530		0.425		0.275		-		0.275	-	-	N/A

Remarks
 Pre-Planned Product Improvement efforts (PPPI) required to perform nonrecurring engineering activities, systems and software development, integration and testing of capability upgrades.
 TMPC 6.0 Implements functionality to support Missile Modernization; Timeline Improvements; Navigation and Communications Upgrades and M-Code compatibility. Aligns with PU: 4032.
 TMPC 7.0 Implements functionality to support Maritime Strike Tomahawk capability. Aligns with PU: 4034.

UNCLASSIFIED

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy

Date: May 2021

Appropriation/Budget Activity
1319 / 7

R-1 Program Element (Number/Name)
PE 0204229N / Tomahawk Mssn Planning Ctr

Project (Number/Name)
4036 / TTWCS TMPC PPPI

TMPC, TTWCS, P3I	FY 2020				FY 2021				FY 2022			
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Acquisition Milestones Milestones						TMPC 6.0 IOC Δ						
						TTWCS v5.6 IOC Δ						
Systems Development Software Development	TMPC 7.0 SW Dev & Integration											
	JMEWS Engineering and Manufacturing Development											
	TMPC 8.0 Requirements Definition								TMPC 8.0 SW Dev & Integration			
Hardware Development	TTWCS v5.7 Candidate Dev								TTWCS v5.7 SW Dev & Int			
	TACTOM Preplanned Product Improvement (P3I)											
Reviews Critical Design Reviews Acquisition Reviews Test and Evaluation	TTWCS v5.6 DT/OT											
	TMPC 6.0 PAT & DT/OT											
									TTWCS v5.6.1 DT/OT			
									TMPC 7.0 PAT DT/OT			

UNCLASSIFIED

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204229N / <i>Tomahawk Mssn Planning Ctr</i>	Project (Number/Name) 4036 / <i>TTWCS TMPC PPPI</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
TMPC, TTWCS, P3I				
Acquisition Milestones: Milestones: TMPC 6.0 IOC	2	2021	2	2021
Acquisition Milestones: Milestones: TTWCS v5.6 IOC	2	2021	2	2021
Systems Development: Software Development: TMPC 7.0 SW Dev & Integration	1	2020	4	2022
Systems Development: Software Development: TMPC 8.0 SW Dev & Integration	1	2022	4	2022
Systems Development: Software Development: TMPC 8.0 Requirements Definition	1	2020	4	2021
Systems Development: Software Development: TTWCS v5.7 Candidate Dev	1	2020	4	2021
Systems Development: Software Development: TTWCS v5.7 SW Dev & Int	1	2022	4	2022
Systems Development: Hardware Development: TACTOM Preplanned Product Improvement (P3I)	1	2020	4	2022
Reviews: Test and Evaluation: TTWCS V5.6 Modernized Missile DT/OT	1	2020	2	2021
Reviews: Test and Evaluation: TTWCS V5.6.1 DT/OT	4	2022	4	2022
Reviews: Test and Evaluation: TMPC 6.0 Product Acceptance Testing (PAT) & DT/OT	1	2020	2	2021
Reviews: Test and Evaluation: TMPC 7.0 Product Acceptance Testing (PAT) & DT/OT	4	2022	4	2022