Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy											Date: February 2020	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603502N *I Surface & Shallow Water MCM*							
COST ($ in Millions)	**Prior Years**	**FY 2019**	**FY 2020**	**FY 2021 Base**	**FY 2021 OCO**	**FY 2021 Total**	**FY 2022**	**FY 2023**	**FY 2024**	**FY 2025**	**Cost To Complete**	**Total Cost**
Total Program Element	136.397	116.113	407.800	52.358	-	52.358	57.289	57.129	58.270	59.431	Continuing	Continuing
1234: *Unmanned Surface Vehicle (USV)*	103.279	27.703	31.519	19.167	-	19.167	18.929	19.304	19.684	20.073	Continuing	Continuing
2989: *Barracuda*	20.572	27.739	28.641	33.191	-	33.191	38.360	37.825	38.586	39.358	Continuing	Continuing
3066: *Large Unmanned Surface Vessel (LUSV)*	0.000	0.000	273.327	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	273.327
3067: *Unmanned Surface Vehicle Enabling Capabilities*	0.000	0.000	50.413	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	50.413
3428: *Medium Unmanned Surface Vehicle (MUSV)*	0.000	2.690	23.900	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	26.590
9999: *Congressional Adds*	12.546	57.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	70.527

Note

Beginning in FY21, funding for Projects 3066, 3067, and 3428 was realigned to PE 0603178N.

A. Mission Description and Budget Item Justification

This program element provides resources for development of mine countermeasures systems to provide minehunting, minesweeping, and mine neutralization to counter known and projected mine threats. The mine countermeasures systems provide mobile, quick reaction forces capable of land- or sea-based minehunting and minesweeping operations worldwide. Resources are for developing and deploying advanced minehunting and minesweeping systems and the intelligence and oceanographic capabilities that will enable mine warfare superiority. Tactics and techniques used vary across a diversity of environments and a diversity of threats, including both asymmetric and emerging. Resources provide for systems and support of mine warfare systems, maritime systems, and expeditionary systems to allow for continuous operations of the Navy's warships and support vessels, other military vessels, and commercial vessels. Core capabilities include forward presence, deterrence, sea control, power projection, maritime security, humanitarian assistance and disaster response to maintain freedom of the seas. Increased capability includes conducting minefield reconnaissance (mine density and location) at high area search rates, improving detection capability, decreasing sensor false alarm rates, reducing or eliminating post-mission analysis detect, classify, identify, decide time, improving neutralization time, improving network communications, automatic target recognition, and achieving in-stride detect-to-engage capability. Concept of operations includes development of cooperative, unmanned, modular systems; the establishment of a capable networked command and control system; and standing up an accurate and interactive environmental system with the ability to form and disseminate a Common Environmental Picture. Efforts benefit the Mine Countermeasure (MCM) force by transforming the Navy from the platform-centered legacy set of systems to a capability-centered force that is distributed, networked, and able to provide unique maritime influence and access across the entire maritime domain.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603502N *I Surface & Shallow Water MCM*

The Surface Mine Countermeasures (SMCM) programs are in general platform independent and will provide detection, classification, localization, identification, neutralization, and influence clearance capabilities. Programs develop: (1) unmanned minehunting capability for surface platforms; (2) the integration and improvement of new and existing systems; (3) support for systems which detect, localize, classify, identify, and neutralize all mine types across MCM Avenger Class and other platforms; (4) systems for neutralizing mines and light obstacles through the entire water column to include deep water, open water, shallow water, very shallow water, surf zones, and beach landing craft zones in support of operations; (5) integrate hardware for experimental testing related to surface ship, aircraft, and other cross platform applications; and (6) provide for the future unmanned portion of the Future Surface Combatant (FSC) strategy.

Medium Unmanned Surface Vehicles (MUSVs) and Large Unmanned Surface Vessels (LUSVs) are segments of the Navy's Unmanned Surface Vehicle Family of Systems (FoS). MUSV is defined as having a reconfigurable mission capability which is accomplished via modular payloads with an initial mission capability to support Battlespace Awareness through Intelligence, Surveillance and Reconnaissance (ISR) and Electronic Warfare (EW). LUSV is defined as having a reconfigurable, multi-mission capability which is accomplished via an organic warfare capability and may be augmented with additional modular payloads. Initial LUSV missions include Anti-Surface Warfare (ASuW) and Strike. MUSVs and LUSVs provide low cost, high endurance, reconfigurable ships able to accommodate various payloads for unmanned missions and augment the Navy's manned surface force. MUSVs and LUSVs will be capable initially of semi-autonomous operation, with operators in-the-loop or on-the-loop. USV Command and Control (C2) will be maintained via the afloat element (i.e., embarked on a United States Navy (USN) combatant/support ship) or via the ashore element (C2 station ashore). While MUSV and LUSV will logically share common Government Furnished Equipment(GFE) C2 systems to support fleet integration and operations and may share other autonomy and mechanical technologies (depending on acquisition approaches), they will be primarily differentiated by size and cost as driven by payload capability, capacity and LUSV's organic warfare capability.

Future missions for both MUSV and LUSV will be informed by the Navy's Future Surface Combatant Force (FSCF) Analysis of Alternatives (AoA) and as future payloads and concept of operations (CONOPs) are refined. Under the FSCF, MUSV and LUSV will be referred to as Future Surface Combatant USVs (FSC USVs) and are projected to include missions for Anti-Submarine Warfare (ASW), Logistics, MCM, Counter Swarm, Armed Escort, and Mine Warfare (i.e., mining). MUSV and LUSV are key enablers of the Navy's Distributed Maritime Operations (DMO) concept, which includes being able to forward deploy (alone or in teams/swarms), team with individual manned combatants or augment battle groups. Fielding of MUSV and LUSV will provide the Navy increased capability and necessary capacity at lower procurement and sustainment costs, reduced risk to sailors and increased readiness by offloading missions from manned combatants.

While unmanned surface vehicles are new additions to fleet units, MUSV and LUSV are intended to combine robust and proven commercial vessel designs with existing military payloads to rapidly and affordably expand the capacity and capability of the surface fleet. Both programs benefit from years of investment and full scale demonstration efforts in autonomy, endurance, command and control, payloads and testing from the Defense Advanced Research Projects Agency (DARPA) Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) and Office of Naval Research (ONR) Medium Displacement Unmanned Surface Vehicle (MDUSV)/ Sea Hunter (FY 2017 to FY 2021) and Office of the Secretary of Defense Strategic Capabilities Office (OSD SCO) Ghost Fleet Overlord Large USV experimentation effort (FY 2018 to FY 2021). The combination of fleet-ready C2 solutions developed by the Ghost Fleet Overlord program and initial man-in-the-loop or man-on-the-loop control will reduce the risk of fleet integration of unmanned surface vehicles and allow autonomy and payload technologies to develop in parallel with fielding vehicles with standardized interfaces.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603502N *I Surface & Shallow Water MCM*

These efforts are broken out into three (3) Project Units (PUs): Medium Unmanned Surface Vehicle (MUSV) (Project 3428), Large Unmanned Surface Vessel (LUSV) (Project 3066) and Unmanned Surface Vehicle Enabling Capabilities (Project 3067).

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	120.348	507.000	813.251	-	813.251
Current President's Budget	116.113	407.800	52.358	-	52.358
Total Adjustments	-4.235	-99.200	-760.893	-	-760.893
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-99.200			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.013	0.000			
• SBIR/STTR Transfer	-4.222	0.000			
• Program Adjustments	0.000	0.000	-760.963	-	-760.963
• Rate/Misc Adjustments	0.000	0.000	0.070	-	0.070

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Project: 9999: *Congressional Adds*		
Congressional Add: *Medium Displacement Unmanned Surface Vehicle*	40.519	0.000
Congressional Add: *Navy Identified MCM USV Requirement*	13.603	0.000
Congressional Add: *Navy Identified UISS Requirement*	3.859	0.000
Congressional Add Subtotals for Project: 9999	57.981	0.000
Congressional Add Totals for all Projects	57.981	0.000

Change Summary Explanation

Program Adjustments:
FY19: -$4,222K SBIR, -$13K miscellaneous reduction
FY20: -$79,200K Project 3066 long lead material early to need; -$20,000K Project 3066 initial incremental non-VLS concept design only
FY21: -$296,916K LUSV program adjustment; -$464,047K USV PE re-alignment; +$70K rate adjustments

Technical: Not applicable.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603502N *I Surface & Shallow Water MCM*

Schedule: Not applicable.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 1234 / *Unmanned Surface Vehicle (USV)*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
1234: *Unmanned Surface Vehicle (USV)*	103.279	27.703	31.519	19.167	-	19.167	18.929	19.304	19.684	20.073	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

In FY 2019, UISS received a Congressional Add of $4.000M in Project Unit 9999/C444. In FY 2019, MCM USV received a Congressional Add of $14.100M in Project Unit 9999/C443. In FY 2020, the UISS program was subsumed into the MCM USV program.

A. Mission Description and Budget Item Justification

This project provides resources for development, improvement and integration of Unmanned Surface Vehicle (USV) Mine Countermeasure (MCM) systems. A description of the major planned programs includes the following:

1) The Unmanned Influence Sweep System (UISS) utilizes an Unmanned Surface Vehicle (USV) integrated with an Unmanned Surface Sweep System (US3), a magnetic/acoustic sweep system developed to sweep acoustic/magnetic influence mines. It can be deployed from the Littoral Combat Ship (LCS) or a Vessel of Opportunity (VOO).

2) Mine Hunting USVs (MHUs) were delivered in FY 2014 to 5th Fleet in response to an Urgent Operational Need (UON) from Naval Forces Central Command concerning MCM capacity and capability gaps. Four systems (referred to as MHUs 1-4) were provided to Combined Task Force (CTF) 52 to conduct Minehunting Operations. Each MHU consists of a USMI Naval Special Warfare (NSW) 11-meter Rigid Hull Inflatable Boat (RHIB), which was converted to a USV by Naval Undersea Warfare Center (NUWC) Division Newport, and tows an AN/AQS-24B Minehunting sonar. The systems are controlled from a Command and Control (C2) container located on either an underway host platform or on pier-side. MHUs 1-4 are currently in sustainment and will support CTF52 until MCM Mission Packages are deployed to United States 5th Fleet (C5F) Area of Responsibility (AOR). In FY 2016-2017, Speed to Fleet (S2F) funding supported the design and fabrication of an additional minehunting asset (referred to as "MHU 5") based on the MCM USV craft and integrating the AQS-24B. Beyond FY 2017, all future efforts with MHU 5 are within the MCM USV program.

3) The Mine Countermeasures Unmanned Surface Vehicle (MCM USV) program leverages the USV from the UISS Program of Record (PoR) and adds a modular mission capability through the addition of multiple payloads. MCM USV w/ AQS-20C integrates the existing AQS-20C minehunting sonar. MCM USV w/ AQS-24B continues the Minehunting efforts. In FY 2019, the MCM USV program began initial design efforts to support integration with a Mine Neutralization capability (Barracuda). Minesweeping payloads will be subsumed by the MCM USV PoR in FY 2020.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: UISS Product Development	0.958	0.000	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Articles:	-	-	-	-	-
FY 2020 Plans: N/A ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A					
Title: UISS Support	1.225	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2020 Plans: N/A ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A					
Title: UISS Test and Evaluation	1.600	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2020 Plans: N/A ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A					
Title: UISS Management Services	0.130	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2020 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A					
Title: MHU Support ***Articles:*** ***FY 2020 Plans:*** - Provide program management, engineering and logistics support for product improvements to forward-deployed MHU 1-4 USVs and C2 Station. Maintain Cybersecurity compliance by developing, managing and installing software updates on fielded MHUs and the C2 container. ***FY 2021 Base Plans:*** - Provide program management, engineering and logistics support for product improvements to forward-deployed MHU 1-4 USVs and C2 Station. Maintain Cybersecurity compliance by developing, managing and installing software updates on fielded MHUs and the C2 container. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Minor increase in FY 2021 for continued MHU support.	0.900 -	0.913 -	0.926 -	0.000 -	0.926 -
Title: MCM USV Product Development ***Articles:*** ***FY 2020 Plans:*** - Complete integration of an AQS-20C and AQS-24B with the MCM USV. - Demonstrate system capability from LCS and/or shore operations through Integration Testing. - Finalize technical data packages for MCM USV and sonar deploy and retrieve systems. - Continue integration testing with sonar payloads. - Continue Engineering Change Proposal (ECP) development for EDM and LRIP units. - Commence systems engineering efforts in support of LRIP production integration and test efforts.	14.499 -	19.184 -	11.460 -	0.000 -	11.460 -

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Continue tactics development, requirements definition and design of Mine Neutralization (Barracuda) payload and integration with MCM USV. ***FY 2021 Base Plans:*** - Continue tactics development, requirements definition and design of Mine Neutralization (Barracuda) payload and integration with MCM USV. - Achieve Ready for Training (RFT) status. - Commence MCM MP Development Testing (DT) and Technical Evaluation. - Conduct MCM USV + MH DT and User Operational Evaluation System (UOES). - Continue ECP development for Engineering Development Model (EDM), Low Rate Initial Production (LRIP), and Full Rate Production (FRP) units. - Continue systems engineering efforts in support of program and test efforts. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease in FY 2021 due to the completion of integration of the AQS-20C and AQS-24B with the MCM USV in FY 2020.					
Title: MCM USV Support	4.000	5.532	3.295	0.000	3.295
Articles:	-	-	-	-	-
FY 2020 Plans: - Support testing and assessment of system capabilities to determine Military utility. - Conduct efforts in support of Full Rate Production (FRP) preparations and Request for Proposal (RFP) release. - Continue to update MCM USV documentation to include Mine Neutralization, Minehunting, and Minesweeping. - Procure initial spares for test events. - Continue engineering, management and logistics support to achieve FRP decisions in FY 2021. - Continue to support MCM MP integration and testing. - Conduct efforts in support of FRP source selection and award. ***FY 2021 Base Plans:*** - Continue to support testing and assessment of system capabilities to determine Military utility. - Support program efforts under the USV Indefinite Delivery, Indefinite Quantity contract. - Continue to update MCM USV documentation to include Mine Neutralization, Minehunting, and Minesweeping.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Procure additional spares for test events. - Continue to support MCM MP integration and testing. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease in FY 2021 due to the completion of engineering, management and logistics support for the FRP decision in FY 2021.					
Title: MCM USV Test and Evaluation	4.150	5.500	3.255	0.000	3.255
Articles:	-	-	-	-	-
FY 2020 Plans: - Conduct UISS IOT&E testing - Continue contractor integration testing of MCM USV w/ AQS-24B and MCM USV w/ AQS-20C. - Conduct UOES testing with AQS-20C and AQS-24B. - Commence MCM USV DT with AQS-20C. - Commence MCM MP DT support. - Conduct UISS test and evaluation efforts associated with ECP incorporation. ***FY 2021 Base Plans:*** - Continue MCM MP DT support. - Conduct MCM USV test and evaluation efforts associated with ECP incorporation. - Commence support of MCM MP Technical Evaluation efforts. - Complete contractor integration testing of MCM USV w/ AQS-24B and MCM USV w/ AQS-20C. - Complete MCM USV DT with AQS-20C. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease in FY 2021 due to the completion of contractor integration testing and UOES testing.					
Title: MCM USV Management Services	0.241	0.390	0.231	0.000	0.231
Articles:	-	-	-	-	-
FY 2020 Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Provide program planning, management and acquisition document updates for the MCM USV program. - Conduct FRP proposal evaluation and manage award of FRP contract. ***FY 2021 Base Plans:*** - Provide program planning, management and acquisition document updates for the MCM USV program. - Manage FRP contract and options. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Decrease in FY 2021 due to the award of the FRP contract in FY 2021.					
Accomplishments/Planned Programs Subtotals	27.703	31.519	19.167	0.000	19.167

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• 0603596N: *LCS Mission Modules*	5.000	1.800	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	64.129
• OPN/1601: *LCS MCM Mission Modules*	98.901	64.789	218.822	-	218.822	222.754	234.330	243.187	247.949	1,111.812	2,666.795
• RDTE/0603502N/9999: *Congressional Add*	57.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	70.527
• OPN/2622: *Minesweeping System Replacement*	32.367	19.448	15.744	-	15.744	16.301	16.811	17.020	17.345	Continuing	Continuing

Remarks

RDT&E/0603596N - Funding shown only reflects funding for required USV development efforts.

RDT&E/0603502N/9999 - The above funding line accounts for several programs, of which the Unmanned Surface Vehicle programs are only a portion.

OPN/1601 - The above funding line accounts for several programs, of which the Unmanned Surface Vehicle programs are only a portion.

OPN/2622 - The above funding line accounts for several programs, of which the Unmanned Surface Vehicle programs are only a portion.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

D. Acquisition Strategy

UISS - Requirements are documented in the Unmanned Influence Sweep System (UISS) Capability Production Document (CPD). An Engineering and Manufacturing Development (E&MD) contract was awarded in FY 2014 with options for Low Rate Initial Production (LRIP) in FY 2019. In FY 2019-2020, MCM USV is developing a Capability Development Document (CDD) leveraging existing requirements (UISS, AN/AQS-20, MCM MP, etc.). In FY 2021, MCM USV anticipates a Full Rate Production (FRP) decision and will conduct a full and open competition for FRP contract(s). In FY 2020, MCM USV anticipates LRIP awards for up to 4 craft with sweep, following a Milestone C Decision.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 1234 / *Unmanned Surface Vehicle (USV)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Product Development	C/CPIF	Textron Systems, Inc : Hunt Valley, MD	32.187	0.958	Jan 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MHU: Product Development	SS/CPFF	JHU APL : Laurel, MD	12.215	0.000		0.000		0.000		-		0.000	0.000	12.215	-
MHU: Product Development	C/FPIF	Textron Systems, Inc : Hunt Valley, MD	7.545	0.000		0.000		0.000		-		0.000	0.000	7.545	-
MHU: Product Development	WR	NSWC PC : Panama City, FL	0.922	0.000		0.000		0.000		-		0.000	0.000	0.922	-
MHU: Product Development	WR	NUWC N : Newport, RI	0.740	0.000		0.000		0.000		-		0.000	0.000	0.740	-
MHU: Product Development	WR	NSWC CD : Bethesda, MD	0.235	0.000		0.000		0.000		-		0.000	0.000	0.235	-
MHU: Product Development	WR	Various : Various	0.570	0.000		0.000		0.000		-		0.000	0.000	0.570	-
MCM USV: Product Development 1	C/CPIF	Textron Systems, Inc : Hunt Valley, MD	0.000	0.000		2.084	Jan 2020	0.000		-		0.000	0.000	2.084	-
MCM USV: Product Development 2	C/FPIF	Textron Systems, Inc : Hunt Valley, MD	12.220	3.339	Jan 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MCM USV: Product Development1	C/CPFF	Textron Systems, Inc : Hunt Valley, MD	0.000	3.100	Jan 2019	9.000	Nov 2019	6.583	Nov 2020	-		6.583	Continuing	Continuing	Continuing
MCM USV: Product Development	SS/CPFF	Raytheon : Portsmouth, RI	10.202	1.975	Feb 2019	2.000	Nov 2019	1.000	Feb 2021	-		1.000	Continuing	Continuing	Continuing
MCM USV: Product Development	SS/CPFF	JHU APL : Laurel, MD	0.000	0.750	Feb 2019	2.000	Feb 2020	1.000	Feb 2021	-		1.000	Continuing	Continuing	Continuing
MCM USV: Product Development	WR	NSWC PC : Panama City, FL	0.925	2.610	Jan 2019	3.000	Nov 2019	1.823	Nov 2020	-		1.823	Continuing	Continuing	Continuing
MCM USV: Product Development	WR	NUWC N : Newport, RI	0.770	0.675	Jan 2019	0.500	Nov 2019	0.296	Nov 2020	-		0.296	Continuing	Continuing	Continuing
MCM USV: Product Development	WR	NSWC CD : Bethesda, MD	0.980	2.050	Jan 2019	0.600	Nov 2019	0.758	Nov 2020	-		0.758	Continuing	Continuing	Continuing
		Subtotal	79.511	15.457		19.184		11.460		-		11.460	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 1234 / *Unmanned Surface Vehicle (USV)*	

Support ($ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 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
UISS: Engineering Support	WR	NUWC N : Newport, RI	0.600	0.250	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Engineering Support	WR	NSWC PC : Panama City, FL	2.089	0.200	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Engineering Support	WR	NSWC CD : Bethesda, MD	1.811	0.100	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Engineering Support	C/CPFF	Textron Systems, Inc : Hunt Valley, MD	1.170	0.100	Jan 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Integrated Logistics	WR	NSWC PC : Panama City, FL	0.490	0.175	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Integrated Logistics	WR	NSWC CD : Bethesda, MD	0.751	0.200	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Integrated Logistics	C/CPFF	Textron Systems, Inc : Hunt Valley, MD	0.928	0.200	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	SSC PAC : San Diego, CA	0.338	0.030	Dec 2018	0.036	Dec 2019	0.040	Dec 2020	-		0.040	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	NSWC PC : Panama City, FL	0.933	0.840	Feb 2019	0.841	Feb 2020	0.846	Feb 2021	-		0.846	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	NUWC N : Newport, RI	0.853	0.000		0.000		0.000		-		0.000	0.000	0.853	-
MHU: Engineering Support	WR	NSWC CD : Bethesda, MD	0.278	0.030	Dec 2018	0.036	Dec 2019	0.040	Dec 2020	-		0.040	Continuing	Continuing	Continuing
MHU: Engineering Support	WR	Various : Various	0.520	0.000		0.000		0.000		-		0.000	0.000	0.520	-
MCM USV: Engineering Support	WR	NSWC PC : Panama City, FL	3.828	1.300	Jan 2019	1.750	Nov 2019	1.038	Nov 2020	-		1.038	Continuing	Continuing	Continuing
MCM USV: Engineering Support	WR	NUWC N : Newport, RI	2.120	0.800	Jan 2019	0.750	Nov 2019	0.443	Nov 2020	-		0.443	Continuing	Continuing	Continuing
MCM USV: Engineering Support	WR	NSWC CD : Bethesda, MD	0.300	0.000		0.400	Dec 2019	0.235	Nov 2020	-		0.235	0.000	0.935	-
MCM USV: Engineering Support	C/CPFF	Textron Systems, Inc : Hunt Valley, MD	0.000	0.215	Jan 2019	1.000	Nov 2019	0.590	Nov 2020	-		0.590	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MCM USV: Integrated Logistics	WR	NSWC PC : Panama City, FL	0.000	0.000		0.062	Dec 2019	0.099	Nov 2020	-		0.099	0.000	0.161	-
MCM USV: Integrated Logistics	WR	NSWC CD : Bethesda, MD	0.000	0.000		0.061	Dec 2019	0.089	Nov 2020	-		0.089	0.000	0.150	-
MCM USV: Integrated Logistics	SS/CPFF	Raytheon : Portsmouth, RI	0.000	0.400	Jan 2019	0.400	Dec 2019	0.178	Jan 2021	-		0.178	Continuing	Continuing	Continuing
MCM USV: Integrated Logistics	SS/CPFF	Northrup Grumman : Annapolis, MD	0.000	0.300	Mar 2019	0.300	Mar 2020	0.178	Jan 2021	-		0.178	Continuing	Continuing	Continuing
MCM USV: Integrated Logistics	C/CPFF	Textron Systems, Inc : Hunt Valley, MD	0.000	0.985	Feb 2019	0.809	Feb 2020	0.445	Dec 2020	-		0.445	Continuing	Continuing	Continuing
		Subtotal	17.009	6.125		6.445		4.221		-		4.221	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Test and Evaluation	WR	NSWC PC : Panama City, FL	1.030	1.025	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Test and Evaluation	WR	NSWC CD : Bethesda, MD	1.331	0.400	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Test and Evaluation	C/CPIF	Textron Systems, Inc : Hunt Valley, MD	1.709	0.175	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MCM USV: Test and Evaluation	WR	NSWC PC : Panama City, FL	0.000	2.050	Mar 2019	2.500	Dec 2019	1.465	Dec 2020	-		1.465	Continuing	Continuing	Continuing
MCM USV: Test and Evaluation	WR	NSWC CD : Bethesda, MD	0.000	0.200	Mar 2019	1.500	Dec 2019	0.879	Dec 2020	-		0.879	Continuing	Continuing	Continuing
MCM USV: Test and Evaluation	SS/CPFF	Raytheon : Portsmouth, RI	0.000	0.400	Mar 2019	0.500	Dec 2019	0.325	Dec 2020	-		0.325	Continuing	Continuing	Continuing
MCM USV: Test and Evaluation	C/CPFF	Textron Systems, Inc : Hunt Valley, MD	0.000	1.500	Mar 2019	1.000	Dec 2019	0.586	Dec 2020	-		0.586	0.000	3.086	-
		Subtotal	4.070	5.750		5.500		3.255		-		3.255	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Travel	WR	NAVSEA : Washington, DC	0.275	0.020	Jan 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
UISS: Management	C/CPAF	TBD : TBD	2.164	0.110	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
MCM USV: Travel	WR	NAVSEA : Washington, DC	0.100	0.100	Jan 2019	0.120	Jan 2020	0.069	Jan 2021	-		0.069	Continuing	Continuing	Continuing
MCM USV: Management	C/CPAF	TBD : TBD	0.150	0.141	Nov 2018	0.270	Nov 2019	0.162	Nov 2020	-		0.162	Continuing	Continuing	Continuing
		Subtotal	2.689	0.371		0.390		0.231		-		0.231	Continuing	Continuing	N/A

	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	103.279	27.703		31.519		19.167		-		19.167	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

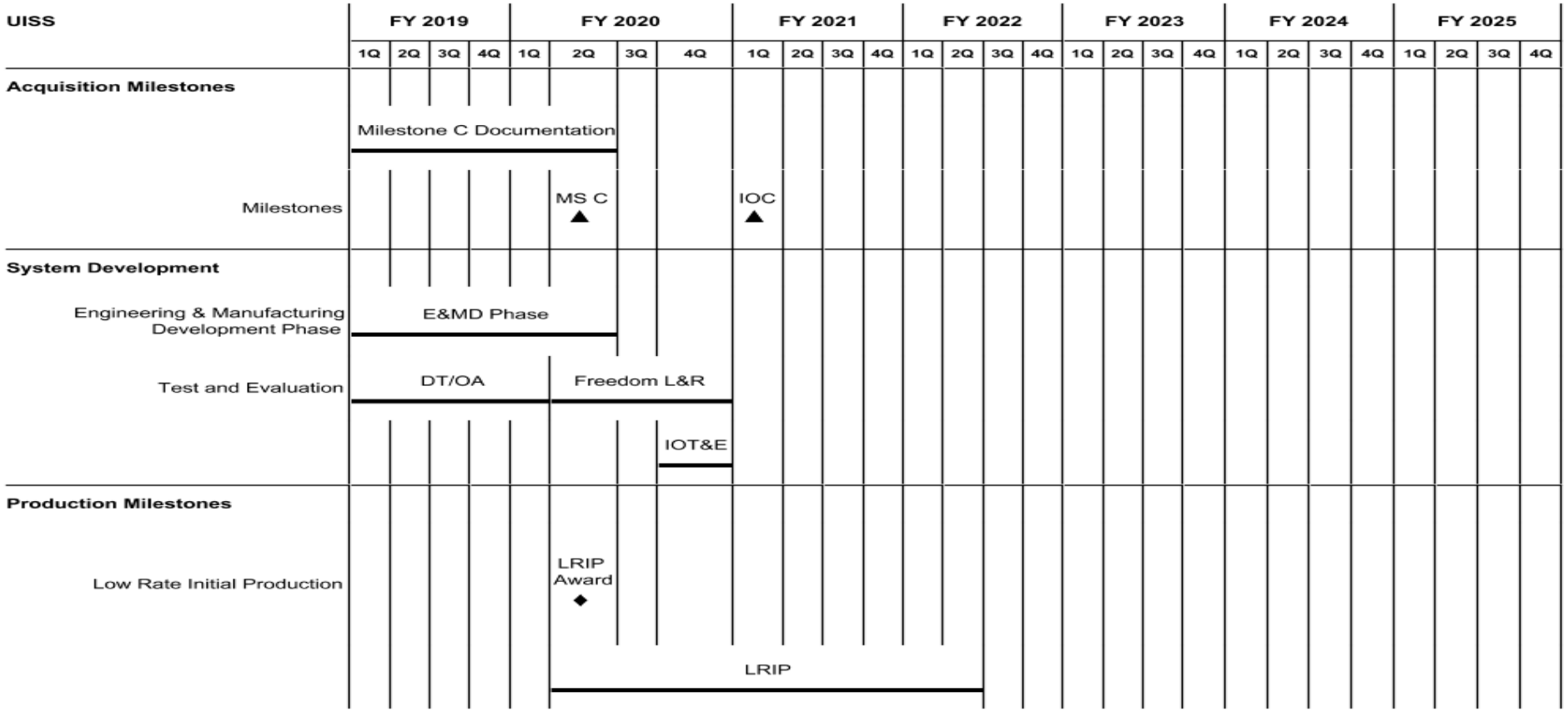

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

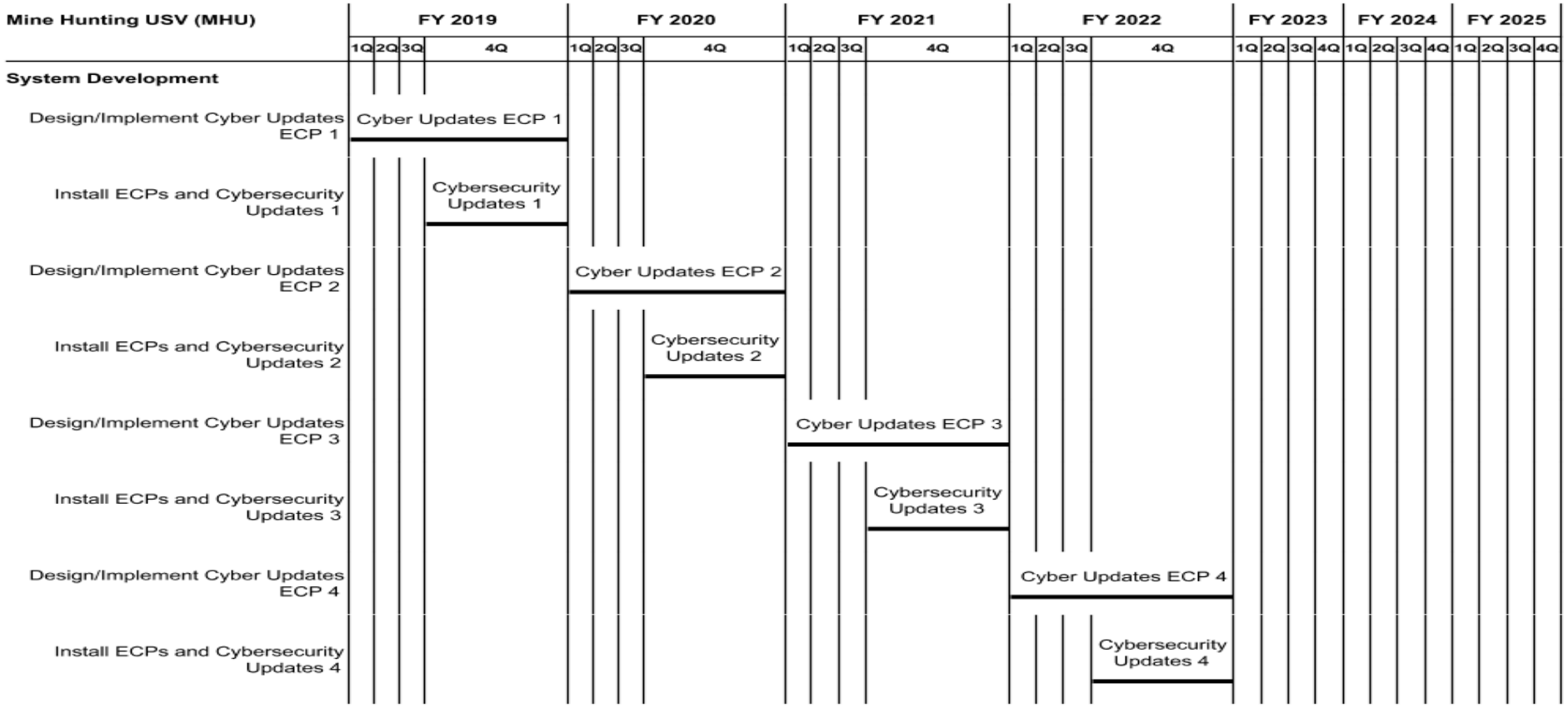

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

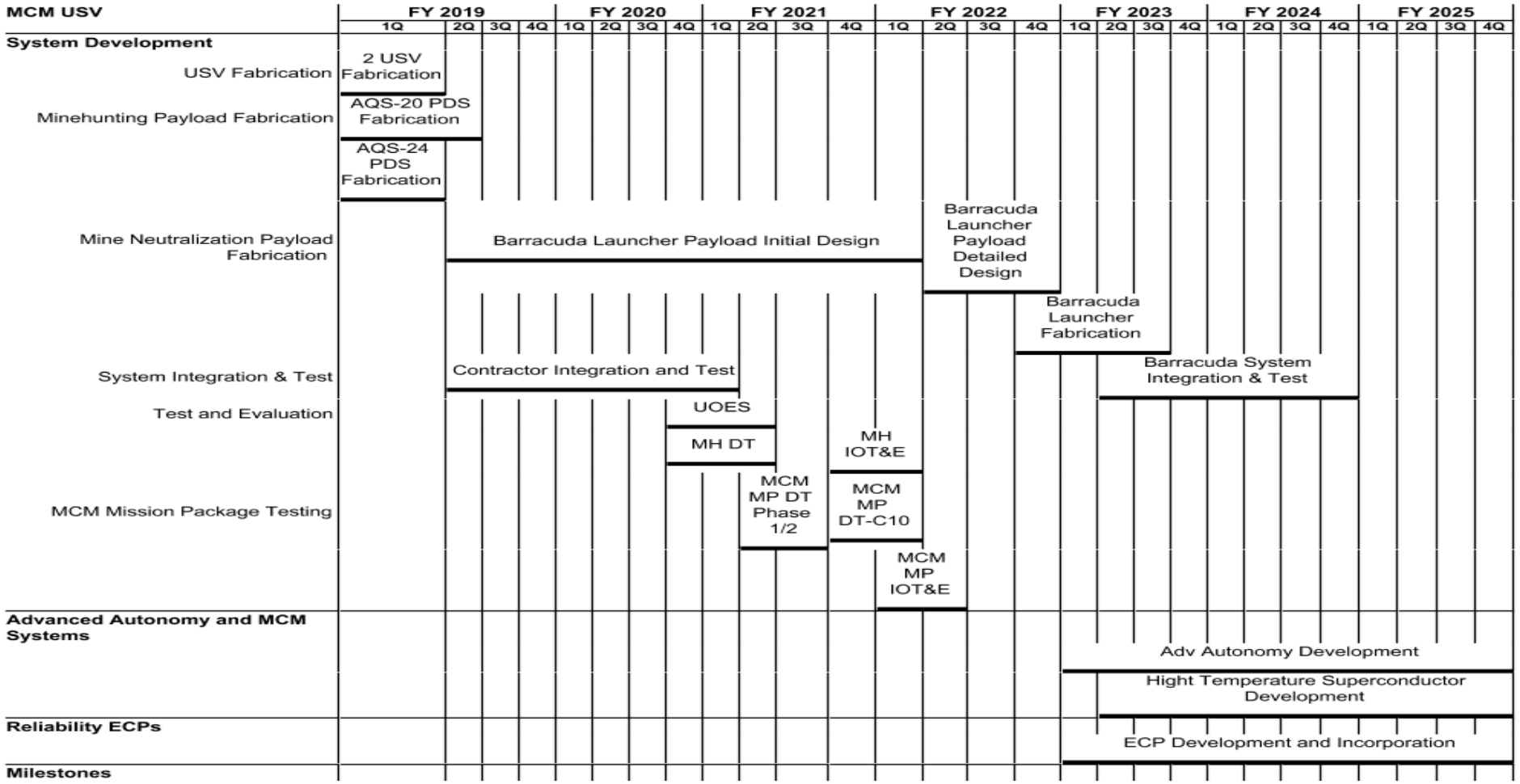

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

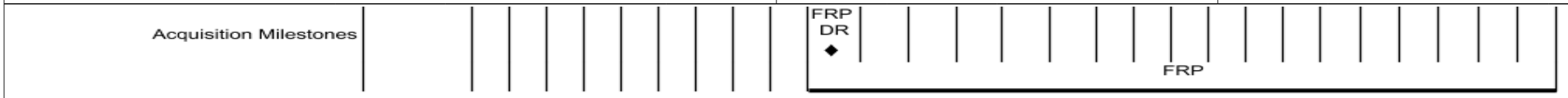

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
UISS				
Acquisition Milestones: Milestone C Documentation	1	2019	2	2020
Acquisition Milestones: Milestones: Milestone C	2	2020	2	2020
Acquisition Milestones: Milestones: Initial Operational Capability	1	2021	1	2021
System Development: Engineering & Manufacturing Development Phase: Engineering & Manufacturing Development Phase	1	2019	2	2020
System Development: Test and Evaluation: DT Testing	1	2019	1	2020
System Development: Test and Evaluation: LCS L&R	2	2020	4	2020
System Development: Test and Evaluation: Initial Operational Test & Evaluation	4	2020	4	2020
Production Milestones: Low Rate Initial Production: LRIP Contract Award	2	2020	2	2020
Production Milestones: Low Rate Initial Production: LRIP Production	2	2020	2	2022
Mine Hunting USV (MHU)				
System Development: Design/Implement Cyber Updates ECP 1: Design/Implement Cyber Updates ECP 1	1	2019	4	2019
System Development: Install ECPs and Cybersecurity Updates 1: Install ECPs and Cybersecurity Updates 1	4	2019	4	2019
System Development: Design/Implement Cyber Updates ECP 2: Design/Implement Cyber Updates ECP 2	1	2020	4	2020
System Development: Install ECPs and Cybersecurity Updates 2: Install ECPs and Cybersecurity Updates 2	4	2020	4	2020
System Development: Design/Implement Cyber Updates ECP 3: Design/Implement Cyber Updates ECP 3	1	2021	4	2021
System Development: Install ECPs and Cybersecurity Updates 3: Install ECPs and Cybersecurity Updates 3	4	2021	4	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 1234 / *Unmanned Surface Vehicle (USV)*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
System Development: Design/Implement Cyber Updates ECP 4: Design/Implement Cyber Updates ECP 4	1	2022	4	2022
System Development: Install ECPs and Cybersecurity Updates 4: Install ECPs and Cybersecurity Updates 4	4	2022	4	2022
MCM USV				
System Development: USV Fabrication: 2 USV Fabrication	1	2019	1	2019
System Development: Minehunting Payload Fabrication: AQS-20 PDS Fabrication	1	2019	2	2019
System Development: Minehunting Payload Fabrication: AQS-24 PDS Fabrication	1	2019	1	2019
System Development: Mine Neutralization Payload Fabrication: Barracuda Launcher Payload Initial Design	2	2019	1	2022
System Development: Mine Neutralization Payload Fabrication: Barracuda Launcher Payload Detailed Design	2	2022	4	2022
System Development: Mine Neutralization Payload Fabrication: Barracuda Launcher Fabrication	4	2022	3	2023
System Development: System Integration & Test: System Integration and Test	2	2019	1	2021
System Development: System Integration & Test: Barracuda System Integration & Test	2	2023	4	2024
System Development: Test and Evaluation: UOES	4	2020	2	2021
System Development: Test and Evaluation: Minehunt Development Test	4	2020	2	2021
System Development: Test and Evaluation: Minehunt Initial Operational Test & Evaluation (IOT&E)	4	2021	1	2022
System Development: MCM Mission Package Testing: Developmental Testing	2	2021	3	2021
System Development: MCM Mission Package Testing: MCM MP DT-C10	4	2021	1	2022
System Development: MCM Mission Package Testing: IOT&E	1	2022	2	2022
Advanced Autonomy and MCM Systems: Advanced Autonomy Development	1	2023	4	2025
Advanced Autonomy and MCM Systems: High Temperature Superconductor (HTS)	2	2023	4	2025
Reliability ECPs: Long-term Reliability Enhancements	1	2023	4	2025
Milestones: Acquisition Milestones: Full Rate Production Decision Review	3	2021	3	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
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	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Milestones: Acquisition Milestones: Full Rate Production	3	2021	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 2989 / *Barracuda*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
2989: *Barracuda*	20.572	27.739	28.641	33.191	-	33.191	38.360	37.825	38.586	39.358	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Barracuda system is an expendable, modular, mine neutralizer launched from the Mine Countermeasures (MCM) Unmanned Surface Vessel (USV) as part of the Littoral Combat Ship (LCS) MCM Mission Package (MP) to autonomously reacquire and neutralize previously detected near-surface mines. Upon entering the water, the vehicle will conduct a search, capture an image and, use a communications buoy to send the image to the operator in the MCM MP to evaluate the image and order the weapon to fire, abort, or continue searching. Future capabilities may include launch from manned or unmanned aircraft or vessels of opportunity as well as the ability to neutralize mines in volume and on the bottom.

The Barracuda detailed design and development contract (awarded April 2018) funds system design, program management, systems engineering, software development, integrated product support and contractor testing.

FY2021 funds the detailed design and development contract.

Engineering Development Models (EDMs) will be purchased starting in FY 2023 for tests starting in Q1 FY2023. There is a 12-month lead time between procurement and delivery.
Low Rate Initial Production (LRIP) units will be purchased following Milestone C.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Barracuda: Product Development	22.764	23.785	28.238	0.000	28.238
Articles:	-	-	-	-	-
FY 2020 Plans: Continue detailed system design in support of Critical Design Review (CDR). The program will conduct long-lead time risk reduction for warhead, fuze, and autonomy. Conduct contractor prototyping and development in advance of CDR.					
FY 2021 Base Plans: Conduct PDR for product support and test support equipment. Conduct contractor prototyping and development in support of CDR.					
FY 2021 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increased funding will support ramp up required to support CDR.					
Title: Barracuda: Engineering Support	4.758	4.621	4.621	0.000	4.621
Articles:	-	-	-	-	-
FY 2020 Plans: Continue detailed system design for CDR. Conduct and manage safety reviews as design matures. Evaluate and manage contractor deliverables, overseeing system engineering design and establish system configuration management. The program will conduct risk reduction for warhead, fuze, and autonomy. ***FY 2021 Base Plans:*** Conduct and manage safety reviews as design matures. Evaluate and manage contractor deliverables, overseeing system engineering design and maintain system configuration management. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** N/A					
Title: Barracuda: Management Services	0.217	0.235	0.332	0.000	0.332
Articles:	-	-	-	-	-
FY 2020 Plans: Continue to provide program management, financial management and engineering support. ***FY 2021 Base Plans:*** Continue to provide program management, financial management and engineering support. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Increased FY 2021 management costs support ramp up of support required to support CDR.					
Accomplishments/Planned Programs Subtotals	27.739	28.641	33.191	0.000	33.191

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The Barracuda program awarded a competitive contract in FY 2018 to Raytheon Integrated Defense Systems (IDS) in Middletown RI. The Barracuda program is developing a semi-autonomous mine neutralization system as part of the LCS MCM MP. Initial concepts were based on small UUVs developed as part of the ONR Single Sortie, Detect to Engage Future Naval Capabilities project (FY15-18). The overall engineering approach is to leverage known technologies and established interfaces in addition to early prototyping and qualification testing to retire risk before purchasing units for developmental testing.

In FY 2020 the program will continue detailed design in advance of CDR as part of the program rebaseline. The program will prioritize risk reduction efforts on warhead, fuze and autonomy. Contractor will commence contractor prototyping.

In FY 2021, the program will conduct and manage safety reviews as design matures as a risk reduction method. The contractor will conduct the second phase of prototyping.

In FY 2022, the program will conduct CDR and the contractor will complete the final phase prototyping.

In FY 2023, the EDM contract for 150 neutralizers will be awarded and contractor testing will commence with delivery in FY24.

In FY 2024, the contractor will complete Contractor testing. The Barracuda program will take delivery of the neutralizer EDMs and complete developmental testing (DT). An operational assessment will be conducted from a vessel of opportunity using surrogate test support equipment or MCM USV to evaluate Barracuda performance. As test platforms are available, Barracuda will conduct MCM USV and LCL MCM MP integration in advance of Milestone C and LRIP procurement in FY2025.

In FY 2025, Milestone C will be accomplished and LRIP Option 1 will be exercised.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Barracuda Hardware/ Support	C/CPIF	Raytheon (Integrated Defense Systems) : Portsmouth, RI	16.118	22.764	Jan 2019	23.785	Jan 2020	28.238	Dec 2020	-		28.238	0.000	90.905	92.000
		Subtotal	16.118	22.764		23.785		28.238		-		28.238	0.000	90.905	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Barracuda Engineering Support	WR	NUWC NPT : Newport, RI	0.544	0.449	Dec 2018	0.569	Dec 2019	1.040	Dec 2020	-		1.040	Continuing	Continuing	Continuing
Barracuda Engineering Services	C/CPIF	JHU APL : Baltimore, MD	0.598	0.710	Dec 2018	0.801	Dec 2019	0.658	Dec 2020	-		0.658	Continuing	Continuing	Continuing
Barracuda Engineering Support	WR	NSWC, PC : Panama City, FL	1.322	1.352	Dec 2018	1.400	Dec 2019	1.708	Dec 2020	-		1.708	Continuing	Continuing	Continuing
Barracuda Support	WR	NSWC, IHD : Indian Head, MD	1.257	1.359	Dec 2018	1.275	Dec 2019	0.723	Dec 2020	-		0.723	0.000	4.614	-
Barracuda Support	WR	Naval Research Lab : Washington, DC	0.193	0.578	Dec 2018	0.302	Dec 2019	0.212	Dec 2020	-		0.212	0.000	1.285	-
Barracuda Support	WR	NSWC, Carderock : Bethesda, MD	0.254	0.310	Dec 2018	0.274	Dec 2019	0.280	Dec 2020	-		0.280	0.000	1.118	-
		Subtotal	4.168	4.758		4.621		4.621		-		4.621	Continuing	Continuing	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Barracuda Management Support	WR	NSWC, PC : Panama City, FL	0.286	0.217	Dec 2018	0.235	Dec 2019	0.332	Dec 2020	-		0.332	0.000	1.070	-
		Subtotal	0.286	0.217		0.235		0.332		-		0.332	0.000	1.070	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 2989 / *Barracuda*	

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	20.572	27.739		28.641		33.191		-		33.191	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 2989 / *Barracuda*

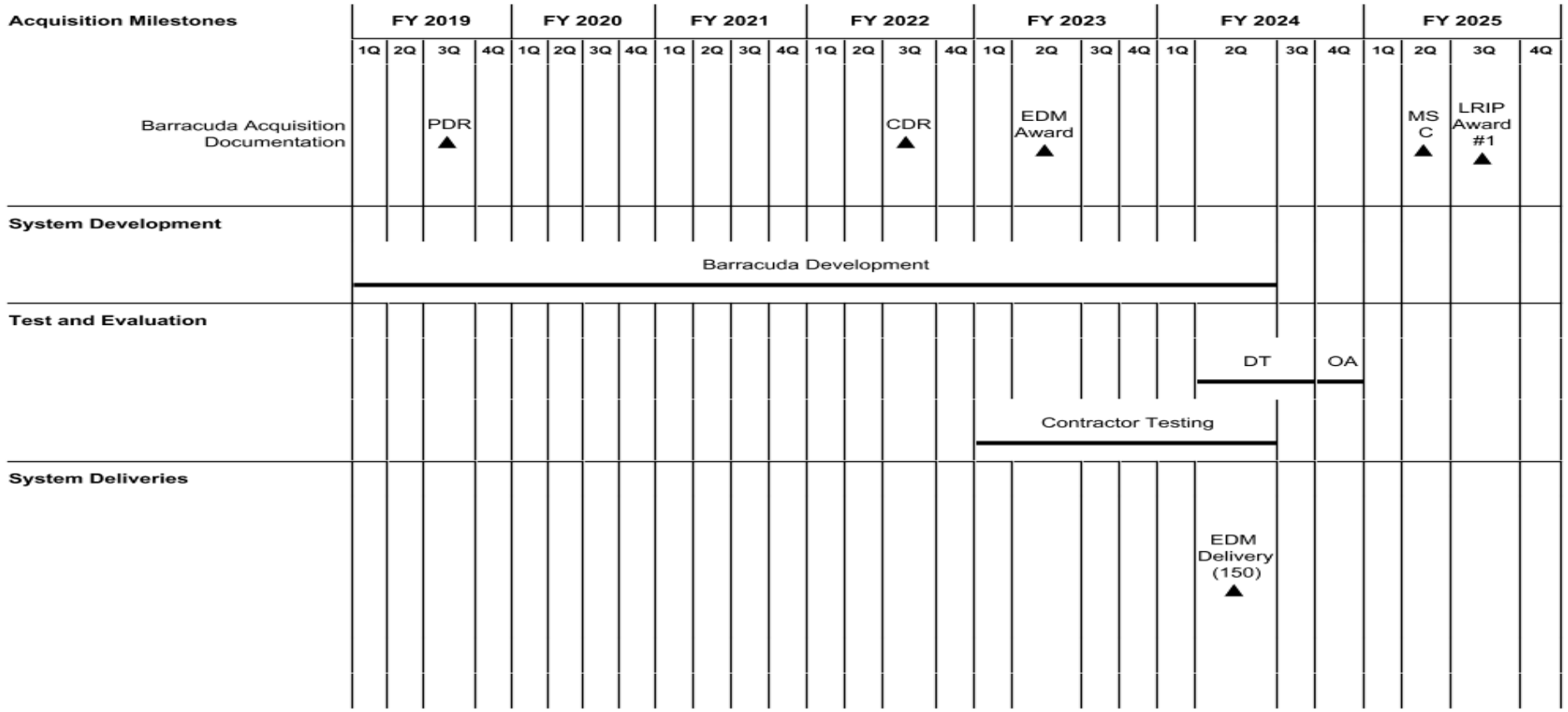

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Acquisition Milestones				
Barracuda Acquisition Documentation: Preliminary Design Review	3	2019	3	2019
Barracuda Acquisition Documentation: Critical Design Review	3	2022	3	2022
Barracuda Acquisition Documentation: Milestone C	2	2025	2	2025
Barracuda Acquisition Documentation: Engineering Development Models (EDM)	2	2023	2	2023
Barracuda Acquisition Documentation: Low Rate Initial Product Units #1	3	2025	3	2025
System Development: Barracuda Development	1	2019	2	2024
Test and Evaluation: Development Testing	2	2024	3	2024
Test and Evaluation: Operational Assessment	4	2024	4	2024
Test and Evaluation: Contractor Qual Testing	1	2023	2	2024
System Deliveries: Incremental Engineering Development Model Deliveries	2	2024	2	2024

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3066 / *Large Unmanned Surface Vessel (LUSV)*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
3066: *Large Unmanned Surface Vessel (LUSV)*	0.000	0.000	273.327	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	273.327
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The Large Unmanned Surface Vessel (LUSV) project was a new start effort in FY 2020 that leveraged efforts under PE 0604250D8Z through the Office of the Secretary of Defense (OSD) Strategic Capabilities Office (SCO) Ghost Fleet - Overlord project. In FY 2021, the Navy will continue efforts started in FY 2020 and will procure Overlord prototypes, based on commercial ship designs and intended to employ modular payloads.

FY 2021 and future funding for Project 3066 were realigned to Program Element 0603178N.

A. Mission Description and Budget Item Justification

The Large Unmanned Surface Vessel (LUSV) project provides resources for the detailed design, construction, testing, fleet introduction, and support of the LUSV.

LUSVs will provide affordable, high endurance, ships able to accommodate various payloads augmenting the Navy's manned surface force in supporting the Future Surface Combatant Force (FSCF) program and Distributed Maritime Operations (DMO) concept. The platforms will be capable of weeks-long deployments and trans-oceanic transits and operate aggregated with Carrier Strike Groups (CSGs), Amphibious Ready Groups (ARGs), Surface Action Groups (SAGs), and individual manned combatants.

The LUSV will be delivered and fielded initially as research and development prototype vessels intended to demonstrate successful integration of government furnished Command, Control, Communications, Computers and Intelligence (C4I) and combat systems and the reliability of automated hull, mechanical, and electrical (HM&E) systems. In FY 2020, the Navy intends to procure Overlord prototypes capable of employing modular payloads but also integrating the organic capability needed for the LUSV program. These vessels will also continue to build on the lessons learned through the Office of the Secretary of Defense (OSD) Strategic Capabilities Office (SCO) Ghost Fleet - Overlord project. Future LUSVs will incorporate reservations in the design for future combat capabilities as a step toward the desired goal of delivering a LUSV in FY 2026 with an integrated combat system and organic payloads supporting Anti-Surface Warfare (ASuW) and Strike mission areas. Other potential future LUSV capabilities are being informed by the Navy's FSCF Analysis of Alternatives (AoA) and will be refined as future payloads and concepts of operations (CONOPs) are developed. Fielding of LUSV will provide the Navy increased capability and necessary capacity at lower projected procurement and sustainment costs, reduced risk to sailors and increased readiness by assuming missions from manned combatants.

LUSVs will be based on commercial specifications and greater than 190ft in length in order to provide a long-endurance platform with sufficient margin in the design to support the incorporation of combat systems and future payloads. LUSVs will be capable of autonomous navigation, transit planning, and COLREGS-compliant maneuvering and will be designed with automated propulsion, electrical generation, and support systems. LUSV missions will be conducted with operators in-the-

loop (with continuous or near-continuous observation or control) or on-the-loop (autonomous operation that prompts operator action/intervention from sensory input or autonomous behaviors).

The LUSV integrated combat system will be developed under the Unmanned Surface Vehicle Enabling Capabilities (Project 3067). Modular payloads may be developed separately by other programs or prototyping efforts and will be further developed and/or integrated into LUSV under the Enabling Capabilities project that supports both the LUSV and MUSV projects. Key combat systems and payload technologies and enablers will continue to be developed and matured, leading to an at-sea capstone demonstration of the complete firing chain remotely commanded from a surface combatant in FY 2022.

The LUSV equipped with an integrated combat system and organic payload capability will not be capable of autonomous payload engagement or execution of a complete detect-to-engage sequence. The vessel will be incapable of payload activation, deactivation, or engagement without the deliberate action of a remote, off-hull human operator. The LUSV's combat systems and C4I configuration will ensure that a remote human operator must always positively command all payload activation, deactivation, and engagement.

The LUSV program will integrate current Navy combat systems programs of record that have been adapted to enable remote monitoring and operational control from an off-hull command and control point, and will not be equipped with components that would enable payload engagement from onboard the vessel. USV Command and Control (C2) will be maintained via an afloat element (i.e., embarked on a United States Navy (USN) combatant/support ship), or via the ashore element (C2 station ashore). LUSV C2, combat and/or weapon system integration will employ tamper proofing and security controls to prevent disclosure of data and electronic warfare defenses during autonomous operation. LUSVs will employ a Risk Management Framework (RMF) approach with physical, technical and administrative security controls and LUSVs will have hardware and software components to protect classified/sensitive functions, countermeasures designed to thwart adversary exploitation, anti-tamper mechanisms to prevent disclosure of data, and electronic warfare defenses.

LUSV will continue to leverage efforts external to this project unit accomplished through the OSD SCO Ghost Fleet - Overlord project that will complete in FY 2021. Overlord converts existing commercial fast supply vessels into experimentation LUSVs, with the end goal to demonstrate relevant Navy Surface Warfare missions utilizing modular prototype payloads. The Overlord systems are advancing the technology needed for autonomous operation of pier-launched vessels as well as increase the reliability and redundancy required to support Hull, Mechanical, and Electrical (HM&E) systems for unmanned vessels. The two existing Ghost Fleet Overlord prototypes procured in FY 2019 will be turned over to the Navy at the conclusion of the testing program at the end of FY 2021. The Navy's Surface Development Squadron (SURFDEVRON) will use the vessels for continued testing, experimentation, and refinement of unmanned platform CONOPs and Tactics, Techniques, and Procedures (TTPs) to operate and fight alongside crewed platforms. Each vessel is anticipated to provide up to 1,000 hours annually of experimentation time, which will be used to further test and prove autonomous behaviors and reliability and automation of hull, mechanical, and electrical systems.

In FY 2020, the Navy will procure two Overlord prototypes which will deliver in FY 2021. One vessel will be procured from each of the vendors on the current Washington Headquarters Services contract. Additional Overlord prototype(s) will be procured in FY21.

Conceptual Design contracts are planned for award in FY 2020 to develop a LUSV with reservations in the design to support integration of future capabilities, supporting a competitive Detail Design and Construction contract for a prototype LUSV hull form in FY 2022 and subsequent LUSV vessels.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3066 / *Large Unmanned Surface Vessel (LUSV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Product Development	0.000	252.311	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2020 Plans: In order to reduce risk and ensure technology reaches the required maturity level to support LUSV plans in FY 2021, the Navy plans to procure quantity two (2) Ghost Fleet Overlord Block 2 experimentation vessels via the existing Ghost Fleet - Overlord contract vehicle established under PE 0604250D8Z through the Office of the Secretary of Defense (OSD) Strategic Capabilities Office (SCO) in FY 2020. These vessels are based on commercial designs. The Navy will procure and provide GFE in the form of communications gear, USV Command and Control (C2) software, and prototype modular payloads (also developed by separate OSD SCO programs). While these systems will be deployable assets, the Navy plans to place these units in a Surface Development Squadron to ensure Tactics, Techniques and Procedures (TTPs) are refined to allow the fleet to operate and fight alongside manned systems. The OSD SCO Ghost Fleet - Overlord project will influence the requirements and specifications for the Navy's desired LUSV. The Navy will award multiple Conceptual Design efforts in FY 2020 to develop a Performance Specification for a LUSV design based on commercial vessel specifications capable of integrating future combat systems and payloads. The Conceptual Design effort will continue into FY 2021. Efforts in FY 2020 will also include technology development and maturation efforts to integrate government furnished combat systems and C4I equipment into the LUSV design. ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.					
Title: Support	0.000	19.016	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2020 Plans: Award Conceptual Design contract(s) to develop a LUSV Performance Specification for design capable of integrating future combat systems and payloads. Support technology development and maturation efforts and					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3066 / *Large Unmanned Surface Vessel (LUSV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
the development of requirements and acquisition documentation including a Capability Development Document, System Engineering Plan (SEP), Test and Evaluation Master Plan (TEMP), Life Cycle Support Plan (LCSP), Cybersecurity Strategy, Open Systems Architecture Management Plan, Quality Assurance Program Plan, Reliability and Maintainability Program Plan, Configuration Management Plan, Software Development Plan, and Program Protection Plan (PPP). ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.					
Title: Management Services ***Articles:*** ***FY 2020 Plans:*** Develop all governing documentation as required to support activities leading up to the award of the first two LUSVs and to support future program milestones. This includes the creation of the following artifacts: development of requirements and acquisition documentation including a Capability Development Document, Systems Engineering Plan (SEP), Test and Evaluation Master Plan (TEMP), Life Cycle Support Plan (LCSP), Cybersecurity Strategy, Open Systems Architecture Management Plan, Quality Assurance Program Plan, Reliability Maintainability Program Plan, Configuration Management Plan, Software Development Plan, and Program Protection Plan (PPP). ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.	0.000 -	2.000 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	0.000	273.327	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3066 / *Large Unmanned Surface Vessel (LUSV)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTEN/0603178N/3066: *Large Unmanned Surface Vehicle (LUSV)*	0.000	0.000	238.617	-	238.617	377.200	144.549	198.720	134.948	Continuing	Continuing

Remarks

D. Acquisition Strategy

In FY 2020, the Navy will procure two prototype experimentation vessels as a means to mitigate technical risk and continue to generate lessons learned through testing and experimentation, which will be delivered in FY 2021. In FY 2020, the Navy will award multiple Conceptual Design contracts for a LUSV with reservations in the design to integrate future payloads, which will inform the final Performance Specification. Following in FY 2021, the Navy intends to procure up to two additional prototype experimentation vessels intended to build on the lessons learned through the Overlord project, designed to employ modular payloads and will serve as additional combat systems, C4I, and HM&E test and evaluation platforms as well as be used to further refine CONOPs and TTPs. Also in FY 2021, the Navy will release a RFP solicitation in support of a full and open competition, and will award a DD&C contract for one prototype LUSV with reservations to integrate future payloads, as a step towards delivering a LUSV with the ICS and VLS. In FY 2023, the Navy plans to proceed to serial production of LUSVs with ICS and VLS using SCN appropriations. The FY 2021 President's Budget request plan procures ten vessels throughout the FY 2021 President's Budget request FYDP, two prototype experimentation vessels and one prototype LUSV using FY22 RDTEN funding in Project 3066, then two LUSVs with ICS and VLS yearly in FY 2023 and FY 2024, and three in FY 2025 using SCN. All planned procurements are fully funded in the year of procurement, regardless of appropriation.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3066 / *Large Unmanned Surface Vessel (LUSV)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
LUSV Conceptual Design	C/CPIF	TBD : TBD	0.000	0.000		50.000	Feb 2020	0.000		-		0.000	0.000	50.000	-
OVERLORD Fabrication & System/Payload Integration	C/CPIF	TBD : TBD	0.000	0.000		94.807	Jan 2020	0.000		-		0.000	0.000	94.807	-
LUSV GFE/Long Lead Time Material	C/FFP	TBD : TBD	0.000	0.000		26.000	May 2020	0.000		-		0.000	0.000	26.000	-
LUSV Specification/ Hardware Contract Support	WR	Various : Various	0.000	0.000		6.000	Jan 2020	0.000		-		0.000	0.000	6.000	-
LUSV Combat Systems/ C4I/HM&E Automation Design and Testing	Various	TBD : TBD	0.000	0.000		57.255	Feb 2020	0.000		-		0.000	0.000	57.255	-
Overlord Experimentation	Various	Various : Various	0.000	0.000		18.249	Mar 2020	0.000		-		0.000	0.000	18.249	-
		Subtotal	0.000	0.000		252.311		0.000		-		0.000	0.000	252.311	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SUPSHIP, WF Center Support	WR	Various : Various	0.000	0.000		17.766	Feb 2020	0.000		-		0.000	0.000	17.766	-
LUSV Source Selection	WR	Various : Various	0.000	0.000		1.250	Jan 2020	0.000		-		0.000	0.000	1.250	-
		Subtotal	0.000	0.000		19.016		0.000		-		0.000	0.000	19.016	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	WR	NAVSEA : Washington, DC	0.000	0.000		0.200	Jan 2020	0.000		-		0.000	0.000	0.200	-
Management Services	WR	Various : Various	0.000	0.000		1.800	Jan 2020	0.000		-		0.000	0.000	1.800	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3066 / *Large Unmanned Surface Vessel (LUSV)*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	0.000	0.000		2.000		0.000		-		0.000	0.000	2.000	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		273.327		0.000		-		0.000	0.000	273.327	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3066 / *Large Unmanned Surface Vessel (LUSV)*

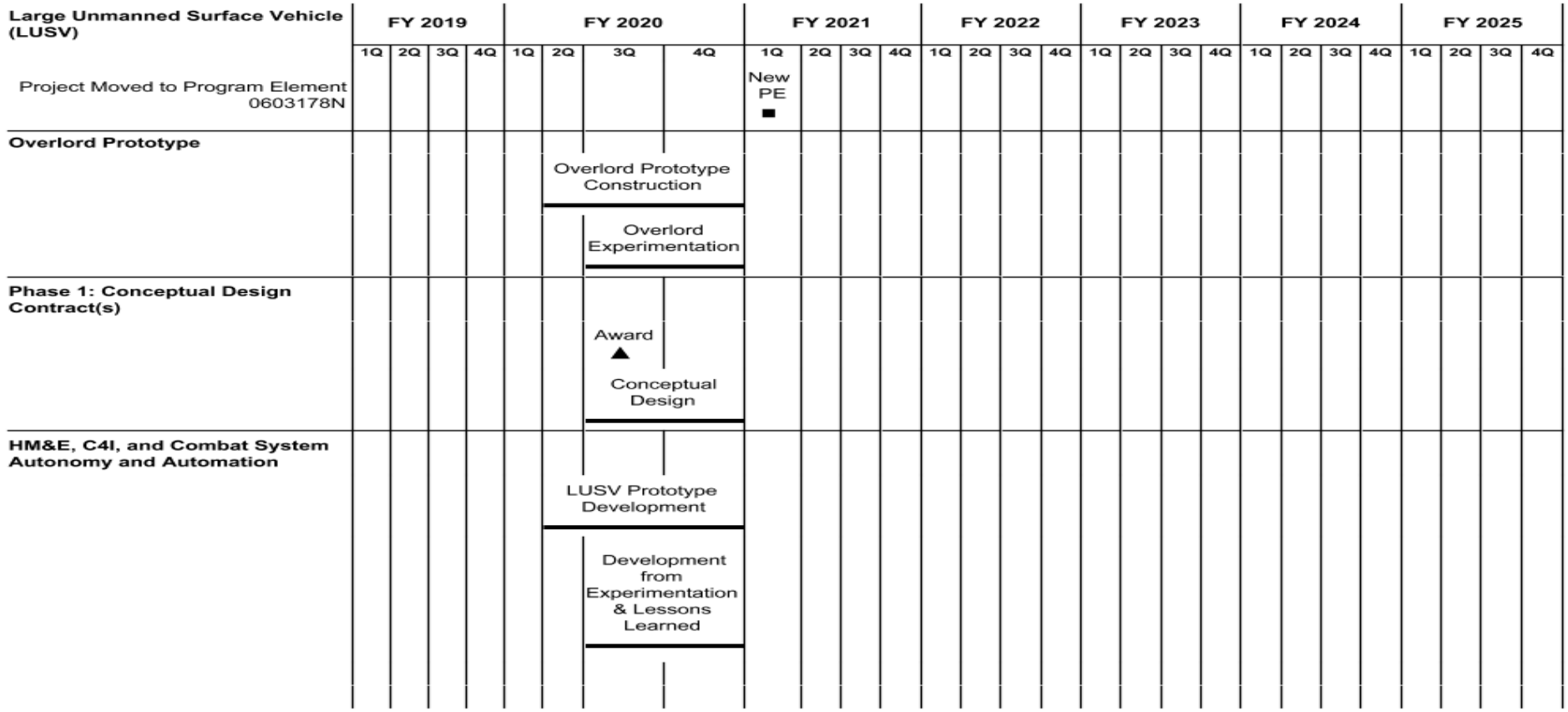

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3066 / *Large Unmanned Surface Vessel (LUSV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Large Unmanned Surface Vehicle (LUSV)				
Project Moved to Program Element 0603178N: Project Moved to Program Element 0603178N	1	2021	1	2021
Overlord Prototype: Overlord Prototype Construction (options on WHS contract)	2	2020	4	2020
Overlord Prototype: Overlord Experimentation	3	2020	4	2020
Phase 1: Conceptual Design Contract(s): Conceptual Design Contract(s) Award	3	2020	3	2020
Phase 1: Conceptual Design Contract(s): Conceptual Design	3	2020	4	2020
HM&E, C4I, and Combat System Autonomy and Automation: LUSV Prototype Development	2	2020	4	2020
HM&E, C4I, and Combat System Autonomy and Automation: Development from Experimentation & Lessons Learned	3	2020	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3067 / *Unmanned Surface Vehicle Enabling Capabilities*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
3067: *Unmanned Surface Vehicle Enabling Capabilities*	0.000	0.000	50.413	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	50.413
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

FY 2021 and future funding for Project 3067 were realigned to Program Element 0603178N.

A. Mission Description and Budget Item Justification

In order to accelerate future capability and support steady growth of the Navy's Unmanned Surface Vehicle (USV) Family of Systems (FoS), the Unmanned Surface Vessel Enabling Capabilities project includes development, test, and integration of USV technologies; the advancement of Defense Advanced Research Projects Agency (DARPA), Office of the Secretary of Defense (OSD) Strategic Capabilities Office (SCO), Office of Naval Research (ONR) and Industry USV efforts for associated technologies and the development and fabrication of payloads for Large Unmanned Surface Vessels (LUSVs) and Medium Unmanned Surface Vehicles (MUSVs). USV technology efforts in this project unit support demonstration of mission level autonomy, communications, command and control, navigation compliance with the International Regulations for Preventing Collisions at Sea 1972 (COLREGS), endurance, at sea replenishment, payload feasibility, mission planning and execution for the Office of the Secretary of Defense (OSD) Strategic Capabilities Office (SCO) Overlord efforts, and enabling technologies for other USVs in the USV FoS, as applicable.

Modular payloads employed by LUSVs and MUSVs will be developed under this project unit. Payloads will be customized to meet Navy needs and demonstrate useful capability for the Fleet. MUSVs will achieve their mission capability through their employment of modular payloads. LUSVs will augment their organic warfare capabilities with additional modular payloads.

Efforts to develop LUSV organic warfare capability will also be executed under this project. In order to support LUSV future missions, investment in LUSV payload development, payload integration, and Integrated Combat System (ICS) development is required. Investment is also needed to support LUSV payload testing and follow-on operations. Due to the nature of this project, specific applications and detailed plans are available at a higher classification.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Product Development	0.000	44.613	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2020 Plans: Utilize Future Surface Combatant Force (FSCF) Technology Investment Strategy to transition mature products to USVs that increase capabilities to levels required to support Navy warfighting requirements efforts that include					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3067 / *Unmanned Surface Vehicle Enabling Capabilities*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
developing and integrating innovative payloads onto USVs to improve warfighting capabilities. Utilize FSCF payload investments developed by Office of the Secretary of Defense (OSD) Strategic Capabilities Office (SCO) to support the acquisition and integration of payload capabilities, development of the Integrated Combat System (ICS) and plans for industry competition for both large and small businesses (i.e., Request for Proposal (RFP) development, SBIR Phase III). Leveraging the Naval Research and Development Enterprise and industry, options will be assessed for the impact to warfighting capabilities. FY 2020 efforts will include technical studies for Elevated Sensor technologies/modalities to provide wide defensive radar coverage and detect/track/identify objects from extended distances. Efforts will also include the development of Elevated Sensor contract(s) to design, develop, and demonstrate a persistent airborne system capable of providing USVs with more time and more battle space to identify potential threats and make critical decisions. Initial requirements derived through market research and studies will drive design efforts of prototype systems of explosive and non-lethal payloads. The payloads will be initially integrated and demonstrated on the Overlord vessels, and developed for integration into other applicable FoS USVs when ready. Develop and deliver an ICS for USVs that will be ready for combined and integrated capabilities, with the ICS infrastructure ready to support any future capabilities. ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.					
Title: Support ***Articles:*** ***FY 2020 Plans:*** In conjunction with the Office of the Chief of Naval Operations (OPNAV), update requirements documents, develop interface control specifications and architecture documentation, develop ship design and top side layout drawings and start development of T&E plans for USV ICS and payloads. Update documentation and continue work on development of common autonomy standards, interfaces, and systems and support modeling/simulation efforts	0.000 -	5.750 -	0.000 -	0.000 -	0.000 -

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3067 / *Unmanned Surface Vehicle Enabling Capabilities*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
and prototype development. Update Common Control System documentation and support testing and design efforts. Operation and maintenance of experimental MUSV and LUSV platforms. ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.					
Title: Management Services ***Articles:*** ***FY 2020 Plans:*** Provide execution of the product development and support tasks. Develop acquisition documents to include Systems Engineering Plan (SEP), test and evaluation plan, integrated master schedule, risk evaluations and program cost estimates based on the required capabilities. Oversee transition of payload prototypes and associated experimentation and risk reduction efforts. Coordinate with and across supporting activities (e.g., Program Executive Office (PEO) Integrated Warfare Systems (IWS), PEO Command, Control, Communications, Computers and Intelligence (C4I)), warfare centers, labs, and industry partners to address requirements, manage funding and execute plans for the integration of planned LUSV payloads with the USV ICS. ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.	0.000 -	0.050 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	0.000	50.413	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3067 / *Unmanned Surface Vehicle Enabling Capabilities*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTEN/0603178N/3067: *Unmanned Surface Vehicle Enabling Capabilities*	0.000	0.000	199.123	-	199.123	122.837	192.836	77.854	80.857	Continuing	Continuing

Remarks

D. Acquisition Strategy

USV Enabling Capabilities efforts will accelerate future capability and support steady growth of the Navy's Unmanned Surface Vehicle (USV) Family of Systems (FoS). By leveraging efforts from the Naval Research and Development Enterprise and industry for associated technologies and payloads and integrating them into USVs at the appropriate level of technical maturity, USV capabilities for the Fleet will be increasingly enhanced. Coordination with UxS platforms will eliminate redundant efforts, encourage innovation and improve coordination of unmanned systems across multiple domains. Leveraging SCO-developed standalone capabilities, the plan is to develop these capabilities for the initial LUSVs and then transition those capabilities into the LUSV through incremental development and integration across the funding portfolio. The project will deliver an ICS that will be ready for combined and integrated capabilities with the infrastructure ready to support any future systems, payloads, and capabilities. The Navy will accomplish efforts under USV Enabling Capabilities through existing contract vehicles prepared for SCO and ONR efforts, the USV FoS Indefinite Delivery Indefinite Quantity (IDIQ) Multiple Award Contract (MAC) which will be awarded in FY 2020, the prime contract awarded for MUSV design and fabrication, the prime contract(s) awarded for LUSV Conceptual Design and, later, Detailed Design, and existing contracts for payload fabrication.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3067 / *Unmanned Surface Vehicle Enabling Capabilities*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Integrated Combat Systems (ICS) Integration Development	Various	TBD : TBD	0.000	0.000		38.738	Jan 2020	0.000		-		0.000	0.000	38.738	-
Technical Services	WR	Various : Various	0.000	0.000		1.625	Jan 2020	0.000		-		0.000	0.000	1.625	-
Elevated Sensors	C/CPIF	TBD : TBD	0.000	0.000		0.750	Jan 2020	0.000		-		0.000	0.000	0.750	-
Experimentation	WR	Various : Various	0.000	0.000		3.500	Jan 2020	0.000		-		0.000	0.000	3.500	-
		Subtotal	0.000	0.000		44.613		0.000		-		0.000	0.000	44.613	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Autonomy	Various	Various : Various	0.000	0.000		0.750	Jan 2020	0.000		-		0.000	0.000	0.750	-
Command and Control (C2) Integration	Various	Various : Various	0.000	0.000		1.500	Jan 2020	0.000		-		0.000	0.000	1.500	-
USV Squadron Operations	WR	Various : Various	0.000	0.000		2.500	Jan 2020	0.000		-		0.000	0.000	2.500	-
Delta Req, RFP Dev, Evaluation	WR	Various : Various	0.000	0.000		1.000	Jan 2020	0.000		-		0.000	0.000	1.000	-
RFP Development	WR	Various : Various	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
		Subtotal	0.000	0.000		5.750		0.000		-		0.000	0.000	5.750	N/A

Management Services ($ in Millions)

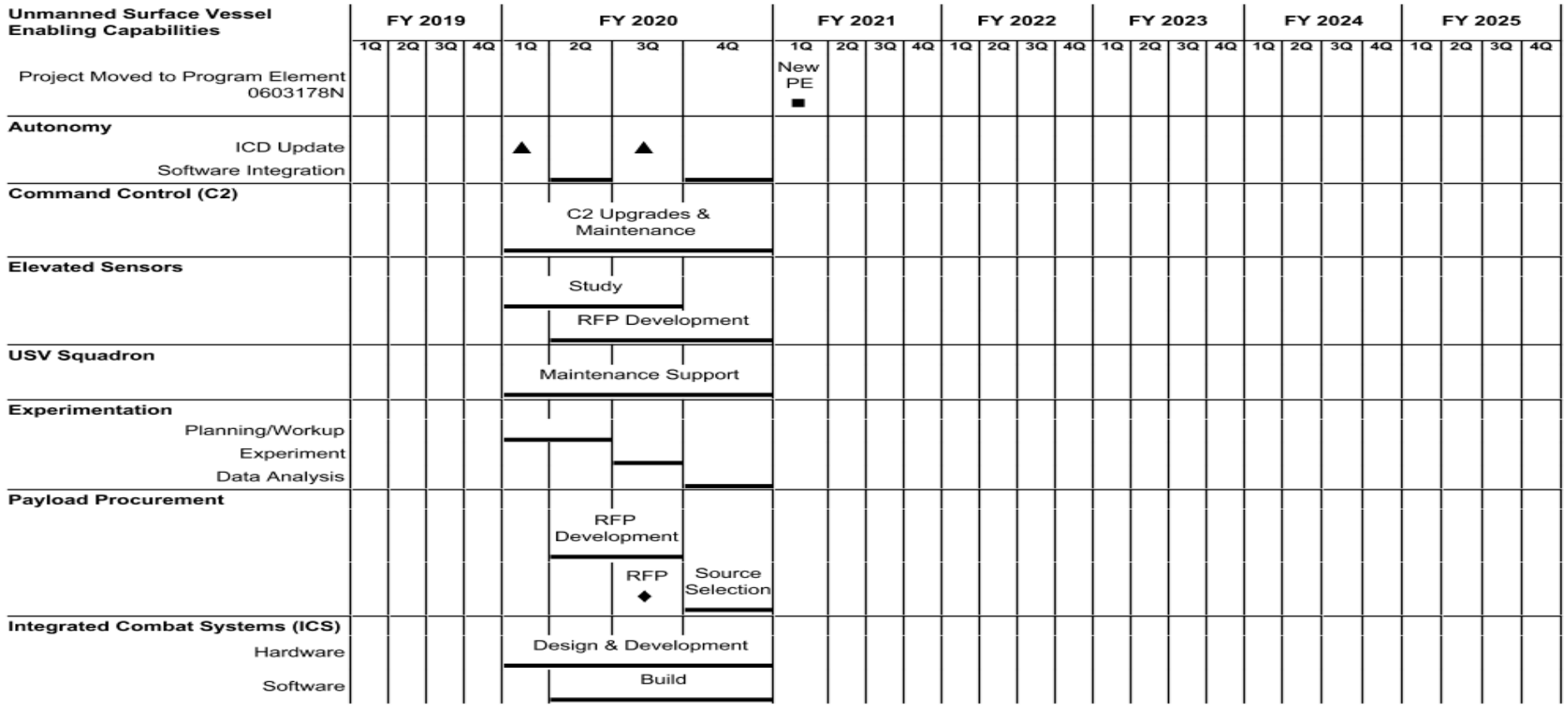
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services	WR	NAVSEA : Washington, DC	0.000	0.000		0.050	Jan 2020	0.000		-		0.000	0.000	0.050	-
		Subtotal	0.000	0.000		0.050		0.000		-		0.000	0.000	0.050	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3067 / *Unmanned Surface Vehicle Enabling Capabilities*	

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		50.413		0.000		-		0.000	0.000	50.413	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3067 / *Unmanned Surface Vehicle Enabling Capabilities*



2021PB - 0603502N - 3067

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3067 / *Unmanned Surface Vehicle Enabling Capabilities*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Unmanned Surface Vessel Enabling Capabilities				
Project Moved to Program Element 0603178N: New PE	1	2021	1	2021
Autonomy: ICD Update: 1	1	2020	1	2020
Autonomy: ICD Update: 2	3	2020	3	2020
Autonomy: Software Integration: 1	2	2020	2	2020
Autonomy: Software Integration: 2	4	2020	4	2020
Command Control (C2): Command and Control (C2)	1	2020	4	2020
Elevated Sensors: Study	1	2020	3	2020
Elevated Sensors: RFP Solicitation Development	2	2020	4	2020
USV Squadron: Maintenance Support	1	2020	4	2020
Experimentation: Planning/Workup: 1	1	2020	2	2020
Experimentation: Experiment: 1	3	2020	3	2020
Experimentation: Data Analysis: 1	4	2020	4	2020
Payload Procurement: RFP Development	2	2020	3	2020
Payload Procurement: RFP Released	3	2020	3	2020
Payload Procurement: Source Selection	4	2020	4	2020
Integrated Combat Systems (ICS): Hardware: Design and Development	1	2020	4	2020
Integrated Combat Systems (ICS): Software: Software Build	2	2020	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3428 / *Medium Unmanned Surface Vehicle (MUSV)*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
3428: *Medium Unmanned Surface Vehicle (MUSV)*	0.000	2.690	23.900	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	26.590
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

The MUSV project builds on efforts executed in FY 2019 under Project 3428 as well as through the Congressional Add of $42.000 million in Project 9999. Additionally, the project continues to leverage lessons learned through experimentation efforts external to this program element under Defense Advanced Research Projects Agency (DARPA) Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) and the Office of Naval Research (ONR) Medium Displacement Unmanned Surface Vehicle (MDUSV)/Sea Hunter projects.

FY 2021 and future funding for Project 3428 were realigned to Program Element 0603178N.

A. Mission Description and Budget Item Justification

As part of the Unmanned Surface Vehicle (USV) Family of Systems (FoS), the Medium Unmanned Surface Vehicle (MUSV) project provides resources for the detail design, fabrication, testing, experimentation and support of the MUSV. The MUSV is defined as having a reconfigurable mission capability which is accomplished via modular payloads with an initial capability to support Battlespace Awareness through supporting Intelligence, Surveillance and Reconnaissance (ISR) and Information Operations (IO) mission areas. Modular payloads may be developed separately by other programs or prototyping efforts and will be further developed and/or integrated into MUSV under the Unmanned Surface Vehicle Enabling Capabilities project unit that supports MUSV and LUSV. MUSVs will provide affordable, high endurance, reconfigurable vehicles able to accommodate various payloads for unmanned missions to augment the Navy's manned surface force.

MUSVs will support the Navy's ability to produce, deploy and disburse ISR/EW capabilities in sufficient quantities and provide/improve distributed situational awareness in maritime Areas of Responsibility (AORs). MUSVs will be designed to be attritable assets if used in a peer or near-peer conflict. MUSVs will initially be capable of semi-autonomous operation, with operators in-the-loop (continuous or near-continuous observation and/or control of operations by remote operators) or on-the-loop (semi-autonomous operations where autonomy is controlling the vessel, but it may prompt the remote human operator for input based on sensory input and autonomy behaviors, or an operator may choose to intervene based on data sent from the MUSV or other sources to the remote operating station). USV Command and Control (C2) will be maintained via the afloat element (i.e., embarked on a United States Navy (USN) combatant/support ship), or via the ashore element (C2 station ashore). MUSV C2, combat and/or weapon system integration will employ tamper proofing and
security controls to prevent disclosure of data and electronic warfare defenses during autonomous operation. MUSVs will employ a Risk Management Framework (RMF) approach with physical, technical and administrative security controls. MUSVs will have hardware and software components to protect classified/sensitive functions. MUSVs will be capable of
weeks-long deployments and trans-oceanic transits, and operate aggregated with Carrier Strike Groups (CSGs) and Surface Action Groups (SAGs), as well as have the ability to deploy independently.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3428 / *Medium Unmanned Surface Vehicle (MUSV)*

MUSV leverages efforts external to this project unit accomplished through Defense Advanced Research Projects Agency (DARPA) Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) and Office of Naval Research (ONR) Medium Displacement Unmanned Surface Vehicle (MDUSV)/Sea Hunter investments in autonomy, reliability, endurance, command and control, payloads and testing that started in FY 2017 and will continue through FY 2021. In addition, the MUSV C2 concept directly leverages the fleet-ready C2 solution developed for unmanned surface vessels in the OSD SCO Ghost Fleet Overlord LUSV experimentation program. In FY 2020, the Navy is transitioning MDUSV Sea Hunter I to the Surface Development Squadron (SURFDEVRON) under the MUSV project, and will be used for continued experimentation and Fleet learning.

The MUSV will be a key enabler of the Navy's Distributed Maritime Operations (DMO) concept, which includes being able to deploy independently or with other MUSVs as well as operate with individual manned combatants or as part of a larger battle group. Potential future missions for MUSV will continue to be explored as the Navy continues to learn through
experimentation with Sea Hunter I and the Ghost Fleet Overlord projects and as MUSV concepts of operation (CONOPs) are developed and refined. Following up on the outcome of the FSCF Analysis of Alternatives (AOA) completed in FY 2019, the Navy will have opportunities in the future to increase the MUSV capability set as technology matures. Fielding of MUSV starting in FY 2022 will provide the Navy increased capability and necessary capacity at lower procurement and sustainment costs, reduced risk to sailors and increased readiness by assuming missions from manned combatants.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Product Development	1.790	16.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2020 Plans: Execute DD&F contract for MUSV prototype (contract award described under Congressional Add of $42.000M in Project Unit 9999/C442). Evaluate and approve industry's preliminary and detailed designs for MUSV through Preliminary Design Review (PDR) and Critical Design Review (CDR). Procure materials in support of fabrication. Begin construction of hull and assembly of subcomponents. Begin software modifications to existing autonomy systems to comply with Navy requirements. ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.					
Title: Support	0.700	6.200	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3428 / *Medium Unmanned Surface Vehicle (MUSV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY 2020 Plans: The Navy will transition Sea Hunter I to Commander, Naval Surface Forces / Surface Development Squadron by Q2FY20. The Navy will prepare solicitations for Sea Hunter original equipment manufacturer (OEM) support and the development of training and maintenance documentation in preparation of fleet-based operations and sustainment. The Navy will provide systems engineering, design analysis, hull and assembly oversight, and integration support related to the execution of the DD&F contract. ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.					
Title: Management Services ***Articles:*** ***FY 2020 Plans:*** Develop all governing MUSV documentation as required to support advancement of the prototype program. This includes the creation of the following artifacts: System Engineering Plan (SEP), Test and Evaluation Strategy (TES), Life Cycle Support Plan (LCSP), Cybersecurity Strategy, Open Systems Architecture Management Plan, Corrosion Prevention and Control Plan, Weight Control Plan, Quality Assurance Program Plan, Reliability and Maintainability Program Plan, Configuration Management Plan, Software Development Plan and Program Protection Plan (PPP). The Navy will provide program management support related to the execution of the DD&F contract. ***FY 2021 Base Plans:*** N/A ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Project realigned to PE 0603178N from 0603502N in FY 2021.	0.200 -	1.700 -	0.000 -	0.000 -	0.000 -
Accomplishments/Planned Programs Subtotals	2.690	23.900	0.000	0.000	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3428 / *Medium Unmanned Surface Vehicle (MUSV)*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTEN/0603502N/9999: *Congressional Add*	57.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	70.527
• RDTEN/0603178N/3428: *Medium Unmanned Surface Vehicle (MUSV)*	0.000	0.000	26.302	-	26.302	29.998	42.994	43.853	44.730	Continuing	Continuing

Remarks

RDT&E/0603502N/9999 - The above funding line accounts for several programs, of which the Medium Unmanned Surface Vehicle program is only a portion.

D. Acquisition Strategy

MUSV has been designated as a Rapid Prototyping Program designation and follows a Middle Tier Acquisition approach per Section 804 of the Fiscal Year (FY) 2016 National Defense Authorization Act (NDAA), as amended in FY 2017 NDAA (codified at 10 U.S.C. sub sec 2302 note). Required capabilities were codified in a Top Level Requirements (TLR) document approved by the OPNAV Director of Surface Warfare in FY 2019. While the project only has two MUSVs funded in the FYDP (one MUSV in FY 2019 and one in FY 2023), the contract structure allows for options to be added should funding become available. Delivery of the initial prototype is planned FY 2022 following completion of initial testing and a Military Utility Assessment (MUA). The prototyping efforts with the FY 2019 MUSV will inform procurement of additional MUSV units and eventual transition to an ACAT program with formalized requirements through a Capability Development Document and procurement funding.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3428 / *Medium Unmanned Surface Vehicle (MUSV)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Detailed Design & Construction	TBD	TBD : TBD	0.000	0.000		14.980	Jan 2020	0.000		-		0.000	0.000	14.980	-
Requirements Development	WR	NSWC DD : Dahlgren, VA	0.000	0.250	Dec 2018	0.000		0.000		-		0.000	0.000	0.250	-
Requirements Development	WR	NSWC CD : Bethesda, MD	0.000	0.298	Dec 2018	0.000		0.000		-		0.000	0.000	0.298	-
Requirements Development	WR	SSC PAC : San Diego, CA	0.000	0.240	Dec 2018	0.000		0.000		-		0.000	0.000	0.240	-
Requirements Development	WR	NSWC PD : Philadelphia, PA	0.000	0.345	Dec 2018	0.000		0.000		-		0.000	0.000	0.345	-
Requirements Development	SS/CPFF	JHU APL : Laurel, MD	0.000	0.657	Jan 2019	0.000		0.000		-		0.000	0.000	0.657	-
Technical Services	TBD	TBD : TBD	0.000	0.000		1.020	Jan 2020	0.000		-		0.000	0.000	1.020	-
		Subtotal	0.000	1.790		16.000		0.000		-		0.000	0.000	17.790	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Engineering Support	WR	Various : Various	0.000	0.000		3.840	Jan 2020	0.000		-		0.000	0.000	3.840	-
Engineering Support	WR	NSWC DD : Dahlgren, VA	0.000	0.230	Dec 2018	0.480	Dec 2019	0.000		-		0.000	0.000	0.710	-
Engineering Support	WR	SSC PAC : San Diego, CA	0.000	0.240	Dec 2018	1.340	Dec 2019	0.000		-		0.000	0.000	1.580	-
Engineering Support	WR	NSWC PD : Philadelphia, PA	0.000	0.150	Dec 2018	0.180	Dec 2019	0.000		-		0.000	0.000	0.330	-
Engineering Support	SS/CPFF	JHU APL : Laurel, MD	0.000	0.080	Jan 2019	0.360	Dec 2019	0.000		-		0.000	0.000	0.440	-
		Subtotal	0.000	0.700		6.200		0.000		-		0.000	0.000	6.900	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 3428 / *Medium Unmanned Surface Vehicle (MUSV)*	

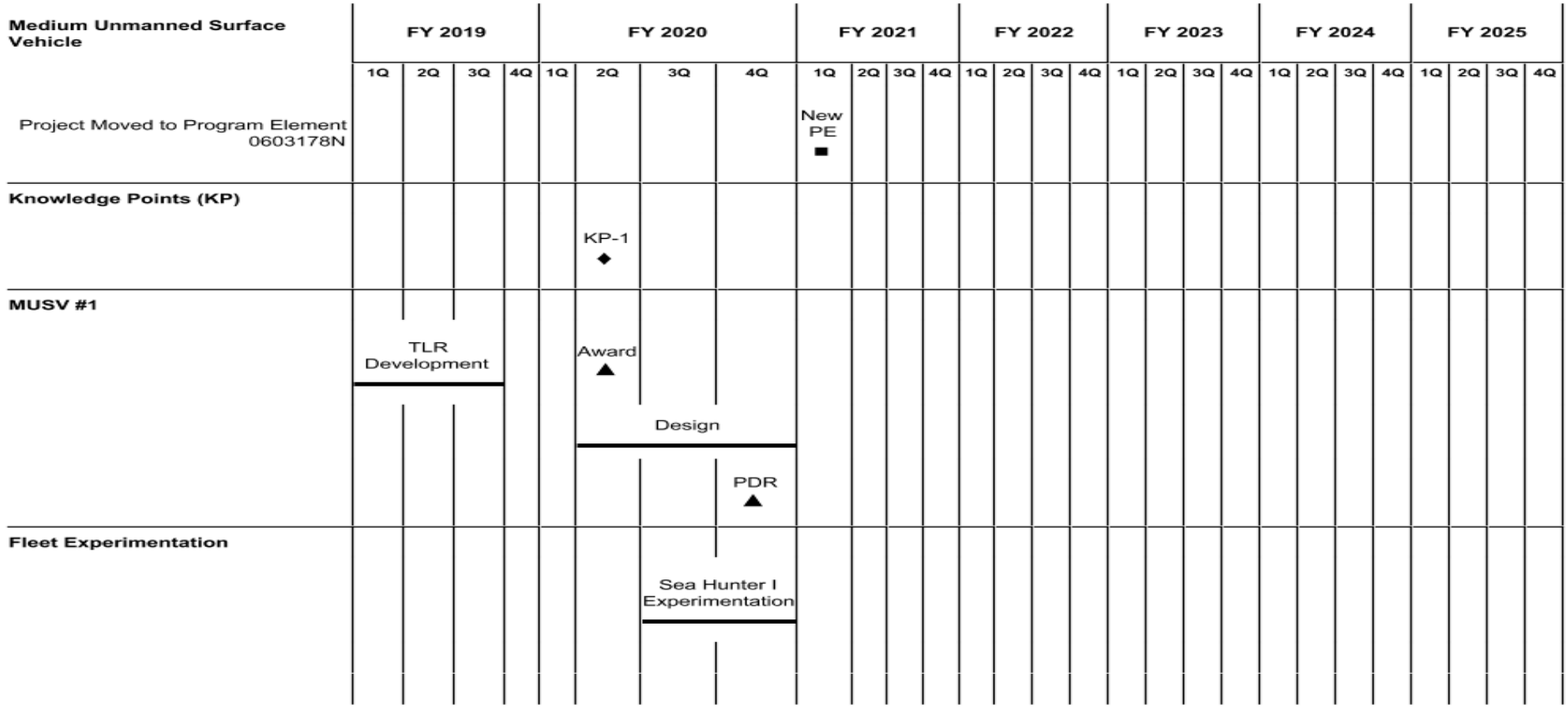
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPFF	Various : Washington, DC	0.000	0.200	Dec 2018	1.700	Dec 2019	0.000		-		0.000	0.000	1.900	-
		Subtotal	0.000	0.200		1.700		0.000		-		0.000	0.000	1.900	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	2.690		23.900		0.000		-		0.000	0.000	26.590	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3428 / *Medium Unmanned Surface Vehicle (MUSV)*



2021PB - 0603502N - 3428

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 3428 / *Medium Unmanned Surface Vehicle (MUSV)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Medium Unmanned Surface Vehicle				
Project Moved to Program Element 0603178N: New PE	1	2021	1	2021
Knowledge Points (KP): Knowledge Point 1	2	2020	2	2020
MUSV #1: Top Level Requirements (TLR) Development	1	2019	3	2019
MUSV #1: Contract Award	2	2020	2	2020
MUSV #1: Detail Design	2	2020	4	2020
MUSV #1: Preliminary Design Review (PDR)	4	2020	4	2020
Fleet Experimentation: Sea Hunter I Experimentation	3	2020	4	2020

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
9999: *Congressional Adds*	12.546	57.981	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	70.527
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

MUSV leverages efforts external to this project unit accomplished through Defense Advanced Research Projects Agency (DARPA) Anti-Submarine Warfare Continuous Trail Unmanned Vessel (ACTUV) and Office of Naval Research (ONR) Medium Displacement Unmanned Surface Vehicle (MDUSV)/Sea Hunter investments in autonomy, reliability, endurance, command and control, payloads and testing that started in FY 2017 and will continue through FY 2021. Beginning in FY 2019, the Navy will commence transition of MDUSV Sea Hunter I asset to Commander Naval Surface Forces under the MUSV project. In addition, the MUSV C2 concept directly leverages the fleet-ready C2 solution developed for unmanned surface vessels in the OSD SCO Ghost Fleet Overlord LUSV experimentation program.

This project also provides resources for development, improvement and integration of Unmanned Surface Vehicle (USV) Mine Countermeasure (MCM) systems. A description of the major planned programs includes the following:

The Unmanned Influence Sweep System (UISS) utilizes an Unmanned Surface Vehicle (USV) integrated with an Unmanned Surface Sweep System (US3), a magnetic/acoustic sweep system developed to sweep acoustic/magnetic influence mines, which can be deployed from the Littoral Combat Ship (LCS) or a Vessel of Opportunity (VOO).

The Mine Countermeasures Unmanned Surface Vehicle (MCM USV) program leverages the USV from the UISS Program of Record (PoR) and adds a modular mission capability through the addition of multiple payloads. MCM USV w/ AQS-20C integrates the existing AQS-20C minehunting sonar. MCM USV w/ AQS-24B continues the Minehunting efforts. In FY 2019, the MCM USV program began initial design efforts to support integration with a Mine Neutralization capability (Barracuda). Minesweeping payloads will be subsumed by the MCM USV PoR in FY 2020.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020
Congressional Add: Medium Displacement Unmanned Surface Vehicle	40.519	0.000
FY 2019 Accomplishments: Product Development: Generate and release Request for Proposal (RFP), including performance specification, for procurement of MUSV; hold Industry Day; and conduct source selection efforts. Support: PEO USC will coordinate with ONR and advise on development and construction oversight of the Sea Hunter II USV.		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020
Management Services: Creation of a MUSV Prototyping Plan. ***FY 2020 Plans:*** Award contract for Detail Design and Fabrication (DD&F) of MUSV prototype.		
Congressional Add: Navy Identified MCM USV Requirement ***FY 2019 Accomplishments:*** Product Development: Complete initial design and software development efforts for craft and payload integration, command and control, and operations. Continue system level testing. Prepare to conduct User Operational Evaluation System (UOES) Employment. Prepare and support design changes for initial Developmental Testing (DT). Conduct technical feasibility studies, trade study analysis, tactics development, requirements definition and USV impact studies for Mine Neutralization (Barracuda) integration with MCM USV. Begin contractor integration testing of MCM USV w/ AQS-24B and MCM USV w/ AQS-20C. Support: Continue program management, engineering and technical support for payload integration and testing efforts. Support testing and User Operational Evaluation System (UOES) efforts for the assessment of system capabilities to determine Military utility. Determine initial spares required for upcoming DT/UOES test events. Management Services: Provide program planning, management and acquisition document updates for the MCM USV program. ***FY 2020 Plans:*** N/A	13.603	0.000
Congressional Add: Navy Identified UISS Requirement ***FY 2019 Accomplishments:*** Product Development: Develop Engineering Change Proposals (ECPs) for EDM and Low Rate Initial Production (LRIP) units in preparation for integration testing and Initial Operational Test and Evaluation (IOT&E). Conduct systems engineering efforts in support of program and test efforts. Complete UISS corrective action period to increase reliability to support a successful Developmental Test (DT) and Operational Assessment (OA). Support: Support engineering, management and logistics efforts for MS C in 2Q FY 2020 and Initial Operational Capability (IOC) in 1Q FY 2021. Prepare for IOT&E. Continue development of Full Rate Production (FRP) documentation to release Request for Proposal (RFP) in early FY 2020. Test and Evaluation: Continue UISS DT and OA in support of MS C decision in 2Q FY 2020. Conduct UISS system level IOT&E in support of FRP decision planned for FY 2020.	3.859	0.000

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020
Management Services: Oversee ongoing contractor efforts. Manage MS C documentation completion. Manage FRP RFP release and proposal evaluation. ***FY 2020 Plans:*** N/A		
Congressional Adds Subtotals	57.981	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• RDTE/0603502N/1234: *Unmanned Surface Vehicle (USV)*	27.703	31.519	19.167	-	19.167	18.929	19.304	19.684	20.073	Continuing	Continuing
• RDTE/0603502N/3428: *Medium Unmanned Surface Vehicle (MUSV)*	2.690	23.900	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	26.590
• RDTE/0603178N/3428: *Medium Unmanned Surface Vehicle (MUSV)*	0.000	0.000	26.302	-	26.302	29.998	42.994	43.853	44.730	Continuing	Continuing

Remarks

D. Acquisition Strategy

MUSV will pursue a Rapid Prototyping Program designation and follow a Middle Tier Acquisition approach per Section 804 of the Fiscal Year (FY) 2016 National Defense Authorization Act (NDAA), as amended in FY 2017 NDAA (codified at 10 U.S.C. sub sec 2302 note). Navy required capabilities will be captured in a Top Level Requirements (TLR) document approved by the OPNAV Director of Surface Warfare. A development RFP will be released to industry in FY 2019, containing options for additional USVs contingent on validation of warfighting requirements. A full and open procurement will take place in FY 2019, awarding a single MUSV prototype in FY 2020(Note: Congressional Add of $42.000M in Project Unit 9999/C442). The requirements of the MUSV will allow proposals from both traditional defense and commercial shipyards. Estimated delivery of the initial prototype will be FY 2022. Rapid prototyping efforts with the FY19 MUSV will inform procurement of additional MUSV units and eventual transition to an ACAT program and procurement funding.

UISS requirements are documented in the Unmanned Influence Sweep System (UISS) Capability Production Document (CPD). An Engineering and Manufacturing Development (E&MD) contract was awarded in FY 2014 with options for Low Rate Initial Production (LRIP) in FY 2019.

In FY 2019 and FY 2020, MCM USV is developing a CDD leveraging existing requirements (UISS, AN/AQS-20, MCM MP, etc.). In FY 2021, MCM USV anticipates a Full Rate Production (FRP) decision and will conduct a full and open competition for FRP contract(s).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603502N / *Surface & Shallow Water MCM*	Project (Number/Name) 9999 / *Congressional Adds*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Product Devlopment	C/CPIF	Textron Systems, Inc. : Hunt Valley, MD	7.663	1.272	Jan 2019	0.000		0.000		-		0.000	0.000	8.935	-
MCM USV: Product Development	C/CPFF	Textron Systems, Inc. : Hunt Valley, MD	0.000	12.300	Mar 2019	0.000		0.000		-		0.000	0.000	12.300	-
MUSV: Product Development	C/FPIF	TBD : TBD	0.000	36.987	Sep 2019	0.000		0.000		-		0.000	0.000	36.987	-
MUSV: Product Development	WR	SSC LANT : Charleston, SC	0.000	0.249	Jan 2019	0.000		0.000		-		0.000	0.000	0.249	-
MUSV: Product Development	WR	NSWC CD : Bethesda, MD	0.000	0.787	Dec 2018	0.000		0.000		-		0.000	0.000	0.787	-
MUSV: Product Development	WR	SSC PAC : San Diego, CA	0.000	1.800	Feb 2019	0.000		0.000		-		0.000	0.000	1.800	-
		Subtotal	7.663	53.395		0.000		0.000		-		0.000	0.000	61.058	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Engineering Support	WR	NUWC N : Newport, RI	0.188	0.100	Jan 2019	0.000		0.000		-		0.000	0.000	0.288	-
UISS: Engineering Support	WR	NSWC PC : Panama City, FL	2.000	0.600	Jan 2019	0.000		0.000		-		0.000	0.000	2.600	-
UISS: Engineering Support	WR	NSWC CD : Bethesda, MD	0.500	0.000		0.000		0.000		-		0.000	0.000	0.500	-
UISS: Integrated Logistics	WR	NSWC PC : Panama City, FL	0.314	0.000		0.000		0.000		-		0.000	0.000	0.314	-
UISS: Integrated Logistics	WR	NSWC CD : Bethesda, MD	0.266	0.000		0.000		0.000		-		0.000	0.000	0.266	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 9999 / *Congressional Adds*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MCM USV: Engineering Support	C/CPFF	Textron Systems, Inc. : Hunt Valley, MD	0.000	1.103	Mar 2019	0.000		0.000		-		0.000	0.000	1.103	-
MUSV: Engineering Support	WR	SSC LANT : Charleston, SC	0.000	0.165	Jan 2019	0.000		0.000		-		0.000	0.000	0.165	-
MUSV: Integrated Logistics	WR	TBD : TBD	0.000	0.080	Aug 2019	0.000		0.000		-		0.000	0.000	0.080	-
		Subtotal	3.268	2.048		0.000		0.000		-		0.000	0.000	5.316	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Test and Evaluation	WR	NSWC PC : Panama City, FL	0.045	0.400	Jan 2019	0.000		0.000		-		0.000	0.000	0.445	-
UISS: Test and Evaluation	WR	NSWC CD : Bethesda, MD	1.300	1.000	Jan 2019	0.000		0.000		-		0.000	0.000	2.300	-
UISS: Test and Evaluation	C/CPFF	Textron Systems, Inc. : Hunt Valley, MD	0.020	0.000		0.000		0.000		-		0.000	0.000	0.020	-
		Subtotal	1.365	1.400		0.000		0.000		-		0.000	0.000	2.765	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
UISS: Travel	WR	NAVSEA : Washington, DC	0.040	0.100	Mar 2019	0.000		0.000		-		0.000	0.000	0.140	-
UISS: Management	WR	TBD : TBD	0.210	0.387	Nov 2018	0.000		0.000		-		0.000	0.000	0.597	-
MCM USV: Management	WR	TBD : TBD	0.000	0.200	Mar 2019	0.000		0.000		-		0.000	0.000	0.200	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 9999 / *Congressional Adds*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
MUSV: Travel	WR	NAVSEA : Washington, DC	0.000	0.151	Mar 2019	0.000		0.000		-		0.000	0.000	0.151	-
MUSV: Management	WR	TBD : TBD	0.000	0.300	Mar 2019	0.000		0.000		-		0.000	0.000	0.300	-
		Subtotal	0.250	1.138		0.000		0.000		-		0.000	0.000	1.388	N/A

	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	12.546	57.981		0.000		0.000		-		0.000	0.000	70.527	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 9999 / *Congressional Adds*

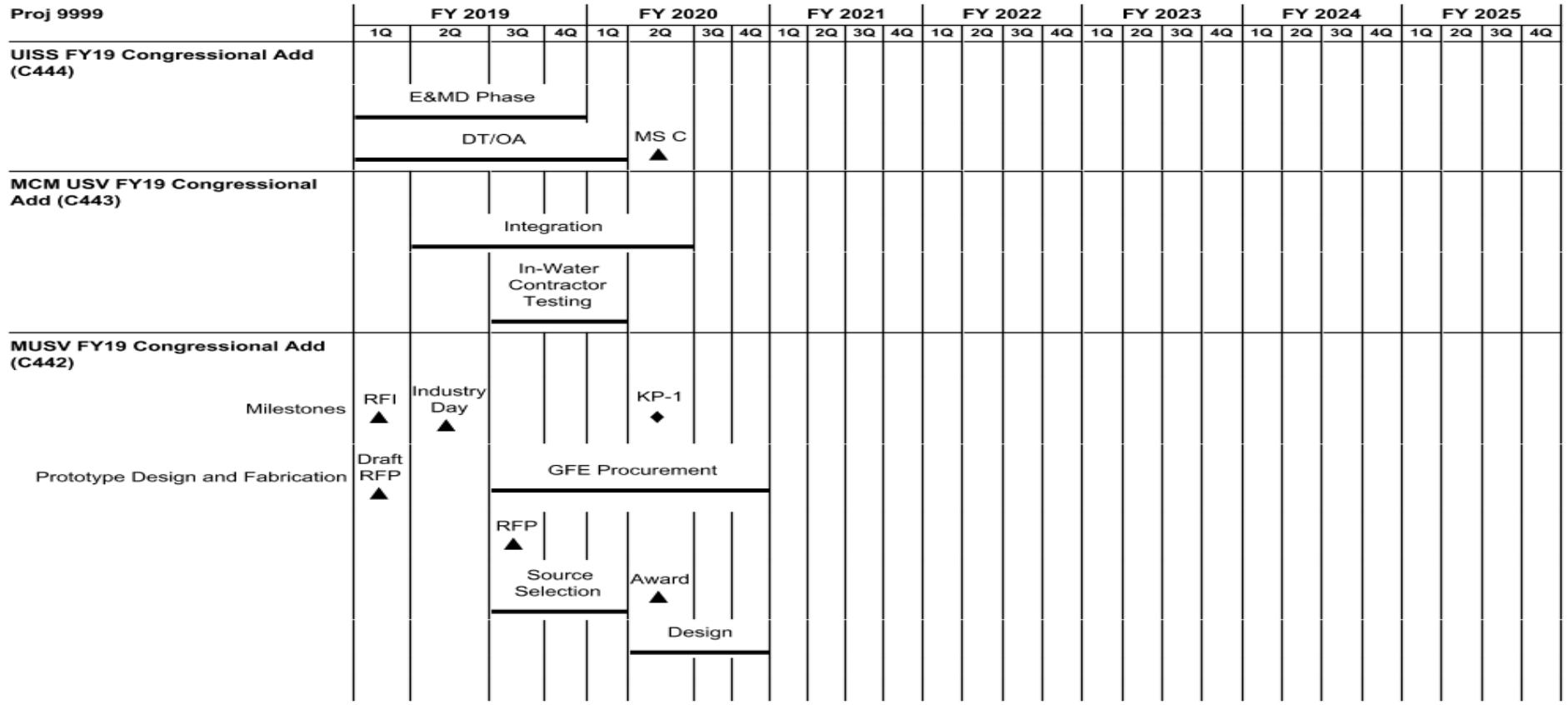


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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603502N / *Surface & Shallow Water MCM*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
UISS FY19 Congressional Add (C444): Engineering & Manufacturing Development Phase	1	2019	4	2019
UISS FY19 Congressional Add (C444): DT/OA Testing	1	2019	1	2020
UISS FY19 Congressional Add (C444): Milestone C	2	2020	2	2020
MCM USV FY19 Congressional Add (C443): Craft/Payload Integration	2	2019	2	2020
MCM USV FY19 Congressional Add (C443): In-Water Contractor Testing	3	2019	1	2020
MUSV FY19 Congressional Add (C442): Milestones: Industry RFI	1	2019	1	2019
MUSV FY19 Congressional Add (C442): Milestones: Industry Day	2	2019	2	2019
MUSV FY19 Congressional Add (C442): Milestones: Knowledge Point 1	2	2020	2	2020
MUSV FY19 Congressional Add (C442): Prototype Design and Fabrication: Government Furnished Equipment (GFE) Procurement	3	2019	4	2020
MUSV FY19 Congressional Add (C442): Prototype Design and Fabrication: Draft RFP Released	1	2019	1	2019
MUSV FY19 Congressional Add (C442): Prototype Design and Fabrication: RFP Released	3	2019	3	2019
MUSV FY19 Congressional Add (C442): Prototype Design and Fabrication: Source Selection	3	2019	1	2020
MUSV FY19 Congressional Add (C442): Prototype Design and Fabrication: Contract Award	2	2020	2	2020
MUSV FY19 Congressional Add (C442): Prototype Design and Fabrication: Design	2	2020	4	2020