Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy											Date: May 2021	
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 0603595N *I SSBN New Design*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	3,729.521	411.431	316.396	296.231	-	296.231	-	-	-	-	-	-
3220: *COLUMBIA Class Submarine Development*	3,678.381	403.713	316.396	296.231	-	296.231	-	-	-	-	-	-
9999: *Congressional Adds*	51.140	7.718	0.000	0.000	-	0.000	-	-	-	-	-	-
Program MDAP/MAIS Code: **Project MDAP/MAIS Code(s):** 444												

A. Mission Description and Budget Item Justification

This program element supports innovative research and development in submarine Hull, Mechanical and Electrical (HM&E) and combat systems technologies and the subsequent evaluation, demonstration, and validation for submarine platforms over the life cycle of the COLUMBIA Class. It will increase the submarine technology base and provide subsystem design options not currently feasible. The program element also supports programs transitioning from Science and Technology (S&T), Defense Advanced Research Projects Agency (DARPA), Independent Research and Development, and Small Business Innovation Research (SBIR) projects.

The funding applies to the design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for Common Missile Compartment (CMC) design, whole ship design, and component technologies development for the next generation U.S. ballistic missile submarine (SSBN), the COLUMBIA Class.

Project Unit 3220:
The objective of the COLUMBIA Class Submarine Development is to design, prepare for, and support construction and delivery of the class that is the replacement of the OHIO Class SSBN.

Project Unit 3440:
This project provides the engineering development and program management required to outfit, upgrade, and support each ship of the COLUMBIA Class Submarine with a Non-Propulsion Electronics System (combat, sonar, etc.) that satisfies requirements to meet its sole mission of Strategic Deterrence over the class life cycle.

Project Unit 3441:
This project encompasses ship system development, coordination, and management efforts for the COLUMBIA Class Submarine Technology Insertion Program and Technology Refresh Program over the class life cycle.

Project Unit 9999:
This Congressional Add project funds efforts for the Advanced Materials Propeller Program, Materials for Submarine Propulsor Applications and Naval Propulsion Foundry Center Facility Power Upgrades.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
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 0603595N *I SSBN New Design*

B. Program Change Summary ($ in Millions)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Previous President's Budget	427.051	317.196	195.821	-	195.821
Current President's Budget	411.431	316.396	296.231	-	296.231
Total Adjustments	-15.620	-0.800	100.410	-	100.410
• Congressional General Reductions	-	-0.800			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-15.620	0.000			
• Program Adjustments	0.000	0.000	115.639	-	115.639
• Rate/Misc Adjustments	0.000	0.000	-15.229	-	-15.229

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2020	FY 2021
Project: 9999: *Congressional Adds*		
Congressional Add: *Materials for submarine propulsor applications*	7.718	0.000
Congressional Add Subtotals for Project: 9999	7.718	0.000
Congressional Add Totals for all Projects	7.718	0.000

Change Summary Explanation

In support of the August 2020 Lead Ship Authorization In Progress Review, the program completed an updated cost estimate to align the FY 2022 budget to the updated estimate. This estimate required increased funding ($115.6M FY22, $458.2M FYDP) primarily to support design agent performance, Strategic Weapons System (SWS) re-host updates and Program Support. In addition to the updated estimate, funds were added to support serial production requirements starting in FY 2026.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603595N / *SSBN New Design*	Project (Number/Name) 3220 / *COLUMBIA Class Submarine Development*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
3220: *COLUMBIA Class Submarine Development*	3,678.381	403.713	316.396	296.231	-	296.231	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Project MDAP/MAIS Code: 444

A. Mission Description and Budget Item Justification

The COLUMBIA Submarine Class Program (previously the OHIO Replacement Class) is developing the next generation sea-based strategic deterrent. The funding applies to the design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for Common Missile Compartment (CMC) design, whole ship design, and component technologies development for the next generation U.S. ballistic missile submarine (SSBN). This RDT&E program supports cooperation with the United Kingdom (UK) to maintain strategic deterrence, based on a single effort to develop a CMC as agreed by the UK Secretary of State for Defense and the U.S. Secretary of Defense in 2009.

The COLUMBIA program strategy is to leverage the re-use of existing Submarine system designs (as applicable), focus on lifecycle Total Ownership Cost (TOC) affordability, and meet the military requirements established for this SSBN to achieve mission success in a challenging environment. The requested funding levels provide for the Technology Development, Design, Engineering, and Integration efforts necessary to support the COLUMBIA Class SSBN lead ship construction start in FY 2021 along with continued development and design support for construction of the class. A Contract Modification for ongoing design/advance construction efforts was awarded on 22 Jun 2020, which also included the Build I Option for the First Two Ships. This is a Pre-Priced Option for the two ships, SSBN 826 and SSBN 827, and associated design/support efforts. This was a modification of the current IPPD contract (N00024-17-C-2117) and is in line with the program's approved Acquisition Strategy. The program has requested authorization of SSBN 826 in FY21, funded with three years of incremental funding in FY21-23, and will request authorization of SSBN 827 in FY24, funded with two years of incremental funding in FY24-25. The RDT&E efforts support this plan.

The following key activities support the COLUMBIA Class SSBN Program:
1. Design and development of a missile compartment, launch system, and Strategic Weapons Support Systems (SWSS) to meet U.S. strategic requirements while cooperating with the UK on modernizing its strategic deterrent in accordance with Presidential direction (December 2006).
2. Concept Definition, System Definition, and Detailed Design for remaining portions of the ship accomplished through a Design/Build/Sustain approach modeled after the approach used by the VIRGINIA Class program.
3. Engineering and integration of existing technologies and development of new technologies required to provide the capabilities necessary to ensure platform operational effectiveness and minimize life cycle cost.
4. Ongoing design support for construction of the submarine class.

COLUMBIA Class SSBN concept study, system definition prototyping, and technology development efforts support design, systems engineering, component development and vendor qualification activities needed to develop the CMC design and the COLUMBIA whole ship design. The COLUMBIA design timelines are

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

based on a design approach proven on the VIRGINIA Class Program, adjusted for the additional complexity of a missile compartment and Strategic Weapons Systems (SWS). Planned technical studies and prototyping are necessary to reduce risks associated with updating SSBN system designs for current technical standards and demonstrating design feasibility of developmental technology to meet the ship design and construction schedule.

The Navy continues to invest in program funded affordability initiatives similar to those employed successfully for VIRGINIA Class, but tailored to the unique SSBN mission and operational tempo of COLUMBIA Class to drive down overall program costs. Efforts focus on reducing ship construction costs through implementing more effective design features and fabrication and assembly methods for a more affordable submarine. As part of this effort, alternative procurement and contracting strategies are also being utilized to include Multi-Program Material Procurement (MPMP) and Economic Order Quantity (EOQ).

Activities were executed for the first article quad pack (FAQP) prototype of the CMC to support the UK DREADNOUGHT Program and COLUMBIA Program, and to continue validation of the Integrated Tube and Hull (ITH) build strategy. These activities included the continuation of the construction of the FAQP, which began August 2016, and completed in October 2019. This FAQP was determined to not be useable based on defective missile tubes and is being cut apart to recover the missile tubes to use later in the program. The CMC program will mature required technologies and re-host the TRIDENT II D5 SWS (Launcher, Fire Control and Navigation) while ensuring no degradation to D5 security, safety, and performance. In addition, whole ship design efforts are focused on technologies requiring significant engineering, integration, and development time as well as those technologies that are required to support ship design and construction schedules such as the propulsor and maneuvering/ship control. These technologies are critical for stealth capability for a ship class that will be in service until the 2080s. Ship detailed design efforts include important pre-construction activities such as finalizing ship arrangements, development of design disclosures to support build products, risk characterization, and mitigation, improvement and validation of performance prediction tools and improvement of design tools. Technology development addresses engineering and integration of existing technologies as well as maturation of developmental technologies. On 14 December 2016, the Secretary of the Navy announced the lead ship of the OHIO Replacement Program will be USS COLUMBIA (SSBN 826) which officially designates this program the COLUMBIA Class Submarine Program.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Common Missile Compartment Design and Prototyping, and Whole Ship Design	137.884	133.492	153.070	0.000	153.070
Articles:	-	-	-	-	-
FY 2021 Plans: The combination of CMC Design and Prototyping with Whole Ship Study and Design represents the required Lead Design Yard (LDY) Shipbuilder design effort for the COLUMBIA Program. CMC Design and Prototyping: This funding applies to the design, systems engineering, prototyping construction, and vendor qualification activities needed required to execute the schedule for CMC construction schedule, design and component and/ technology development for the COLUMBIA submarine. Included in this effort is continued development of CMC design products and associated engineering/management efforts.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Specific planned construction efforts for FY 2021 include: - Continued fabrication of Missile Tubes and Strategic Weapons Support System (SWSS). - The continuation of Verification and Validation testing (V&V) at Strategic Weapons Systems Ashore (SWS-A) facility at Cape Canaveral, FL in support risk mitigation for lead ship COLUMBIA construction and testing. - Formal start of Lead Ship Construction in October 2020 which includes manufacture of the MTM for lead ship, and integration and test of SWSS systems for the land based test facility. Whole Ship Study and Design: This funding applies to the shipbuilder design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for whole ship design and component / technology development for the COLUMBIA submarine, and associated engineering/management efforts. Specific planned construction efforts for FY 2021 include: - About 95 percent of total Design Disclosures (approximately 4540 design disclosures including CMC design disclosures). - Planned completion of approximately 21 percent of Maintenance Integrated Logistics Products (610 of 2870). - Planned completion of approximately 27 percent of Provisioning Integrated Logistics Products (1300 of 4821). - Planned completion of approximately 23 percent of Logistics Technical Data Products (173 of 756). - Planned construction effort in FY2021 includes construction efforts on all Super Modules (1, 2, 3, 4, 5, and 6). ***FY 2022 Base Plans:*** CMC Design and Prototyping: This funding applies to the design, systems engineering, prototyping construction, and vendor qualification activities needed required to execute the schedule for CMC construction schedule, design and component and/ technology development for the COLUMBIA submarine. Included in this effort is continued development of CMC design products and associated engineering/management efforts. Specific planned construction efforts for FY 2022 include: -Continued fabrication of Missile Tubes and Strategic Weapons Support System (SWSS) kits. - The completion of Verification and Validation testing (V&V) at Strategic Weapons Systems Ashore (SWS-A) facility at Cape Canaveral, FL in support risk mitigation for lead ship COLUMBIA construction and testing. -Continued Lead Ship Construction which includes manufacture of the MTM for lead ship, and integration and test of SWSS systems for the land based test facility. Whole Ship Study and Design: - This funding applies to the shipbuilder design, systems engineering, prototyping, and vendor qualification activities needed to execute the schedule for whole ship design and component / technology development for the COLUMBIA submarine, and associated engineering/management efforts.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Planned completion of approximately 38 percent of Maintenance Integrated Logistics Products (1100 of 2870). - Planned completion of approximately 45 percent of Provisioning Integrated Logistics Products (2175 of 4821). - Planned completion of approximately 31 percent of Logistics Technical Data Products (234 of 756). - Planned construction effort in FY2022 includes construction efforts on all Super Modules (1, 2, 3, 4, 5, and 6). ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase due to ship shipbuilder design performance and updates made in accordance with 2020 cost estimate.					
Title: NAVSEA R&D and Prototyping	150.795	121.394	93.795	0.000	93.795
Articles:	-	-	-	-	-
FY 2021 Plans: This funding applies to the Government combat systems, component and technology development for the COLUMBIA submarine essential to achieving required survivability, combat and communications capabilities. Efforts planned in FY 2021 include: Combat Systems: - Initiate development of TI-24 Government Furnished Information in support of detailed design, production, and manufacturing integration. - Continue AN/BST-1 reliability based engineering changes, qualification, and testing. - Continue early environmental qualification testing of Government Furnished Equipment. - Deliver initial developmental Structurally Integrated Enclosures to combat system vendor sites. - Execute shock, explodable volume, High Energy Magnetic Pulse (HEMP), and early integration testing of components. Component Development: - Continue Government support and oversight of development of the approximately 50 remaining out of 101 total engineered components. - Complete endurance and shock and vibration testing of the diesel generator and continue COLUMBIA production unit build. - Complete qualification testing for the air conditioning unit and continue COLUMBIA production unit build.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Refurbish Advanced Carbon Dioxide Removal Unit (ACRU) following qualification testing and deliver to Naval Surface Warfare Center for reliability testing. - Begin production of lead ship ACRU. - Commence at-sea operational assessment of ACRU. Propulsor and Shafting: - Complete reconfiguration of the Full Scale Bearing Test Facility for COLUMBIA scale testing and installation of a propulsor bearing engineering demonstration model. - Complete documentation associated with lead ship propulsor down-selection. Shock, Structures and Composites: - Continue assessment of which components require Large Vehicle Shock Testing for qualification and begin procurements, planning and preparations for a large vehicle shock test series. - Complete analysis of combined shock and submergence test results and full-scale design assessments. - Complete fabrication and begin instrumentation of the forward pressure hull confirmation model. - Complete initial machining of Out of Autoclave bow dome and associated inspections. - Begin fabrication of US Navigation Sonar System Window shipset. - Complete development of composites inspection and maintenance procedures, criteria and evaluation methods. Signatures: - Update whole-boat signature predictions using updated modeling and predictive tools - Perform assessments on the impact of shipbuilder design/construction changes on performance - Provide test support, modeling updates and assessments for shipbuilder system development, component development and qualification testing Maneuvering, Ship Control and Hydrodynamic: - Continue developing CLB Submerged Operating Envelope by characterization of near-surface behavior for various sea states. - Continue Free Running Model hydrodynamic testing. - Continue Hovering Missile Compensation Control System development. - Continue Ship Control System development.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Complete deployment of the Environmental Maintenance & Operator Guidance System (EMOGS) to King's Bay GA (KBNSB) and Port Canaveral, FL (NOTU).					
FY 2022 Base Plans: This funding applies to the Government combat systems, component and technology development for the COLUMBIA submarine essential to achieving required survivability, combat and communications capabilities. Efforts planned in FY 2022 include: Combat Systems: - Continue development of TI-24 Government Furnished Information in support of detailed design, production, and manufacturing. - Continue AN/BST-1 reliability based engineering changes, qualification, and testing. - Complete early environmental qualification testing of Government Furnished Equipment. - Continue to deliver developmental Structurally Integrated Enclosures to combat system vendor sites. - Continue to execute shock, explodable volume, HEMP, and early integration testing of components. Component Development: - Continue Government support and oversight of development of the approximately 34 remaining out of 101 total engineered components. - Support diesel generator integration testing at compatibility test facility and complete COLUMBIA lead ship production unit build. - Continue production of lead ship ACRU. - Continue reliability testing of ACRU at Naval Surface Warfare Center. - Continue at-sea operational assessment of ACRU. Propulsor and Shafting: - Begin testing of propulsor bearing engineering demonstration model at Full Scale Bearing Test Facility. - Continue propulsor shock qualification analysis and design certification efforts. - Continue to update performance achievability assessments to reflect as-manufactured parts. Shock, Structures and Composites: - Continue test planning, test simulations and vehicle assessment for Large Vehicle Shock Testing. - Complete instrumentation and conduct test of the forward pressure hull confirmation model.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Complete fabrication of Out of Autoclave bow dome. - Complete fabrication of US Navigation Sonar System Window shipset. Signatures: - Update whole-boat signature predictions using updated modeling and predictive tools. ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease represents the updated program cost estimate from 2020 capturing updates to government component and technology development efforts.					
Title: Systems Engineering/Program Management	61.865	35.395	35.594	0.000	35.594
Articles:	-	-	-	-	-
FY 2021 Plans: Program Office will continue efforts to manage, coordinate, and oversee all efforts of the program including shipbuilder and government activities. - Conduct SWS fragility testing at NSWC Philadelphia. - Execute the COLUMBIA Survivability Modeling and Simulation (M&S) execution plan at NUWC with the objective of verifying the suite will support accreditation by COMOPTEVFOR before Initial Operational Test and Evaluation in FY2028. - Test the COLUMBIA Class Shock Isolated Deck high capacity mounts and fluid viscous dampers as part of the COLUMBIA LFT&E program. - Update and validate the USS COLUMBIA (SSBN 826) Program Validated Online Lifecycle Threat (VOLT) report - Execute the Joint COLUMBIA Class and VIRGINIA Class Submarine Warfare Federated Tactical System (SWFTS) TI-16 Cybersecurity Early Developmental Test (EDT) 18-1 test event by the National Cyber Range (NCR) and the NAVSEA Red Team. - The COLUMBIA Class Program Office will continue to report on results of developmental testing being conducted to DD(DT&E) in accordance with the TEMP. - Conduct Cyber Risk assessments to support continual cyber security development.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- The Non-Propulsion Electronic System (NPES) division will manage and coordinate government laboratories and sub-system Participating Area Managers (PARMs) to continue evaluations for the SSBN827 TI-24 NPES configuration - Conduct efforts to validate that the design of the TI-24 Control System Module Off-hull and Test Site (COATS) configuration can be retrofit on lead ship during Post Shakedown Availability (PSA) with acceptable risk. - Early Strategic Weapon System Integration into NPES Systems. - Continue studies and preparations at affected shore facilities, such as Utility and Mooring assessments. - Trident Training Facility (TTF) Kings Bay MILCON P676 Final Design Authority is planned in FY21 to support Construction Start in FY23. - Trident Refit Facility (TRF) Kings Bay MILCON P684 planned submission for PRI#1 update in FY21. - TRF Bangor MILCON P817 planned submission for PRI#0 in FY21. - Receive stakeholder concurrence on maintenance product development processes, including roles and responsibilities ultimately resulting in an approved Class Maintenance Plan to support Lead Ship Delivery. - Commence development of COLUMBIA Submarine Bridge Trainer (SBT) Engineering Development Model (EDM). - Complete prototype development of COLUMBIA Integrated Logistics Environment (ILE) to demonstrate capability of leveraging COLUMBIA model based design to plan and execute maintenance at Trident Refit Facilities (TRF). Assess next steps to determine way ahead. - Maintain execution of the COLUMBIA Electronics Integration Plan to support shore side Command and Control testing, and mitigation of integration risks. - Conduct Sonar Commercial Off the Shelf (COTS) component fragility testing at NSWC Philadelphia. Issue a comprehensive Combat, Imaging and Sonar COTS fragility test report. - Leveraging from the Deck Simulating Shock Machine (DSSM) and Fluid Viscus Dampers and High Capacity Mount (FVD/HCM) test results, establish equipment kill criteria for use in assessing CLB mission capabilities after an adversary's simulated successful attack on CLB. - Report on results of developmental testing being conducted to Deputy Director, Developmental Test & Evaluations, and Assessments (DD(DTE&A)) in accordance with the TEMP. - Complete the Joint COLUMBIA Class and VIRGINIA Class SWFTS TI-16 Cybersecurity Early Developmental Test (EDT) 18-1 test event by the National Cyber Range (NCR) and the NAVSEA Red Team. - Test & Evaluation (T&E) will conduct a multi-enclave, multi-site, integrated cybersecurity test event. Systems under test include BYG-1 (TI-18/APB-19), BQQ-10 Acoustics Rapid COTS Insertion (ARCI), Conventional					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Weapons Launcher (CWL), Consolidated Afloat Networks and Enterprise Services (CANES), Common Submarine Radio Room (CSRR).					
FY 2022 Base Plans: Program Office will continue efforts to manage, coordinate, and oversee all efforts of the program including shipbuilder and government activities. - Continue studies and preparations at affected shore facilities, such as Utility and Mooring assessments. - Trident Training Facility (TTF) Kings Bay MILCON P676 Authority to Advertise (ATA) is planned in FY22 to support Construction Start in FY23. - Trident Refit Facility (TRF) Kings Bay MILCON P684 planned submission for PRI#2 update in FY22. - Receive stakeholder concurrence on maintenance product development processes, including roles and responsibilities ultimately resulting in an approved Class Maintenance Plan to support Lead Ship Delivery. - Continue development of COLUMBIA Submarine Bridge Trainer (SBT) Engineering Development Model (EDM). - Initiate government laboratory and sub-system Participating Area Manager (PARMs) efforts to begin detailed design of the SSBN827 TI-24 NPES configuration. - Continue risk reduction actions necessary to install the TI-24 SSBN 827 COATS configuration as a retrofit on lead ship during PSA. - Execute early Strategic Weapon System Integration into NPES Systems. - Maintain execution of the COLUMBIA Electronics Integration Plan to support shore side Command and Control testing, and mitigation of integration risks. - Support the biennial SSBN Security Technology Program (SSTP)-sponsored CLB Vulnerability Assessment. - Draft and coordinate updates to the TEMP in support of FY23 approval by stakeholders. - Conduct fragility testing of SWS COTS components procured in FY20. Prepare report. Begin assessment of relevant threat weapon shot lines. - Develop personal injury scenarios and injury criteria that will enable the projection of casualties resulting from an adversary's simulated successful attack. - Report on results of developmental testing being conducted to DD(DT&E) in accordance with the TEMP. - Conduct a cybersecurity test similar to that completed in FY21, this time on T!-20 baseline systems. This will be CLB's first cyber development test of the SWFTS variant that will be installed on the first of class.					
FY 2022 OCO Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Increase represents the updated program cost estimate from 2020 capturing updated program estimates.					
Title: Strategic Weapons System Integration	53.169	26.115	13.772	0.000	13.772
Articles:	-	-	-	-	-
FY 2021 Plans: - Continue system engineering efforts required for the re-hosting and integration of the TRIDENT II (D5) SWS on the COLUMBIA submarine including review, modification, and update of SWS Coordination, Interface and Arrangement Drawings for SWS equipment within the CMC and performing associated Logistic Support activities. - Continue utilization of the SWS Fire Control Engineering Test Systems within the land-based test berths / facilities for SWS Subsystem hardware and software integration, verification, and validation. - Conduct Fire Control System / SWSS Regression Testing. - Complete development of and conduct verification testing of special test vehicles. - Continue Strategic Weapon Support Systems (SWSS) Verification and Validation (V&V) testing at SWS Ashore. - Continue proofing of Shipyard Installation Test Program (SITP) Test Procedures at SWSA. - Conduct Strategic Weapon Training System (SWTS) Critical Design Review (CDR). - Continue efforts of the Integration Working Group for the integration of NPES with the SWS.					
FY 2022 Base Plans: - Continue system engineering efforts required for the re-hosting and integration of the TRIDENT II (D5) SWS on the COLUMBIA submarine including review, modification, and update of SWS Coordination, Interface and Arrangement Drawings for SWS equipment within the CMC and performing associated Logistic Support activities. - Continue utilization of the SWS Fire Control Engineering Test Systems within the land-based test berths / facilities for SWS Subsystem hardware and software integration, verification, and validation. - Complete Strategic Weapon Support Systems (SWSS) Verification and Validation (V&V) testing at SWS Ashore. - Continue proofing of Shipyard Installation Test Program (SITP) Test Procedures at SWSA.					
FY 2022 OCO Plans:					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Funding levels decreased as SWS Integration efforts ramp down and are incorporated into the SCN-funded detail design (Plans).					
Accomplishments/Planned Programs Subtotals	403.713	316.396	296.231	0.000	296.231

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• RDTEN/0603570N/3219: *SBSD Nuclear Technology Development*	114.006	80.085	60.142	-	60.142	-	-	-	-	-	-
• RDTEN/0101221N/0951: *Joint Warhead Fuze Sustainment Program*	22.332	16.557	6.733	-	6.733	-	-	-	-	-	-
• OPN/5358: *Strategic Missile Systems Equip*	258.901	251.683	281.259	-	281.259	-	-	-	-	-	-
• WPN/1250: *TRIDENT II Mods*	1,165.736	1,160.862	1,144.446	-	1,144.446	-	-	-	-	-	-
• OMN/1D2D: *Fleet Ballistic Missile*	1,410.136	1,411.227	1,476.247	-	1,476.247	-	-	-	-	-	-
• SCN/1045: *COLUMBIA Class Submarine*	1,820.927	4,122.199	4,646.980	-	4,646.980	-	-	-	-	-	-
• MCN/64482044: *MCON Design*	233.220	199.537	256.429	-	256.429	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

The Common Missile Compartment (CMC) is designed and developed to support the U.S. and UK in development of the COLUMBIA and DREADNOUGHT SSBN programs enabling a common U.S.-UK CMC and maximizing the benefit of the ongoing U.S.-UK partnership in strategic deterrence. The COLUMBIA Class Program RDT&E efforts support the design, construction and operations & support portions of the program. RDT&E efforts are being performed by Navy laboratories, shipyards, private industry, and University Affiliated Research Centers.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	Ship Design Contractor-EB : Groton, CT	1,604.476	143.080	Oct 2019	129.937	Oct 2020	153.070	Oct 2021	-		153.070	-	-	-
Product Development	WR	NSWC : Carderock, MD	556.583	53.582	Oct 2019	47.191	Oct 2020	32.801	Oct 2021	-		32.801	-	-	-
Product Development	WR	NSWC : Philadelphia, PA	77.183	19.577	Oct 2019	19.210	Oct 2020	13.614	Oct 2021	-		13.614	-	-	-
Product Development	WR	NUWC : Newport, RI	105.275	32.821	Oct 2019	26.087	Oct 2020	26.988	Oct 2021	-		26.988	-	-	-
Product Development	Various	NAVSEA : Various	242.548	39.616	Oct 2019	32.461	Oct 2020	20.392	Oct 2021	-		20.392	-	-	-
Product Development	SS/CPFF	ARL Penn State University : State College, PA	3.211	0.600	Oct 2019	0.000		0.000		-		0.000	-	-	-
Product Development	SS/CPFF	NGMS : Sunnyvale, CA	193.897	4.612	Oct 2019	2.254	Oct 2020	0.000		-		0.000	-	-	-
Product Development	SS/CPFF	JHU/APL : Laurel, MD	25.406	3.682	Nov 2019	1.617	Nov 2020	0.967	Nov 2021	-		0.967	-	-	-
Product Development	WR	NUWC : Keyport, WA	0.652	0.000		0.000		0.000		-		0.000	-	-	-
Product Development	SS/CPFF	DRAPER : Cambridge, MA	10.166	0.000	Oct 2019	0.000		0.000		-		0.000	-	-	-
Product Development	SS/CPFF	LMRMS : Mitchel Field, NY	79.815	5.410	Oct 2019	0.608	Oct 2020	0.160	Nov 2021	-		0.160	-	-	-
Product Development	C/CPFF	EMCUBE : Alexandria, VA	3.786	0.247	Oct 2019	0.651	Oct 2020	0.000		-		0.000	-	-	-
Product Development	SS/CPFF	LMS : Sunnyvale, CA	111.256	8.012	Oct 2019	1.076	Oct 2020	0.000		-		0.000	-	-	-
Product Development	SS/CPFF	JRC : Washington, DC	4.693	1.139	Oct 2019	0.000		0.000		-		0.000	-	-	-
Product Development	C/CPFF	GDMS : Pittsfield, MA	148.960	11.025	Oct 2019	9.249	Oct 2020	5.848	Oct 2021	-		5.848	-	-	-
Product Development	WR	CNSW : China Lake, CA	82.243	0.000	Oct 2019	0.000		0.000		-		0.000	-	-	-
Product Development	SS/CPFF	IEC : Anaheim, CA	3.703	0.280	Oct 2019	1.316	Oct 2020	1.902	Oct 2021	-		1.902	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	WR	NSWC : Dahlgren, VA	27.876	0.000	Oct 2019	0.000		0.000		-		0.000	-	-	-
Product Development	SS/CPFF	BAE : Rockville, MD	43.056	4.379	Oct 2019	4.875	Oct 2020	0.000		-		0.000	-	-	-
Product Development	SS/CPFF	BNA : Huntington Beach, CA	3.217	0.000		0.000		0.000		-		0.000	-	-	-
Product Development	WR	NSWC Crane : Crane, IN	61.604	8.974	Nov 2019	3.670	Nov 2020	3.291	Nov 2021	-		3.291	-	-	-
Product Development	SS/CPFF	GDEB : Groton, CT	7.393	1.344	Oct 2019	0.684	Oct 2020	1.007	Oct 2021	-		1.007	-	-	-
Product Development	Various	SSP : Various	17.215	2.474	Oct 2019	0.115	Oct 2020	0.597	Oct 2021	-		0.597	-	-	-
Product Development	SS/CPFF	SPA : Alexandria, VA	11.559	0.991	Oct 2019	0.000		0.000		-		0.000	-	-	-
		Subtotal	3,425.773	341.845		281.001		260.637		-		260.637	-	-	N/A

Remarks

FY20 amounts for GDMS and BAE do not reflect the application of United Kingdom (UK) Common R&D funding for Common Missile Compartment (CMC) non-recurring engineering (NRE) efforts, which aligns with the approved UK funding profile, noted in the SAR report. UK funding accounts for 53% of SSP SWS CMC NRE efforts in FY20 and 22% in FY21. FY20 Warfare center requirements changes include updates for FY20 actual execution, and FY21 reflects shifts in work from Carderock to NUWC/Newport and the program transition to SCN Full Funding. Other FY21 & FY22 updates match the approved 2020 cost estimate.

Note: Various is used for multiple activities with different award dates.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Management Support	C/CPFF	Various : Multiple Awards	137.070	34.814	Nov 2019	17.750	Nov 2020	16.298	Nov 2021	-		16.298	-	-	-
Government Management Support	WR	Various: NSWC : Carderock, MD	82.399	14.549	Oct 2019	9.295	Oct 2020	10.111	Oct 2021	-		10.111	-	-	-
Government Management Support	WR	Various: NSWC : Philadelphia, PA	8.944	2.345	Oct 2019	1.802	Oct 2020	1.240	Oct 2021	-		1.240	-	-	-
Government Management Support	WR	Various: NUWC : Newport, RI	14.090	3.929	Oct 2019	2.673	Oct 2020	2.625	Oct 2021	-		2.625	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Management Support	WR	Vairous: SUPSHIP : Groton, CT	7.359	5.579	Oct 2019	3.375	Oct 2020	4.720	Oct 2021	-		4.720	-	-	-
Travel	WR	NAVSEA HQ : Washington, D.C.	2.746	0.652	Nov 2019	0.500	Nov 2020	0.600	Nov 2021	-		0.600	-	-	-
		Subtotal	252.608	61.868		35.395		35.594		-		35.594	-	-	N/A

Remarks

The funding values in FY20 were adjusted from the FY 2021 budget values in order to reflect execution actuals in FY20 and to properly align the execution of funding for FY21 within Management Services and the program transition to SCN Full Funding. These requirements are split funded with SCN beginning in FY21 so values above are ~50% of the required, with remaining balance funded with SCN full funding. Other FY21 & FY22 updates match the approved 2020 cost estimate.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	3,678.381	403.713		316.396		296.231		-		296.231	-	-	N/A

Remarks

The listed Award Dates represent the date on which initial obligations occur for the effort.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

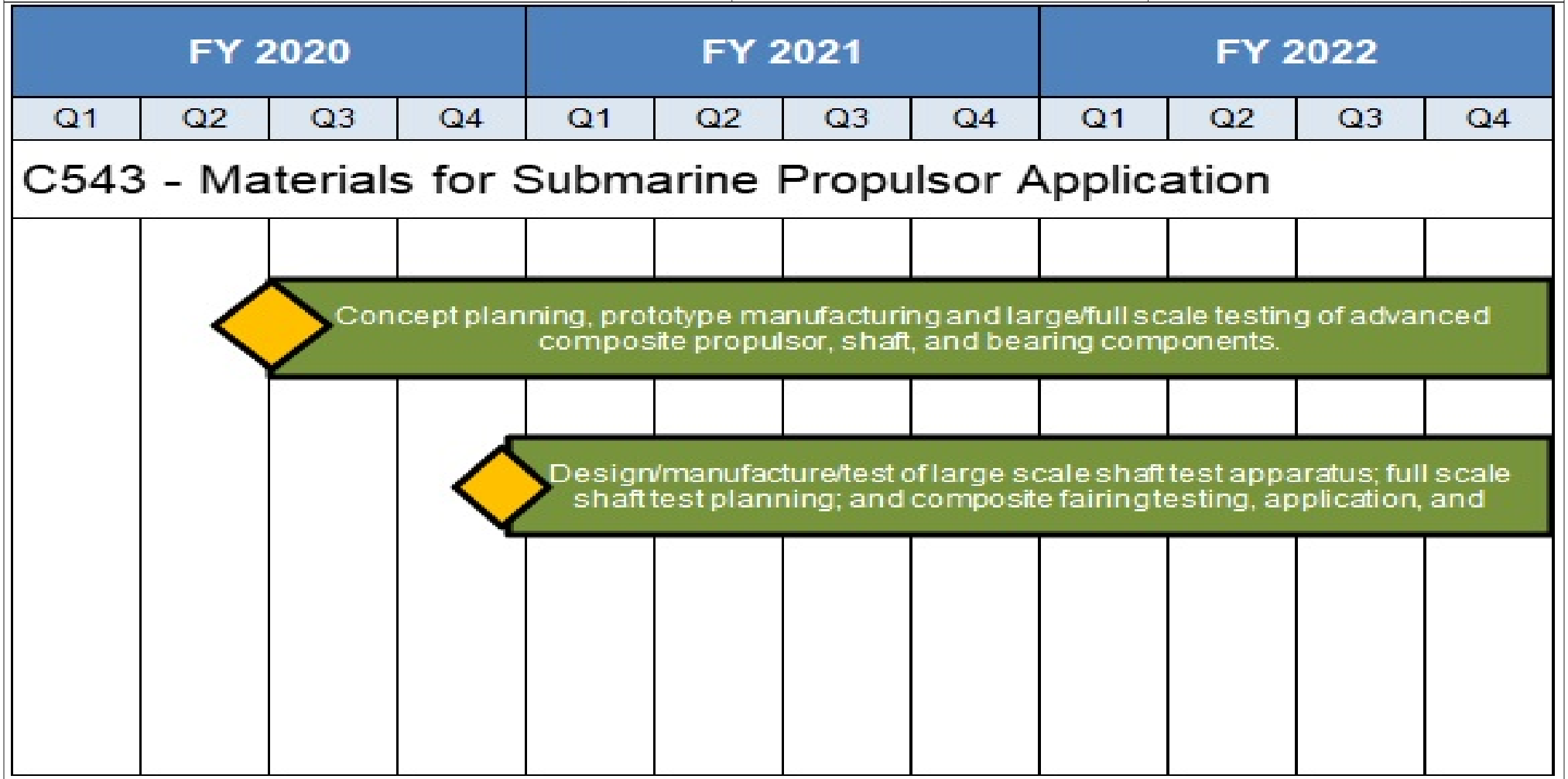

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 3220 / *COLUMBIA Class Submarine Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Notes: * Effort began prior to 1st Quarter FY 2020. ** Effort continues past 4th Quarter FY 2026				
Ship Detailed & Arrangements*	1	2020	1	2022
Ship Design Disclosure and Construction Data*	1	2020	4	2022
Research, Development, and Prototyping for Lead Ship Design*, **	1	2020	4	2022
Component Development/Component Qualification* , **	1	2020	4	2022
Large Scale Vehicle (LSV) Trial 2*	1	2020	3	2020
Advanced Propulsor Bearing Prototype*	1	2020	4	2022
Advanced Carbon Dioxide Removal Unit (ACRU)*, **	1	2020	4	2022
SCN Design*, **	1	2020	4	2022
Lead Ship Construction**	1	2021	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603595N / *SSBN New Design*				Project (Number/Name) 9999 / *Congressional Adds*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
9999: *Congressional Adds*	51.140	7.718	0.000	0.000	-	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Congressional Add supporting the development of composite materials for COLUMBIA Class Propulsion. FY20 Congressional Add supports the continued development of composite materials and also provides funding for the Naval Propulsion Foundry Center Facility Power Upgrades.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2020	FY 2021
Congressional Add: Materials for submarine propulsor applications	7.718	0.000
FY 2020 Accomplishments: N/A		
FY 2021 Plans: Continue efforts started in FY2020.		
Congressional Adds Subtotals	7.718	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	Seeman Composites : Gulfport, MS	1.171	6.218	Sep 2020	0.000		0.000		-		0.000	-	-	-
Product Development	TBD	Seeman Comp : Gulfport, MS	31.651	0.000		0.000		0.000		-		0.000	-	-	-
Product Devlopment	WR	NSWC : Carderock, MD	5.776	1.500	Sep 2020	0.000		0.000		-		0.000	-	-	-
Product Development	C/FFP	DLA Aviation : Richmond, VA	12.542	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	51.140	7.718		0.000		0.000		-		0.000	-	-	N/A

Remarks

Prior year costs are comprised of 2 other Project Units that were provided to the program for these same efforts - PU C405: Advanced Materials Propeller Program ($38.6M); and PU C448: Naval Propulsion Foundry Center Facility Power Upgrades ($12.54M).

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	51.140	7.718		0.000		0.000		-		0.000	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 9999 / *Congressional Adds*

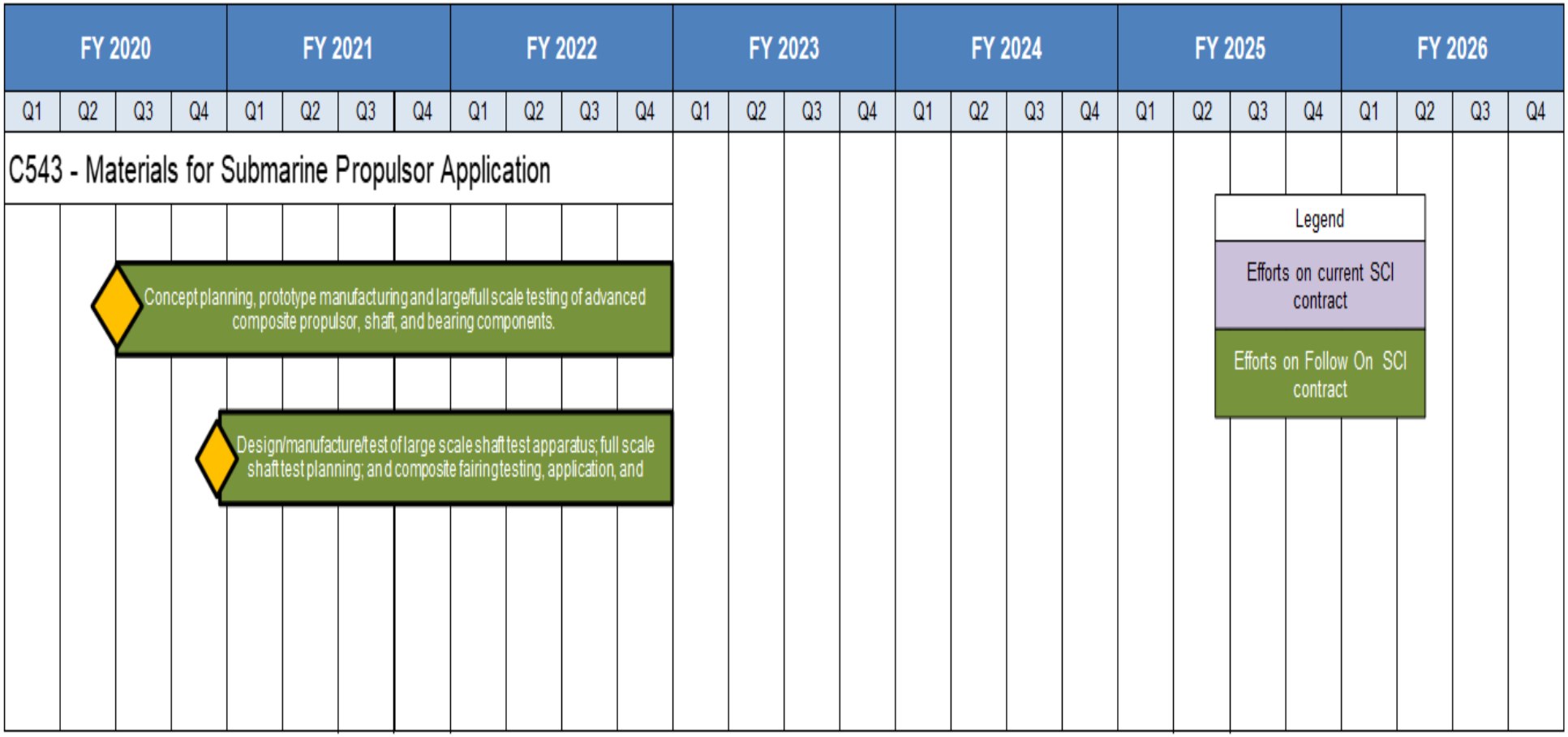

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603595N / *SSBN New Design*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999 Note: * Effort began prior to 1st quarter FY 2019				
Concept planning, prototype manufacturing and large/full scale testing of advanced composite propulsor, shaft, and bearing components.	3	2020	4	2022
Design/manufacture/test of large scale shaft test apparatus; full scale shaft test planning; and composite fairing testing, application, and machining.	4	2020	4	2022