Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy												Date: March 2023
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 0603561N *I Advanced Submarine System Development*							
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
Total Program Element	1,394.754	96.405	110.146	88.415	-	88.415	89.074	102.291	91.274	90.827	Continuing	Continuing
0223: *Sub Combat System Improvement (ADV)*	713.623	53.922	57.691	60.360	-	60.360	61.336	62.917	62.880	62.198	Continuing	Continuing
2033: *Adv Submarine Systems Development*	602.235	28.859	36.607	28.055	-	28.055	27.738	39.374	28.394	28.629	Continuing	Continuing
2096: *Payload Delivery Development*	43.632	2.506	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	46.138
3391: *SSN/SSGN Survivability Program*	35.264	11.118	10.848	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	57.230
9999: *Congressional Adds*	0.000	0.000	5.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000

A. Mission Description and Budget Item Justification

This Program Element (PE) 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. It will increase the submarine technology base and provide subsystem design options not currently feasible. The PE also supports programs transitioning from Science and Technology (S&T), Defense Advanced Research Projects Agency (DARPA), Independent Research & Development (IR&D), and Small Business Innovation Research (SBIR) projects.

DESCRIPTION/JUSTIFICATION BY PROJECT:

PROJECT 0223: The Submarine Combat System Improvement (Advanced) (Non-ACAT) project researches, develops, and tests new sonar, combat system, imaging, and electronic warfare software for Program Executive Office, Undersea Warfare Systems (PEO UWS), delivering approximately thirty (30) new capabilities every other year. The project also develops, tests, and prototypes new sonar arrays for PMS 401, the Submarine Acoustics Program Office in PEO UWS. This project supports Navy Submarine Acoustic Superiority and Technology Insertion (TI) initiatives through the application of advanced development and testing of sensors and sensor processing systems supporting tactical control systems improvements. Improvements are supportive of "Advantage at Sea: Prevailing with Integrated All-Domain Naval Power" and the Chief of Naval Operations (CNO) "Navplan"; addressing all components to include Prevailing in Long-Term Strategic Competition, Operating Across the Competition Continuum, and Delivering Integrated All-Domain Naval Forces. This project addresses threats posed by China, Russia, Iran, and Korea, improved lethality of U.S. Submarine Forces and 3rd Offset Capabilities in the Unmanned and Automated Systems domains.

Project 0223 is comprised of three (3) major efforts: Advanced Processing Builds (APB), Advanced Sensors, and Large Vertical Array (LVA).

APB develops, tests and transitions capabilities for:
- Acoustics, transitioning to AN/BQQ-10;

- Tactical control, transitioning to AN/BYG-1;
- Imaging, transitioning to AN/BVY-1; and
- Electronic Warfare (EW), transitioning to AN/BLQ-10.

Advanced Sensors develops new technologies for hull mounted and towed arrays. Hull mounted array improvements support submarine applications only. Towed array improvements are developed to support submarine, surface and surveillance applications.

LVA leverages demonstrated flank array developments to conduct critical testing and analysis needed to improve array performance and develop sensor employment tactics. It introduces new electronic hardware and software applications to enhance array and signal processing performance. These improvements will be incorporated in future LVA builds for Virginia class SSNs and Ohio and Columbia classes of SSBNs as well as backfits. The LVA project also sustains the prototype LVA on USS Maryland.

PROJECT 2033: Advanced Submarine Systems Development (ASSD) is a non-acquisition program that develops, matures and tests advanced technologies for successful integration into current and future submarine classes, lowers the technical/cost risks of integrating new technologies prior to acquisition, and speeds the delivery of capability and lethality into the Fleet. ASSD transitions Hull, Mechanical, and Electrical (HM&E) technologies, and future naval concepts from the Science & Technology (S&T) and Research and Development (R&D) communities through the development, maturation, and integration of technology projects to operational submarine platforms for assessment, testing, and evaluation. Once projects have proven their maturity and promise through at-sea demonstration, they are formally transitioned into acquisition Programs of Record (PORs). Additionally, ASSD operates and maintains R&D infrastructure assets that are critical to the long-term design, assessment and construction of modern, stealthy submarine platforms.

Project 2033 is comprised of three programmatic budget categories: Strategic Capability R&D Infrastructure, Long Range R&D Investment, and Rapid Technology Development. Strategic infrastructure investments maintain and operate critical, one-of-a-kind undersea warfare R&D assets that enable the design and manufacture of the stealthiest submarines in the world, without the requirement to develop and test at full scale, which is inordinately expensive and risky. Long-range R&D investment is the maturation and prototyping at full scale of long-range (5-10 years) technologies, to enable their readiness for incorporation into existing and future submarines. The objective is to achieve high technology readiness (TRL-7) of the targeted technology so that it can be incorporated into the baseline submarine design during the detail design and construction contract award, and evaluated for back-fit into existing platforms. This is class agnostic technology development that supports the VIRGINIA program, the COLUMBIA program, and the Next Generation Attack Submarine (SSN(X)) programs. Rapid Technology Development projects are efforts designed to rapidly mature higher TRL capabilities and field the particular technology project capability within an 18-30 month window, from program start to submarine at- sea demonstration. Also included in this category are innovative technology transition projects, seedling efforts (<$800K/year) which assess new technology candidates and keep the submarine and Undersea Warfare (USW) technology pipeline primed. All SUB073/ASSD projects are determined by senior USW leadership and N97 sponsor direction.

The Program works with Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), Office of Secretary of Defense (OSD), Office of Naval Research (ONR), and Defense Advanced Research Projects Agency (DARPA) organizations to identify and mature technology candidates for integration into current/future submarine classes to provide new/transformational capabilities, while achieving total-ownership cost reductions. Experimentation and demonstration

are also conducted in a joint warfighting context with other services (i.e. Marine Corps, Army, Air Force to enable early assessment of a new technology's warfighting capabilities, and to inform the Fleet and acquisition community on smarter technology-selection decisions. This Program also supports cooperative R&D through Information/Data Exchange Agreements (IEA/ DEA) and joint Project Arrangements (PA) with international Allies, which target core technology maturation, future submarine component concept designs, etc. Major technology developmental efforts within this budget submission include:

Strategic Capability Infrastructure
- Large Scale Vehicle (LSV)
- Large Scale Vehicle Recapitalization
- Intermediate Scale Measurement System (ISMS)
- High Gain Measurement System (HGMS)
- South Tongue of the Ocean (TOTO) Acoustic Measurement Facility (STAFAC) Recapitalization

Long Range R&D Investment
- Advanced Material Propeller (AMP) Technology
- Advanced Signature Management
- Advanced SSN Technologies
- Next Generation Thrust (future propulsor/shafting technologies)
- Advanced Hull Treatments

Rapid Technology Development
- Innovation Technology Transfer

PROJECT 2096: Payload Delivery Development, consists of the Payload Handling System (PHS).

Payload Delivery Development is a program used for the integration of large deployable and retrievable payloads with submarines. RDT&EN funding will be used to develop a prototype payload launch and recovery system utilized with submarine large ocean interfaces to accommodate large diameter payloads and offboard systems. The project enables launch and recovery of these systems from submarines. This will provide the Submarine Force with the capability to launch and recover large payloads and offboard systems of various configurations in support of critical Undersea Warfare (USW) missions, providing battle space awareness and extending war-fighting reach in support of Subsea and Seabed Warfare (SSW) mission objectives. This capability has been identified as a key enabler for the following critical USW mission areas: Intelligence, Surveillance, and Reconnaissance (ISR), Anti-Submarine Warfare (ASW), Anti-Surface Wa rfare (ASUW), Naval Special Warfare (NSW), Mine Warfare, Subsea and Seabed Warfare (SSW), Counter- Autonomous Underwater Vehicle (AUV) Warfare, Electromagnetic Maneuver Warfare (EMMW), Deception, and Non-Lethal Sea Control. This capability is paramount to winning the great power competition emerging between world powers and maintaining dominance in the undersea domain.

PROJECT 3391: In 2013, OPNAV N97 established SSN/SSGN Survivability Program (S3P) as a separate project area within ASSD to assure SSN/SSGN survivability and the ability of submarines to complete their joint warfighting missions even if covert mobility is compromised. FY 2018 is the first year of S3P execution as Project

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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 0603561N *I Advanced Submarine System Development*

3391 under ASSD with level funding across the FYDP. PBR 19 proposes technology projects that would help pace world-wide technology advances and red investments so as to track and assess US undersea superiority technology insertion plans and their impact on SSN/SSGN survivability.

B. Program Change Summary ($ in Millions)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Previous President's Budget	98.921	105.703	98.756	-	98.756
Current President's Budget	96.405	110.146	88.415	-	88.415
Total Adjustments	-2.516	4.443	-10.341	-	-10.341
• Congressional General Reductions	-	-0.557			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	5.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-2.516	0.000			
• Program Adjustments	0.000	0.000	-11.384	-	-11.384
• Rate/Misc Adjustments	0.000	0.000	1.043	-	1.043

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2022	FY 2023
Project: 9999: *Congressional Adds*		
Congressional Add: *Nickle-zinc battery deployment for Virgina class*	0.000	5.000
Congressional Add Subtotals for Project: 9999	0.000	5.000
Congressional Add Totals for all Projects	0.000	5.000

Change Summary Explanation

FUNDING CHANGES SINCE THE PREVIOUS PRESIDENT'S BUDGET AT THE OVERALL PE LEVEL:
- FY 2022 net decrease of $-2.516M reflects the Small Business Innovative Research (SBIR) transfer.
- FY 2023 net increase of $+4.443M reflects the incorporation of $+5.000M to Project C870 for Nickel-Zinc Battery Deployment to VA Class and $-0.557M of miscellaneous program/rate adjustments applied to the entire PE.
- FY 2024 net decrease of $-10.341M reflects the -$12.796M realignment of funds from Project 3391 to BSO 30 (Strategic Systems Programs); the $+1.400M increase to project 0223 for Project Rebound; and $+1.055M of miscellaneous program/rate adjustments applied to the entire PE.

INFORMATION AT THE PROJECT LEVEL:

PROJECT 0223:

Exhibit R-2, RDT&E Budget Item Justification: PB 2024 Navy	Date: March 2023
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 0603561N *I Advanced Submarine System Development*

FUNDING CHANGES: The FY 2023 ($57.691M) to FY 2024 ($60.360M) budget increase ($+2.669M) above the inflation expected with the RDT&EN appropriation is due to the incorporation of Project Rebound in Advanced Processing Build (APB) / Submarine Warfare Federated Tactical Systems (SWTFS).

SCHEDULE CHANGES:
- Advanced Processing Build (APB): To stay in alignment with PEO UWS Development, Security, and Operations (DEVSECOPS) production schedules, APB-23 Step 4 At-Sea Test shifted from 1Q25 to 3Q24, APB-23 Transition to PEO UWS Production Programs shifted from 2Q25 to 4Q24, APB-25 Step 4 At-Sea Test shifted from 1Q27 to 3Q26, and APB-25 Transition to PEO UWS Production Programs shifted from 2Q27 to 4Q26.
- Advanced Sensors: Completion of Open Architecture Telemetry (OAT) Advanced Development Model (ADM) fabrication has been extended from 2Q23 to 3Q25 for three primary reasons:
1. Budget reductions to the PEO UWS production program caused a re-baseline of the Next Generation Surveillance Array (NGSA) project, which uses OAT.
2. Receipt of materials supporting OAT development and fabrication were delayed due to COVID and supply chain issues in FY 2022 and continuing into FY 2023.
3. OAT is being developed for its initial application in concert with the NGSA which is being developed by PMS485. For programmatic reasons, PMS485 has extended its development and test schedule for at-sea testing into 3Q25. Project 0223 will take advantage of these delays to construct a Universal Test Harness (UTH) and progress the OAT portion of the array from its original intent as an ADM (TRL 5) to an Engineering Development Model (EDM) (TRL 7).
- Project Rebound: This effort commences in FY 2024.

PROJECT 2033:
FY 2023 ($36.607M) to FY 2024 ($28.055M) decrease ($-8.552M) due to programmed project ramp-down within the Strategic Infrastructure budget pillar, specifically the planned transition of the LSV-2 Electric Motor Drive recapitalization project from the procurement/manufacturing phase to the final onboard testing phase.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 0223 / *Sub Combat System Improvement (ADV)*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
0223: *Sub Combat System Improvement (ADV)*	713.623	53.922	57.691	60.360	-	60.360	61.336	62.917	62.880	62.198	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Submarine Combat System Improvement (Advanced) (Non-ACAT) project addresses technology challenges to improve tactical control in littoral and open ocean environments for a variety of operational missions including peacetime engagement, surveillance, battle space preparation, deterrence, regional sea denial, precision strike, task group support, and ground warfare support. These technologies, developed by Navy technology bases, the private sector, Office of Naval Research (ONR), Future Naval Capabilities (FNC), and the Defense Advanced Research Projects Agency (DARPA) are then transitioned. Prototype hardware/software systems are developed to demonstrate technologically promising system concepts in laboratory and at-sea submarine environments. The Advanced Sensor development program develops and tests new sensors and demonstrates large array configurations. Current efforts are directed at towed array sensor technologies, telemetry, and architecture, to improve reliability and performance while decreasing program life-cycle costs. For large array configurations, Conformal Acoustic Velocity Sonar (CAVES), Wide Aperture Array (WAA), Large Vertical Aperture (LVA), a Bow Conformal Array (BCA), and Large Flank Array (LFA) technologies are also being pursued. The focus of sensor processing technology efforts through the Advanced Processing Build (APB) program will address improvements in imaging, tactical control, Electronic Warfare (EW) and acoustics, including detection, localization, classification, ranging, tracking, situational awareness, tactical decision aids, command decision support tools and displays and other functions essential to mission success. APB will also develop capabilities related to off-hull cueing and coordination with other platforms. Technologies and/or capabilities developed under this Project will be shared, as applicable to reduce costs and optimize reuse, with development programs for surface ship sonar, Advanced Capability Build (ACB) and surveillance platforms, Advanced Surveillance Build (ASB). ACB and APB are managed under a common development process titled AxB. While each platform retains its uniqueness and focus in functional domains essential to mission success, a premium is placed on development of common capabilities and modular architecture technologies to maximize commonality and cost effectiveness.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Advanced Processing Build (APB)	42.672	45.241	46.260	0.000	46.260
Articles:	-	-	-	-	-
Description: Advanced Processing Builds (APBs) adhere to a four step process: Step 1: Algorithm/technology assessment by peer review panels of Subject Matter Experts (SME) to down-select technologies and assist developers with technical guidance. Step 2: Algorithm/technology testing with open and closed data sets to further down-select and refine capabilities prior to integration and testing. Step 3: Land-based system-level testing stimulated by the Submarine Multi-Mission Team Trainer (SMMTT), in a realistic tactical environment.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Step 4: At-sea testing on an operational submarine. APB capability priorities are generated by the Submarine Tactical Requirements Group (STRG), a group of senior post-command officers chaired by a Flag Officer, Commander, Undersea Warfare Development Center (UWDC). Priorities are vetted by COMSUBPAC and COMSUBFOR, then provided as requirement by the Chief of Naval Operations (CNO), OPNAV N97. Program Executive Office Undersea Warfare Systems (PEO UWS) provides Milestone Decision Authority (MDA) oversight and approval. Steps 1 and 2 are conducted in a pipeline style, parallel to system integration and production. This makes Steps 1 and 2 independent of any particular Build (e.g APB-21, APB-23, APB-25, etc.) and allows for development of longer lead technologies. The content of a specific APB build (delivered every two years) is then determined through a series of discussions with the Fleet/STRG aimed at selecting the most relevant and mature technologies available in the APB pipeline. Integration at the string and system level is performed followed by Steps 3 and 4, as applicable, and transitioned to production. Beginning in FY 2019, the Navy has pursued a transformation across Submarine Warfare Federated Tactical Systems (SWFTS) to maximize cyber-resiliency, improve software quality, and improve the speed of capability delivery and software improvements. The transformation is being accomplished through a transition to a process comprised of a continuous series of 12-week software increments in a DevSecOps environment. This process better aligns with industry practice and enables the SWFTS systems to leverage industry capability improvements in software configuration management, quality control, Artificial Intelligence (AI) and Machine Learning (ML) and other emerging technologies, while also being more responsive to cyber needs. As APB delivers via SWFTS, changes are required in the 0223 Project's software development and integration methodologies to remain synchronized with the production programs. Instead of delivering a stand-alone improved APB to the PEO UWS SWFTS production programs at the end of development (which the production program offices then had to integrate, mature, test, and certify), development capabilities are now being integrated into the latest SWFTS production hardware and software baseline as they are ready, on a continuing basis. This speeds release of these capabilities to the Fleet by many months. Step 3 and Step 4 testing regimes will be maintained. ***FY 2023 Plans:*** - Conducted Step 4 at-sea testing of APB-21 with tactics and training improvements informed by Step 3 land-based testing. Analyze results to inform Fleet on recommended tactics and training. - Transitioned APB-21 to PEO UWS production programs.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Complete development of major capabilities for APB-23. - Refine continuous development, security, and operations (DevSecOps) process and software pipeline in coordination with production program offices. - Continue providing assistance to PEO UWS production program offices with evolutionary combat system re-architecture to improve cybersecurity and speed of delivery. - Continue development of Machine Learning and Artificial Intelligence (ML/AI), with emphasis on Deep Learning to solve immediate Fleet needs. - Continue Step 1 and Step 2 and commence Step 3 land-based testing of capabilities as they are ready in response to Fleet requirements consistent with the multi-year capability development road map. - Implement Electronic Warfare (EW) detection improvements against complex signals and integrate off-hull payloads into the Submarine Warfare Federated Tactical Systems (SWFTS) construct and Concept of Employment (COE). ***FY 2024 Base Plans:*** - Complete development of remaining capabilities for APB-23. - Conduct Step 3 land-based testing of APB-23. The analysis of results will be used to inform improvements to software, tactics, and training. - Conduct Step 4 at-sea testing of APB-23 with tactics and training improvements informed by Step 3 land-based testing. Analyze results to inform Fleet customer on recommended tactics and training. - Transition APB-23 to PEO UWS production programs. - Continue to refine DevSecOps process and software pipeline in coordination with production program offices. - Continue providing assistance to PEO UWS production program offices with evolutionary combat system re-architecture to improve cybersecurity and speed of delivery. - Continue development of ML/AI, with emphasis on Deep Learning to solve immediate Fleet needs. - Commence Step 1 and Step 2 testing of capabilities as they are ready in response to Fleet requirements consistent with the multi-year capability development road map. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** - FY 2023 ($45.241M) to FY 2024 ($46.260M) increase ($+1.019M) is in line with the inflation expected with the RDT&EN appropriation.					
Title: Advanced Sensors	7.250	7.400	7.550	0.000	7.550

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 0223 / *Sub Combat System Improvement (ADV)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Articles:	-	-	-	-	-

Description: Advanced Sensors develops new technologies for hull mounted and towed arrays. Hull mounted array improvements support submarine applications only. Towed array improvements are shared to support surface and surveillance applications.

FY 2023 Plans:
- Continue fabrication of the Open Architecture Telemetry (OAT) Advanced Development Model (ADM) for the Next Generation Surveillance Array (NGSA).
- Conduct OAT Critical Design Review (CDR).
- Continue fabrication, integration and test of Universal Test Harness (UTH) for NGSA.
- Continue to support the development of new active sensors for Bow Conformal Array (BCA) and SSNx.
- Develop improved passive sensors with new materials to meet aggressive shock requirements while maintaining sensitivity.
- Build test panels for acoustic and shock testing. Conduct acoustic test tank and environmental panel testing of improved Conformal Acoustic Velocity Sonar (CAVES) sensors.
- Develop finite element modeling for passive sensors in CAVES matrix.
- Develop improved active projectors for BCA use that fit the physical profile, without requiring recesses, using textured ceramics.
- Model BCA passive performance in multiple environments with new and existing sensors.

FY 2024 Base Plans:
- Continue OAT ADM fabrication of 13X array.
- Complete UTH construction.
- Begin build-test-build process utilizing the completed UTH to initiate efforts towards design maturation from ADM to Engineering Development Model (EDM).
- Initiate OAT First Article Testing (FAT).
- Continue supporting PEO UWS production programs in BCA development.
- Conduct passive sensor acoustic and shock testing in air and in CAVES matrix.
- Conduct active projector testing in air and water.
- Continue modeling BCA passive performance.
- Update BCA active performance with new sensor.

FY 2024 OCO Plans:

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** - FY 2023 ($7.400M) to FY 2024 ($7.550M) increase ($+0.150M) is in line with the inflation expected with the RDT&EN appropriation.					
Title: Project Rebound ***Articles:*** ***FY 2023 Plans:*** N/A ***FY 2024 Base Plans:*** This classified effort supports Advanced Processing Build (APB)/Submarine Warfare Federated Tactical Systems (SWTFS) processing. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** - FY 2023 ($0.000M) to FY 2024 ($1.400M) increase ($+1.400M) represents the initiation of Project Rebound.	0.000 -	0.000 -	1.400 -	0.000 -	1.400 -
Title: Large Vertical Array (LVA) ***Articles:*** ***Description:*** LVA provides a critically important SONAR to allow the submarine force to sustain acoustic superiority against the most modern submarines. Three submarines currently have LVAs, and more are programmed each year. LVA development is required to support LVA use in the Fleet, pace the threat, adapt to new Navy strategies, and further develop the revolutionary LVA capability. LVA development sustains and maintains the LVA2 Advanced Development Model (ADM); and plans, conducts and analyzes exercises and tests involving LVA2 and Fleet LVAs. LVA development supports new software capability development, informs tactics development and testing, and provides training input for both the Submarine Learning Center (SLC) and embedded training applications on submarines. Additionally, LVA development identifies, investigates, and resolves LVA-related issues. ***FY 2023 Plans:*** - Continue conducting at-sea testing events for LVA2 and analyze at-sea test results. - Analyze SSN 790 LVA3 at-sea test results.	4.000 -	5.050 -	5.150 -	0.000 -	5.150 -

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Provide data-based inputs from tests and exercises to signal processing development, Submarine Learning Center (SLC), and tactical employment recommendations to Undersea Warfare Development Command (UWDC). - Repair known LVA2 equipment failures. - Assess LVA noise concerns, collect baseline and longevity data from multiple LVAs, and conduct modeling and experimentation to identify causes and corrective action. - Collect array data on faulty or failed array inboard/outboard components if they occur. Document troubleshooting and repair findings for evaluation and provide findings/recommendations to the production programs for Virginia, Ohio, and Columbia Class Submarines. - Continue the SSN 688i Conformal Acoustic Velocity Sonar (CAVES) LVA working group with the purpose to develop plans to certify a second source for LVA technology and establish competition for future efforts. - Perform analysis/studies, identify requirements, and continue designs for a conceptual prototype for SSN 688i Class Submarines.					
FY 2024 Base Plans: - Continue conducting at-sea testing events for all LVAs and analyze at-sea test results. - Continue making design improvements based on results of SSN 790 LVA3 at-sea test results. - Update and provide data-based inputs from tests and exercises to signal processing development, SLC, and tactical employment recommendations to UWDC. - Collect array data on faulty or failed array inboard/outboard components if they occur. Document troubleshooting and repair findings for evaluation and provide findings/recommendations to the production programs for Virginia, Ohio, and Columbia Class Submarines. - Repair known LVA2 equipment failures. - Use results of the SSN 688i CAVES LVA working group to certify a second source for LVA technology establishing competition for future efforts. - Perform analysis/studies, identify requirements, and continue designs for a conceptual prototype for SSN 688i Class Submarines. - Support installation of production LVA on USS MARYLAND. - Continue LVA Flow Noise investigations.					
FY 2024 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** - FY 2023 ($5.050M) to FY 2024 ($5.150M) increase ($+0.100M) is in line with the inflation expected with the RDT&EN appropriation.					
Accomplishments/Planned Programs Subtotals	53.922	57.691	60.360	0.000	60.360

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• RDTEN/0205620N: *Surface ASW Cmbt Sys Integr*	27.781	28.999	29.973	-	29.973	30.077	30.542	30.822	31.311	Continuing	Continuing
• RDTEN/0603562N/0770: *Adv Sub Supp Equip Prog*	4.571	3.726	7.791	-	7.791	7.728	6.773	5.040	5.047	Continuing	Continuing

Remarks

D. Acquisition Strategy

Use competitively awarded contracts from Broad Agency Announcement (BAA) solicitations, Other Transaction Authority (OTA), and Small Business Innovative Research (SBIR) initiatives. Integration to fielded systems performed under contracts awarded by the recipient production program within PEO UWS.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
APB, LVA, Advanced Sensor Development	C/CPFF	Adaptive Methods : VA	2.399	0.325	Mar 2022	0.350	Dec 2022	0.350	Dec 2023	-		0.350	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	Alion Sciences : VA	3.267	0.000		0.000		0.000		-		0.000	0.000	3.267	-
APB, LVA, Advanced Sensor Development	C/CPFF	Arete : CA	0.550	0.000		0.000		0.000		-		0.000	0.000	0.550	-
APB, LVA, Advanced Sensor Development	C/CPFF	Chesapeake Science (L-3) : MD	7.551	0.000		0.000		0.000		-		0.000	0.000	7.551	-
APB, LVA, Advanced Sensor Development	C/CPFF	Electric Boat : ME	1.980	2.125	Mar 2022	2.330	Dec 2022	2.350	Dec 2023	-		2.350	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	General Dynamics : VA	30.783	2.151	Mar 2022	2.225	Dec 2022	2.250	Dec 2023	-		2.250	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	GA Tech Research Institute : GA	3.957	0.415	Jan 2022	0.450	Dec 2022	0.450	Dec 2023	-		0.450	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	In Depth Engineering : VA	9.411	1.025	Mar 2022	1.165	Dec 2022	1.175	Dec 2023	-		1.175	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	JHU/APL : MD	136.669	11.350	Jan 2022	11.825	Dec 2022	11.975	Dec 2023	-		11.975	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	Lockheed Martin : VA	110.226	11.175	Nov 2021	11.905	Dec 2022	12.100	Dec 2023	-		12.100	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	Lockheed Martin : NY	10.664	0.000		0.000		0.000		-		0.000	0.000	10.664	-
APB, LVA, Advanced Sensor Development	C/CPFF	Metron : VA	11.798	0.815	Jan 2022	0.865	Dec 2022	0.905	Dec 2023	-		0.905	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPAF	NSMA : VA	14.944	0.700	Jan 2022	0.750	Jan 2023	0.750	Jan 2024	-		0.750	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	WR	NSWC/Carderock : MD	39.483	2.775	Oct 2021	2.695	Nov 2022	2.725	Nov 2023	-		2.725	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	WR	NUWC/Newport : RI	136.043	9.225	Oct 2021	9.100	Nov 2022	9.250	Nov 2023	-		9.250	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	WR	ONI : DC	2.295	0.000		0.000		0.000		-		0.000	0.000	2.295	-

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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
APB, LVA, Advanced Sensor Development	WR	ONR : VA	2.725	0.000		0.000		0.000		-		0.000	0.000	2.725	-
APB, LVA, Advanced Sensor Development	C/CPFF	Progeny : VA	10.146	0.700	Mar 2022	0.715	Dec 2022	0.725	Dec 2023	-		0.725	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	PSU/ARL : PA	13.163	0.700	Jan 2022	0.715	Dec 2022	0.725	Dec 2023	-		0.725	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	SAIC : VA	3.555	0.000		0.000		0.000		-		0.000	0.000	3.555	-
APB, LVA, Advanced Sensor Development	C/CPFF	Sedna Digital : VA	21.444	2.175	Feb 2022	2.175	Dec 2022	2.200	Dec 2023	-		2.200	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	WR	SSC/San Diego : CA	1.963	0.000		0.000		0.000		-		0.000	0.000	1.963	-
APB, LVA, Advanced Sensor Development	MIPR	U.S. Army Research Lab : MD	1.700	0.000		0.000		0.000		-		0.000	0.000	1.700	-
APB, LVA, Advanced Sensor Development	MIPR	U.S. Army/MITRE : NJ	4.595	0.000		0.000		0.000		-		0.000	0.000	4.595	-
APB, LVA, Advanced Sensor Development	MIPR	U.S. Hanscom AFB/ MIT Lincoln Labs : MA	28.914	2.775	Feb 2022	2.975	Dec 2022	3.025	Dec 2023	-		3.025	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	UT/ARL : TX	38.006	2.145	Jan 2022	2.255	Dec 2022	2.275	Dec 2023	-		2.275	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	VAR : VAR*	38.799	1.431	Nov 2021	3.226	Dec 2022	3.760	Dec 2023	-		3.760	Continuing	Continuing	Continuing
Project Rebound Development	C/CPFF	VAR : VAR*	0.000	0.000		0.000		1.400	Nov 2023	-		1.400	0.000	1.400	-
		Subtotal	687.030	52.007		55.721		58.390		-		58.390	Continuing	Continuing	N/A

Remarks

* Consists of multiple performing activities with funding for each not greater than $1M per year.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy		Date: March 2023
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Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support - Acquisition, Business & Finance	C/CPFF	EG&G (URS) : VA	4.291	0.000		0.000		0.000		-		0.000	0.000	4.291	-
Program Management Support - Acquisition, Business & Finance	C/CPAF	BAE Systems : MD	12.665	0.000		0.000		0.000		-		0.000	0.000	12.665	-
Program Management Support - Systems Engineering and Technical Assistance (SETA)	C/CPFF	CGI Federal : VA	6.818	0.000		0.000		0.000		-		0.000	0.000	6.818	-
Program Management Support - Systems Engineering and Technical Assistance (SETA)	C/CPFF	KMS Solutions* : VA	1.761	1.850	Mar 2022	1.900	Dec 2022	1.900	Dec 2023	-		1.900	Continuing	Continuing	Continuing
Program Office Travel	Allot	NAVSEA PEO IWS5 : DC	1.058	0.065	Oct 2021	0.070	Oct 2022	0.070	Oct 2023	-		0.070	Continuing	Continuing	Continuing
		Subtotal	26.593	1.915		1.970		1.970		-		1.970	Continuing	Continuing	N/A

Remarks

* In addition to program office support, KMS Solutions provide technical planning, systems engineering, and test support. KMS Solutions also provide Subject Matter Experts (SMEs) as members of the Advanced Processing Build (APB) technical Peer Review Working Groups and Integrated Product Teams (IPTs) in support of designing and refining candidate technologies for inclusion into APB deliveries.

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	713.623	53.922		57.691		60.360		-		60.360	Continuing	Continuing	N/A

Remarks

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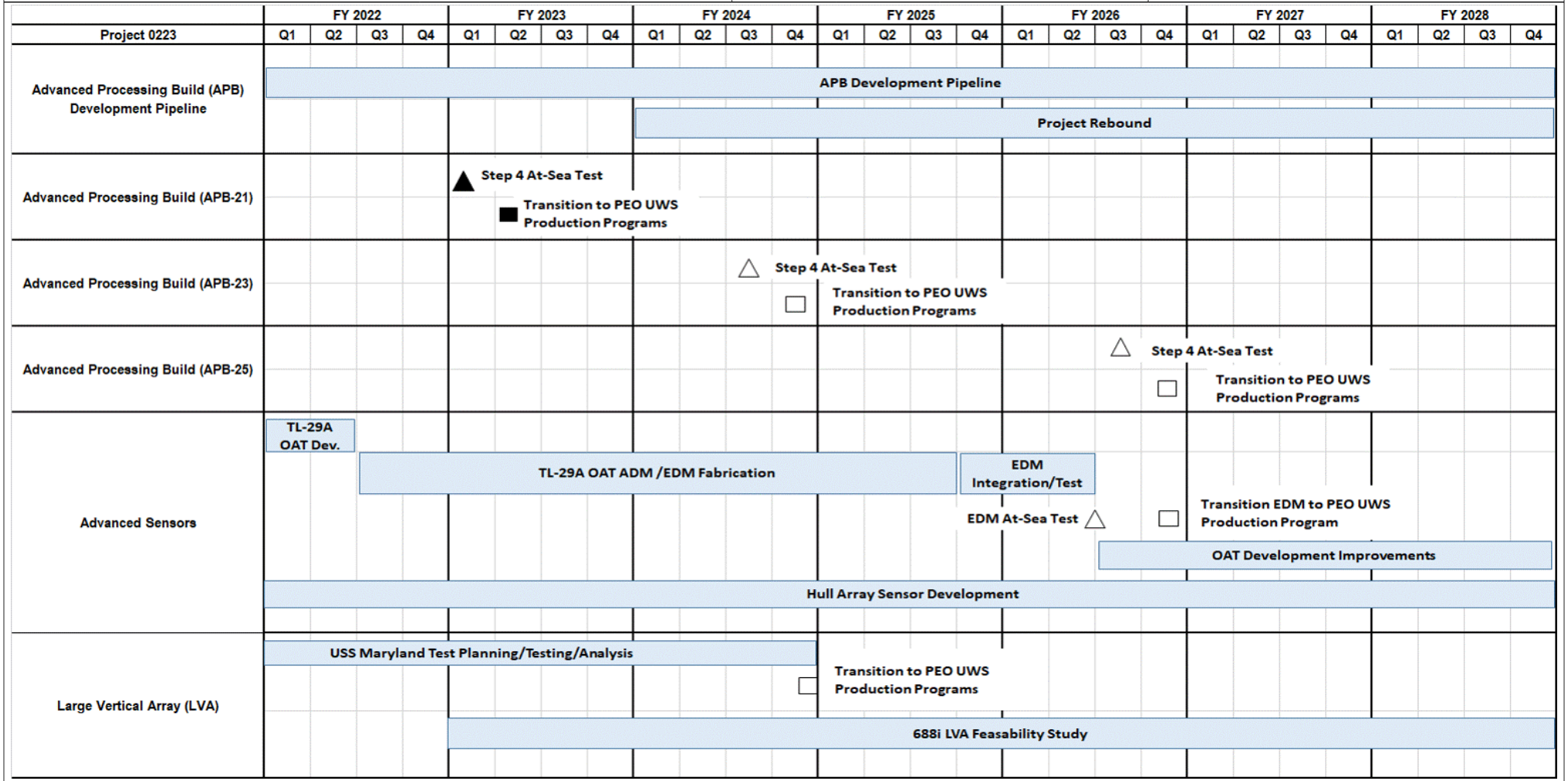

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
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Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 0223				
Advanced Processing Build (APB): APB Development Pipeline	1	2022	4	2028
Advanced Processing Build (APB): Project Rebound	1	2024	4	2028
APB-21: At-Sea Test	1	2023	1	2023
APB-21: Transition to PEO UWS Production Programs	2	2023	2	2023
APB-23: At-Sea Test	3	2024	3	2024
APB-23: Transition to PEO UWS Production Programs	4	2024	4	2024
APB-25: At-Sea Test	3	2026	3	2026
APB-25: Transition to PEO UWS Production Programs	4	2026	4	2026
Advanced Sensors: Hull Array Sensor Development	1	2022	4	2028
Advanced Sensors: TL-29A OAT Development	1	2022	2	2022
Advanced Sensors: TL-29A OAT ADM/EDM Fabrication	3	2022	3	2025
Advanced Sensors: TL-29A OAT EDM Integration/Test	4	2025	2	2026
Advanced Sensors: TL-29A OAT EDM At-Sea Test	2	2026	2	2026
Advanced Sensors: TL-29A OAT EDM Transition	4	2026	4	2026
Advanced Sensors: OAT Development Improvements	3	2026	4	2028
Large Vertical Array (LVA): USS Maryland Test Planning/Testing/Analysis	1	2022	4	2024
Large Vertical Array (LVA): USS Maryland Transition to PEO UWS Production Program	4	2024	4	2024
Large Vertical Array (LVA): 688i LVA Feasibility Study	1	2023	4	2028

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COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
2033: *Adv Submarine Systems Development*	602.235	28.859	36.607	28.055	-	28.055	27.738	39.374	28.394	28.629	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Submarine Systems Development (ASSD) is a non-acquisition program that develops, matures and tests advanced technologies for successful integration into current and future submarine classes, lowers the technical/cost risks of integrating new technologies prior to acquisition, and speeds the delivery of capability and lethality to the Fleet.

ASSD transitions Hull, Mechanical, and Electrical (HM&E) technologies, and future naval concepts from the Science & Technology (S&T) and Research and Development (R&D) communities through the development, maturation, and integration of technology projects to operational submarine platforms for assessment, testing, and evaluation. Once projects have proven their maturity and promise through at-sea demonstration, they are formally transitioned into acquisition Programs Of Record (PORs). Additionally, ASSD operates and maintains strategic R&D infrastructure and measurement assets that are critical to the long-term design, assessment and construction of modern, stealthy submarine platforms.

Project 2033 is comprised of three programmatic budget categories: Strategic Capability R&D Infrastructure, Long Range R&D Investment, and Rapid Technology Development. Strategic infrastructure investments maintain and operate critical, one-of-a-kind undersea warfare R&D assets that enable the design and manufacture of the stealthiest submarines in the world, without the requirement to develop and test at full scale, which is inordinately expensive and risky. Long-range R&D investment is the maturation and prototyping at full scale of long-range (5-10 years) technologies, to enable their readiness for incorporation into existing and future submarines. The objective is to achieve high technology readiness (TRL-7) of the targeted technology so that it can be incorporated into the baseline submarine design during the detailed design and construction contract award, and evaluated for back-fit into existing platforms. This is class agnostic technology development that supports the VIRGINIA program, COLUMBIA program, and the Next Generation Attack Submarine (SSN(X)) programs. Rapid Technology Development projects are efforts designed to rapidly mature higher TRL capabilities and field the particular technology project capability within an 18-30 month window, from program start to submarine at- sea demonstration. Also included in this category are innovative technology transition projects, seedling efforts (<$800K/year) which assess new technology candidates and keep the submarine and Undersea Warfare (USW) technology pipeline primed. All SUB073/ASSD projects are determined by senior USW leadership and N97 sponsor direction.

The Program works with Small Business Innovation Research (SBIR), Small Business Technology Transfer (STTR), Office of Secretary of Defense (OSD), Office of Naval Research (ONR), and Defense Advanced Research Projects Agency (DARPA) organizations to identify and mature technology candidates for integration into current/future submarine classes to provide new/transformational capabilities, while achieving total-ownership cost reductions. Experimentation and demonstration are also conducted in a joint warfighting context with other services (i.e. Marine Corps, Army, Air Force to enable early assessment of a new technology's warfighting capabilities, and to inform the Fleet and acquisition community on smarter technology-selection decisions. This Program also supports cooperative R&D through

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Information/Data Exchange Agreements (IEA/ DEA) and joint Project Arrangements (PA) with international Allies, which target core technology maturation, future submarine component concept designs, etc. Major technology developmental efforts within this budget submission include:

Strategic Capability R&D Infrastructure
- Large Scale Vehicle (LSV)
- Large Scale Vehicle Recapitalization
- Intermediate Scale Measurement System (ISMS)
- High Gain Measurement System (HGMS)
- South TOTO Acoustic Measurement Facility (STAFAC) Recapitalization

Long Range R&D
- Advanced Hull Treatments
- Next Generation Thrust (future propulsor/shafting technologies, materials, and designs)
- Advanced Material Propeller
- Advanced SSN Technologies
- Advanced Energy (Submarine Main Storage Battery - NiZn alternative chemistry)
- Advanced Signature Management

Rapid Technology Development
- Innovative Technology Transfer

FY23 to FY24 decrease due to programmed project ramp-down within the Strategic Infrastructure budget pillar, specifically the planned transition of the LSV-2 Electric Motor Drive recapitalization project from the procurement/manufacturing phase to the final onboard testing phase.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Strategic Capability R&D Infrastructure	20.201	30.511	21.543	0.000	21.543
Articles:	-	-	-	-	-
Description: Sustains Navy R&D capability for continued operations of the Large Scale Vehicle (LSV), Intermediate Scale Measurement System (ISMS), and High Gain Measurement System (HGMS) test facilities in support of VIRGINIA and COLUMBIA Class Programs, numerous other smaller programs, and future submarine technology development. These facilities are a critical enabler supporting the conduct of large-scale model experiments and focus on evaluating the stealth, control, affordability, and operational effectiveness of new submarine technologies. The technology validation provided by the model experiments has provided significant cost and schedule savings by allowing prototyping at scale, vice with first-of-hull assets.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
This project also funds STAFAC Recapitalization, which modernizes the existing South Toto Acoustic Measurement Facility (STAFAC), which is currently at its 15 year design life. Project provides a lifecycle replacement of acoustic measurement system and inserts new capabilities and data transfer technology required to support the measurement and assessment of COLUMBIA and other future submarine platforms to ensure their stealth. The project additionally funds LSV2 Recapitalization, which is constructing a full ship set of electric drive modules based on the original system design, extending LSV2 lifetime beyond 2040 at lowest cost and technical risk. ***FY 2023 Plans:*** LSV-2: Conduct LSV-2 core ship systems maintenance, maintain crew qualification, ensure compliance with all LSVSAFE and general regulations. Maintain and operate acoustic data navigation and control systems and all required shore support systems. Execute testing as required for Integrated Shaft trial. In support of LSV-2 drive recapitalization process, conduct 1st article builds and testing for new electric drive modules (inverters and converters). Implement replacement of INU with modern COTS/integrated system. Complete LSV2 driveline alignment with motor mount hardware and replacement flex-coupling. Continue Electronic Drive Control Electronics (EDCE) redesign, testbed update, and system sustainment planning. ISMS: Continue ongoing system refurbishment and replacement on ISMS. Operate and maintain ISMS acoustic test range underwater and shore-based facilities. Continue support of structural acoustics, target strength and radiated noise measurements in support of COLUMBIA, VIRGINIA, SSN(X), ONR, and other fleet needs. HGMS: Operate and maintain HGMS acoustic test range underwater and shore-based facilities in support of highly accurate acoustic data from LSV2 operations. STAFAC Recapitalization: Finalize procurement specifications and initiate component lab test and integration. ***FY 2024 Base Plans:*** LSV-2: Complete LSV-2 drive recapitalization process including delivery of all drive units. Continue updates to Electronic Drive Control Electronics (EDCE) testbed and continue EDCE and motor drive sustainment initiatives.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
ISMS: Continue ongoing system refurbishment and replacement on ISMS. Operate and maintain ISMS acoustic test range underwater and shore-based facilities. Continue support of structural acoustics, target strength and radiated noise measurements in support of COLUMBIA, VIRGINIA, SSN(X), ONR, and other fleet needs. HGMS: Operate and maintain HGMS acoustic test range underwater and shore-based facilities in support of highly accurate acoustic data from LSV2 operations; begin work toward mid-life recapitalization of the range. STAFAC Recapitalization: Efforts include testing of the first article High Frequency Volumetric Array and required post-test design assessments, subsystem electronics and interface testing for array and tracking components, and acoustic sensor characterization for the volumetric arrays. Initiate software development for new beamforming capabilities and accelerated life testing of in-water components such as the array power supplies. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Decrease due to programmed project ramp-down as LSV-2 Electric Motor Drive recapitalization project transitions from the procurement/manufacturing phase to the final onboard testing phase.					
Title: Long Range R&D	8.583	5.796	6.200	0.000	6.200
Articles:	-	-	-	-	-
Description: Develop advanced technologies and tools to increase current and future submarine capabilities, lower acquisition and life-cycle costs, and enhance survivability. Develop technologies and materials that facilitate new and enhance existing warfighting concepts. The program currently supports development of advanced submarine hull coatings for improved acoustic performance, maintainability and cost, with the objective of near-term implementation on VIRGINIA and COLUMBIA Class platforms, as well as future submarine classes. The budget line continues to develop technologies for alternative propulsion/propulsor designs to enhance submarine performance, maneuverability and stealth while reducing submarine acquisition costs. This long-range R&D effort continues to develop and demonstrate technologies for future submarines in areas of hull and platform technologies, propulsors, propellers, corrosion control, ship control, electric actuation, sensors, survivability, and other systems which increase near-term capability and provide cost reduction for in-service and future submarine classes.					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
FY 2023 Plans: ADVANCED HULL TREATMENTS: Evaluate at sea performance of advanced hull treatment (VCS Hull C), during post drydocking acoustic trial. Continue collaboration with NSWC Carderock and ONR ManTech to assess performance and mature manufacturability of emerging Low Technology Readiness Level hull treatment materials. ADVANCED SIGNATURE MANAGEMENT (ASM): Prototyping: Continue to Develop Concept of Operation (CONOP)/procedural guidance for ASM integration into Ship Systems. Project Arrangements: Continue data analysis of FY22 At Sea Demonstration and shore-based testing/modeling results, and the integration of Audient software algorithm into ship systems for continued testing. Continue collaborative partnership with ONR in support of ONR Own Ship Acoustic Monitoring (OSAM) FNC and initiate preparation for FY24 At Sea Shakedown testing. Continue collaborative planning for deferred Partner Underwater Electro-Magnetic (UEM) Measurement Trials in FY24 (pending test asset availability). NEXT GENERATION THRUST (NGT): Continue design exploration for full-scale composite shafting. Continue development of Generation 1 of the New SSN propulsor design. Continue tool design improvement initiatives in support of New SSN propulsion technology development. Continue scale-model planning, testing, and upgrades to testing facilities. ADVANCED MATERIAL PROPELLER (AMP): Conduct follow-on destructive/non-destructive testing and analysis of full-scale propeller data per follow-on Project Arrangement. ADVANCED SSN TECHNOLOGIES: Continue assessment of new technologies for future submarines in support of the Tactical Submarine Evolution Plan (TSEP) and continue studies to assess potential impacts on platform capability. Complete calibration and perform surface flow measurements of surfaces of interest in the LCC with the measurement test bed. ADVANCED ENERGY: Continue planned NSWC Crane testing of COTS batteries and platform integration studies to assess Nickel Zinc (NiZn) suitability for submarine Main Storage Battery utilization. Support transition of NAVSEA lead for NiZn battery R&D to the VIRGINIA Class Program Office (PMS450) in support of VA Block VII design space exploration. ***FY 2024 Base Plans:***					

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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
ADVANCED HULL TREATMENTS: Mature next generation hull treatments in coordination with ONR ManTech and continuing development of and maturing hull treatment. ADVANCED SIGNATURE MANAGEMENT (ASM): Prototyping: Continue CONOP and procedural guidance development for ASM integration into Ship Systems. Finalize planning and execute At-Sea Shakedown demonstration in support of ONR Own Ship Acoustic Monitoring (OSAM) FNC. Conduct data analysis on Shakedown demo and planning/preparation for follow-on Refinement demo in support of ONR Own Ship Acoustic Monitoring (OSAM) FNC. Complete collaborative planning for deferred Partner Underwater Electro-Magnetic (UEM) Measurement Trials in support of late FY24 execution (pending partner test asset availability). NEXT GENERATION THRUST (NGT): Begin design concepts for full-scale composite shafting. Continue development of Generation 1 of the New SSN propulsor design and conduct scale-model testing of Gen 1 designs. Begin development of Generation 2 of the New SSN propulsor design. Continue tool design improvement initiatives in support of New SSN propulsion technology development. Continue scale-model planning, testing, and upgrades to testing facilities. ADVANCED MATERIAL PROPELLER (AMP): Continue follow-on destructive/non-destructive testing and analysis of full-scale propeller data per follow-on Project Arrangement. ADVANCED SSN TECHNOLOGIES: Continue assessment of new and adapted technologies for future submarine use in support of the Tactical Submarine Evolution Plan (TSEP). Continue studies to assess potential impacts on platform capability and challenges to ship integration. Conduct modeling and prototyping to identify and evaluate technology solutions for In-Service stealth issues. ADVANCED ENERGY: Project transitioned to the VIRGINIA Class Program Office (PMS450). ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Increase from FY23 to FY24 due to material testing phase of the Advanced Material Propeller (AMP) project.					
Title: Rapid Technology Development	0.075	0.300	0.312	0.000	0.312
Articles:	-	-	-	-	-

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Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Description: Conduct Navy and joint demonstrations of advanced technologies to assess the operational value of the technologies/systems under consideration, and speed transition of operational capabilities. Coordinate with new construction and in-service program offices to synchronize ship technology demonstration and insertion with design/delivery timelines. ***FY 2023 Plans:*** Continue to leverage products and analysis from Naval Laboratories, Small Business (SBIR/STTR), industry Independent Research and Development (IRAD), and Foreign Comparative Testing efforts to identify/develop innovative submarine and USW technology transition project candidates. FY 22 planned projects include prototype sensor and component development in support of measurement ranges. ***FY 2024 Base Plans:*** Continue to leverage products and analysis from Naval Laboratories, Small Business (SBIR/STTR), industry Independent Research and Development (IRAD), and Foreign Comparative Testing efforts to identify/develop innovative submarine and USW technology transition project candidates. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** Minor increase due to miscellaneous program adjustments.					
Accomplishments/Planned Programs Subtotals	28.859	36.607	28.055	0.000	28.055

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• OPN/0941: *Submarine Support Equipment*	88.284	116.575	112.526	-	112.526	75.149	78.982	87.445	79.308	Continuing	Continuing

Remarks

A portion of the funding required for the STAFAC Recapitalization project is included within the OPN project above.

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

D. Acquisition Strategy

Non-ACAT program with BA4 R&D investment. Projects transition via formal processes to acquisition programs of record for inclusion into existing ship baselines or insertion as capability upgrades. Concept Formulation (CONFORM) contracts with the only two submarine design/construction shipyards, General Dynamics Electric Boat (GDEB) and Huntington Ingalls Industries Newport News Shipbuilding (HII-NNS) facilitate this process. Engagement with industry via competitively awarded Small Business Innovation Research (SBIR) and topic-specific Broad Agency Announcement (BAA) contracts are used to build vendor base and support development of R&D products for enhanced submarine capability in the areas of advanced Hull Mechanical & Electrical (HM&E) technology, stealth improvements and payload system development. Program leverages technical analysis and prototyping support from University Affiliated Research Centers (UARCs), such as Penn State University Applied Research Laboratory, Johns Hopkins University Applied Physics Laboratory and University of Washington Applied Physics Laboratory via NAVSEA UARC contract vehicles. Program utilizes Interagency Agreements with National Laboratories, such as Oak Ridge National Laboratory, as needed, to leverage their unique technical competencies in energy, sensing systems, materials and advanced/additive manufacturing.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/FFP	DRS Technologies : Milwaukee, WI	9.840	0.000		7.000	Nov 2022	0.000		-		0.000	0.000	16.840	-
Product Development	WR	NSWC Crane : Crane, IN	0.935	0.301	Dec 2021	0.307	Dec 2022	0.000	Dec 2023	-		0.000	0.000	1.543	-
Product Development	WR	NSWC PHILLY : Philly, PA	1.100	0.375	Nov 2021	0.383	Nov 2022	0.135	Nov 2023	-		0.135	Continuing	Continuing	Continuing
Product Development	WR	NRL : Washington, DC	3.109	0.104	Nov 2021	0.106	Dec 2022	0.108	Dec 2023	-		0.108	0.000	3.427	-
Product Development	SS/CPFF	HII : Newport News, VA	24.884	1.671	Jan 2022	1.704	Jan 2023	0.450	Jan 2024	-		0.450	Continuing	Continuing	Continuing
Product Development	SS/CPFF	EB : Groton, CT	89.463	3.521	Jan 2022	3.591	Jan 2023	1.299	Jan 2024	-		1.299	Continuing	Continuing	Continuing
Product Development	WR	NSWC : Carderock, MD	110.079	4.809	Nov 2021	5.166	Nov 2022	6.041	Nov 2023	-		6.041	Continuing	Continuing	Continuing
Product Development	FFRDC	ARL/PSU : State College, PA	12.463	1.339	Apr 2022	1.480	Feb 2023	1.393	Feb 2024	-		1.393	Continuing	Continuing	Continuing
Product Development	FFRDC	JHU/APL : Laurel, MD	25.176	0.260	Apr 2022	0.265	Feb 2023	0.310	Jan 2024	-		0.310	Continuing	Continuing	Continuing
Product Development	Various	Various : Various	37.294	0.302	Jan 2022	0.308	Feb 2023	0.314	Jan 2024	-		0.314	Continuing	Continuing	Continuing
Product Development	WR	NUWC : Newport, RI	81.456	0.000	Nov 2021	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Product Development	FFRDC	APL/University of Washington : Seattle, WA	0.000	0.521	Nov 2021	0.531	Dec 2022	0.544	Dec 2023	-		0.544	0.000	1.596	-
Product Development	SS/CPFF	Leidos : Reston, Va	0.000	0.535	Feb 2022	1.567	Nov 2022	1.569	Nov 2023	-		1.569	0.000	3.671	-
		Subtotal	395.799	13.738		22.408		12.163		-		12.163	Continuing	Continuing	N/A

Remarks

FY23 to FY24 decrease for DRS due to completion of LSV Recap efforts, along with associated efforts at GDEB.

FY23 to FY24 decrease to NSWC Crane due to transition of Advanced Energy project to the VIRGINIA Class Program Office.

Various/VAR is used to group multiple activities with small funding levels.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	SS/CPFF	Various : Various	20.066	1.140	Mar 2022	1.163	Jan 2023	1.146	Jan 2024	-		1.146	Continuing	Continuing	Continuing
Government Engineering Support	WR	Various : Various	8.684	0.587	Oct 2021	0.599	Oct 2022	0.807	Oct 2023	-		0.807	Continuing	Continuing	Continuing
Travel	WR	NAVSEA HQ : Not Specified	1.523	0.110	Oct 2021	0.090	Oct 2022	0.110	Oct 2023	-		0.110	Continuing	Continuing	Continuing
		Subtotal	30.273	1.837		1.852		2.063		-		2.063	Continuing	Continuing	N/A

Remarks

Various/VAR is used to group multiple activities with small funding levels.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation (DT&E)	C/CPFF	GDIT : Bayview, ID	6.200	1.800	Nov 2021	1.836	Nov 2022	2.216	Nov 2023	-		2.216	0.000	12.052	-
Developmental Test & Evaluation (DT&E)	SS/CPFF	EB : Groton, CT	39.341	3.979	Jan 2022	2.856	Jan 2023	3.338	Jan 2024	-		3.338	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	WR	NSWC/PHILLY : PHILLY, PA	10.317	0.503	Nov 2021	0.513	Nov 2022	0.572	Nov 2023	-		0.572	0.000	11.905	9.104
Developmental Test & Evaluation (DT&E)	Various	Various : Various	10.799	0.717	Mar 2022	0.731	Mar 2023	0.746	Mar 2024	-		0.746	0.000	12.993	6.372
Developmental Test & Evaluation (DT&E)	WR	NUWC : Newport, RI	33.225	0.426	Nov 2021	0.435	Nov 2022	0.493	Nov 2023	-		0.493	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	WR	NSWC : Carderock, MD	69.131	4.500	Nov 2021	4.590	Nov 2022	4.997	Nov 2023	-		4.997	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	SS/CPFF	HII : Newport News, VA	6.400	0.618	Jan 2022	0.630	Jan 2023	0.643	Jan 2024	-		0.643	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	SS/CPFF	JHU/APL : Laurel, MD	0.750	0.741	Apr 2022	0.756	Apr 2023	0.824	Apr 2024	-		0.824	0.000	3.071	-
		Subtotal	176.163	13.284		12.347		13.829		-		13.829	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 2033 / *Adv Submarine Systems Development*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

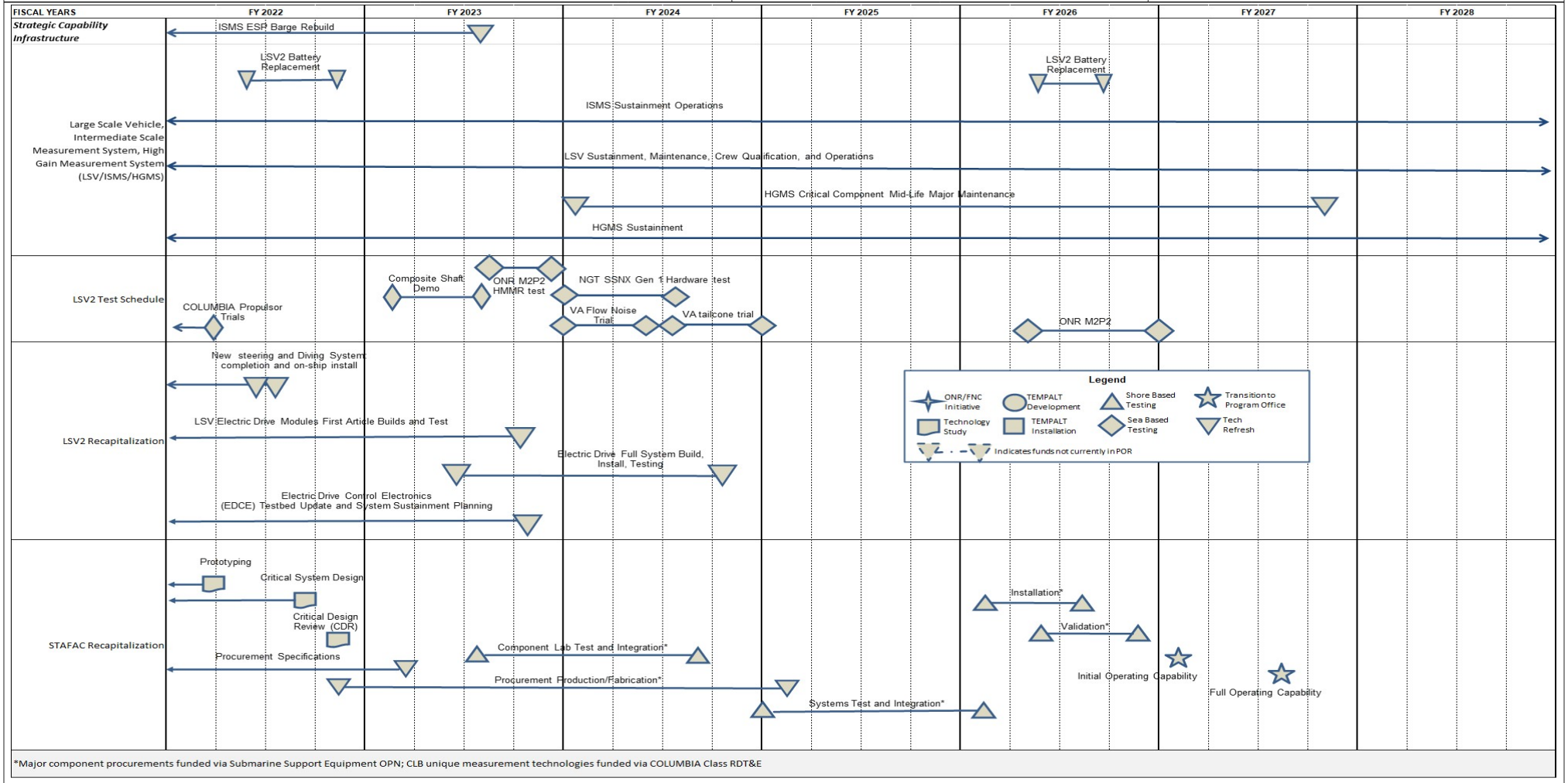
Various/VAR is used to group multiple activities with small funding levels.

GDIT contract supports engineering services/technical support of LSV, ISMS, and associated infrastructure at Acoustic Research Detachment Bayview Idaho.

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	602.235	28.859		36.607		28.055		-		28.055	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*



*Major component procurements funded via Submarine Support Equipment OPN; CLB unique measurement technologies funded via COLUMBIA Class RDT&E

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

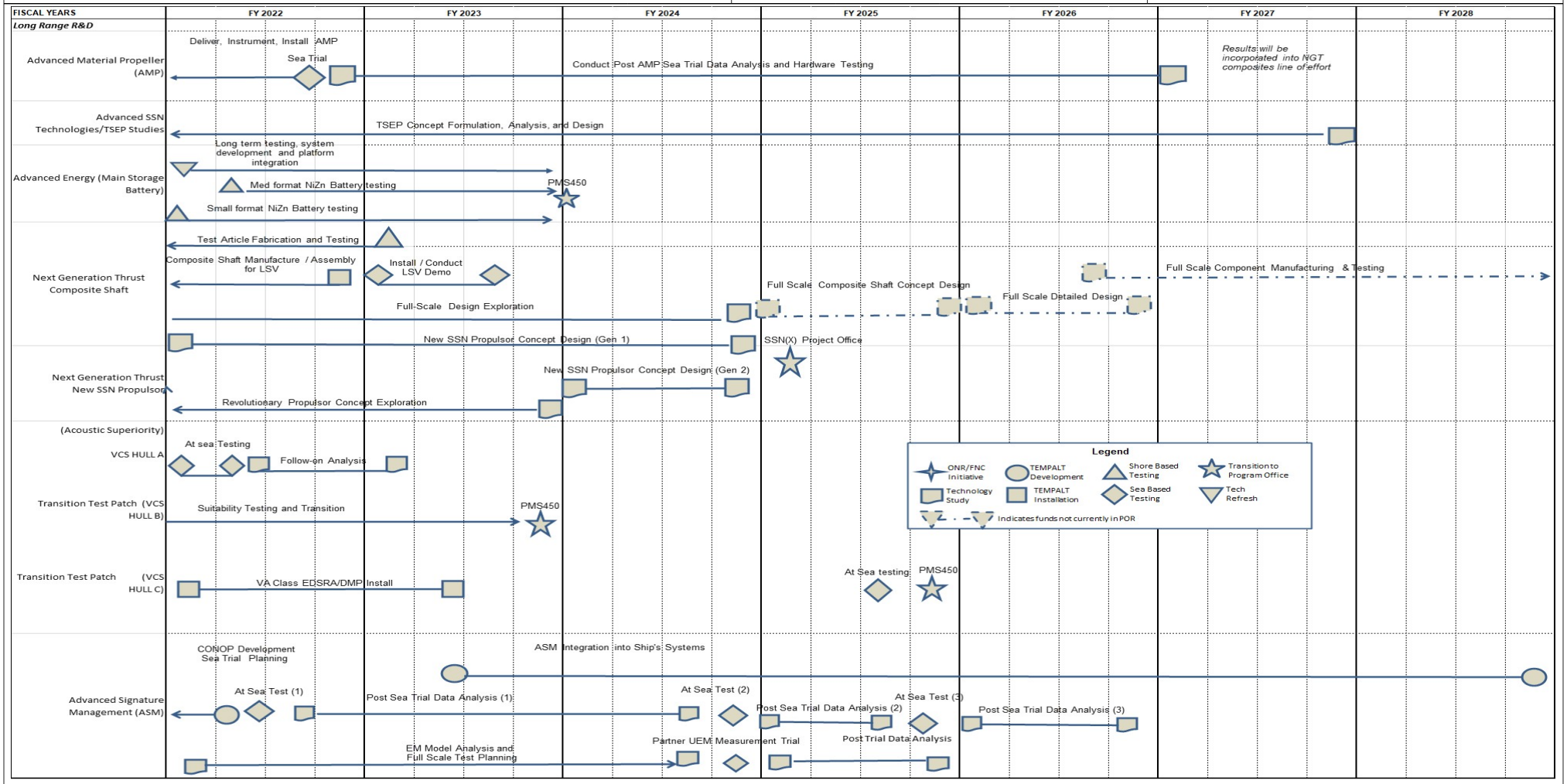


Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

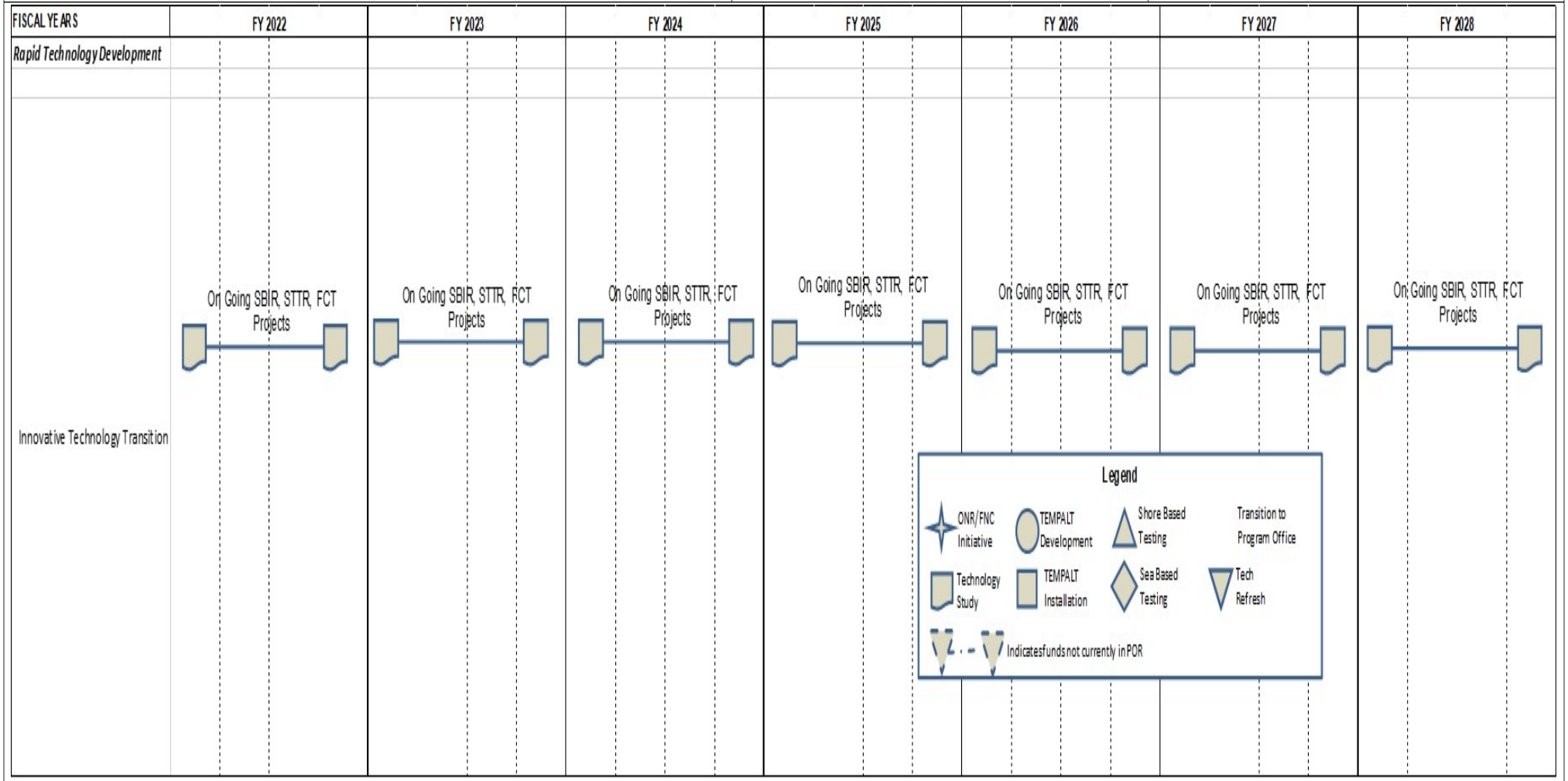


Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 2033				
Strategic Capability Infrastructure: ISMS/LSV /HGMS- ISMS ESP Barge Rebuild	1	2022	3	2023
Strategic Capability Infrastructure: ISMS /LSV/HGMS - LSV Sustainment, Maintenance, Crew Qualification and Operations	1	2022	4	2028
Strategic Capability Infrastructure: ISMS /LSV/HGMS - LSV Battery and Buswork Replacement	2	2022	4	2022
Strategic Capability Infrastructure: ISMS /LSV/HGMS - LSV Battery Replacement (4 year replacement cycle)	2	2026	3	2026
Strategic Capability Infrastructure: ISMS/LSV/HGMS - ISMS Range Sustainment Operations	1	2022	4	2028
Strategic Capability Infrastructure: ISMS/LSV/HGMS - HGMS Critical Component Mid-Life Major Maintenance	1	2024	4	2027
Strategic Capability Infrastructure: ISMS/LSV/HGMS - HGMS Sustainment	1	2022	4	2028
Strategic Capability Infrastructure: LSV2 Test Schedule - COLUMBIA Propulsor Trials	1	2022	2	2022
Strategic Capability Infrastructure: LSV2 Test Schedule - Composite Shaft Demonstration	1	2023	3	2023
Strategic Capability Infrastructure: LSV2 Test Schedule - VA Flow Noise Test	1	2024	2	2024
Strategic Capability Infrastructure: LSV Test Schedule - ONR M2P2 HMMR Test	3	2023	4	2023
Strategic Capability Infrastructure: LSV2 Test Schedule - SSN(X) Gen 1 Hardware Test NGT	1	2024	3	2024
Strategic Capability Infrastructure: LSV2 Test Schedule - SSN(X) VA Tailcone Trial	3	2024	4	2024
Strategic Capability Infrastructure: LSV2 Test Schedule - ONR M2P2 Test	2	2026	4	2026
Strategic Capability Infrastructure: LSV2 Recapitalization - LSV2 Steering and Diving New System Install Replacement	2	2022	3	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Strategic Capability Infrastructure: LSV2 Recapitalization - Electric Drive Modules First Article Builds and Test	1	2022	4	2023
Strategic Capability Infrastructure: LSV2 Recapitalization - Electric Drive Full System Build, Install, Testing	2	2023	4	2024
Strategic Capability Infrastructure: LSV2 Recapitalization - Electronic Drive Control Electronics (EDCE) Test bed Update and System Sustainment Planning	1	2022	4	2023
Strategic Capability Infrastructure: STAFAC Recapitalization - Prototyping	1	2022	2	2022
Strategic Capability Infrastructure: STAFAC Recapitalization - Critical System Design	1	2022	3	2022
Strategic Capability Infrastructure: STAFAC Recapitalization - Procurement Specifications	1	2022	1	2023
Strategic Capability Infrastructure: STAFAC Recapitalization - Critical Design Review	4	2022	4	2022
Strategic Capability Infrastructure: STAFAC Recapitalization - Component Lab Test and Integration	3	2023	3	2024
Strategic Capability Infrastructure: STAFAC Recapitalization - Systems Test and Integration	1	2025	1	2026
Strategic Capability Infrastructure: STAFAC Recapitalization - Installation	1	2026	3	2026
Strategic Capability Infrastructure: STAFAC Recapitalization - Validation	2	2026	4	2026
Strategic Capability Infrastructure: STAFAC Recapitalization - IOC	1	2027	1	2027
Strategic Capability Infrastructure: STAFAC Recapitalization - FOC	3	2027	3	2027
Long Range R&D: Advanced Material Propeller (AMP) - Deliver instrument and install AMP propeller	1	2022	3	2022
Long Range R&D: Advanced Material Propeller (AMP) - At-sea test on partner submarine	3	2022	3	2022
Long Range R&D: Advanced Material Propeller (AMP) - Post-sea trial data analysis and hardware testing	4	2022	1	2027
Long Range R&D: SSN(X) - Advanced SSN Technologies/TSEP Studies - TSEP concept formulation, analysis, and design	1	2022	4	2028

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft -Test Article fabrication and testing	1	2022	1	2023
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft - Manufacture/ Assembly for LSV	1	2022	4	2022
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft -Install/Conduct LSV Demo	1	2023	3	2023
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft - Full Scale Design Exploration	1	2022	4	2024
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft - Full Scale Concept Design	1	2025	4	2025
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft - Full Scale Detailed Design	1	2026	4	2026
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft - Full Scale Component Manufacturing & Testing	3	2026	4	2028
Long Range R&D: Next Generation Thrust New SSN Propulsor - New SSN Propulsor Concept Design (Gen 1)	1	2022	4	2024
Long Range R&D: Next Generation Thrust New SSN Propulsor - New SSN Propulsor Concept Design (Gen 2)	1	2024	4	2024
Long Range R&D: Next Generation Thrust New SSN Propulsor - Revolutionary Propulsor Concept Exploration	1	2022	4	2023
Long Range R&D: Next Generation Thrust New SSN Propulsor - Transition to SSN(X) Project Office	1	2025	1	2025
Long Range R&D: Advanced Hull Treatments (VCS HULL A) - VA Class Sea Based Testing	1	2022	2	2022
Long Range R&D: Advanced Hull Treatments - Follow-on Analysis	2	2022	1	2023
Long Range R&D: Transition Test Patch (VCS HULL B) - VA Class Suitability Testing	1	2022	4	2023
Long Range R&D: Transition Test Patch (VCS HULL C) - VA Class EDSRA/DMP Install	1	2022	3	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Long Range R&D: Transition Test Patch (VCS HULL C) - VA Class Sea Based Testing	3	2025	3	2025
Long Range R&D: Transition Test Patch (VCS HULL C) - Transition to VA Class	4	2025	4	2025
Long Range R&D: Advanced Signature Management - ASM Integration into Ship Systems	2	2023	4	2028
Long Range R&D: Advanced Signature Management - CONOP Dev and Sea Trial Planning for Demo	1	2022	2	2022
Long Range R&D: Advanced Signature Management - At Sea Test (1)	2	2022	2	2022
Long Range R&D: Advanced Signature Management - Post Sea Trials Data Analysis (1)	3	2022	3	2024
Long Range R&D: Advanced Signature Management - At Sea Test (2)	4	2024	4	2024
Long Range R&D: Advanced Signature Management - Post Sea Trials Data Analysis (2)	1	2025	3	2025
Long Range R&D: Advanced Signature Management - At Sea Test (3)	4	2025	4	2025
Long Range R&D: Advanced Signature Management - Post Sea Trials Data Analysis (3)	1	2026	4	2026
Long Range R&D: Advanced Signature Management - EM Model Testing/Analysis and Full Scale Test Planning	1	2022	3	2024
Long Range R&D: Advanced Signature Management - Partner UEM Measurement Trial	4	2024	4	2024
Long Range R&D: Advanced Signature Management - Post Measurement Trial Data Analysis	1	2025	4	2025
Long Range R&D: Advance Energy (Main Storage Battery) - Small Format Testing	1	2022	4	2023
Long Range R&D: Advance Energy (Main Storage Battery) - Medium Format Testing	2	2022	4	2023
Long Range R&D: Advance Energy (Main Storage Battery) - Large Format Testing	4	2022	4	2023
Long Range R&D: Advance Energy (Main Storage Battery) - Long Term Testing System Development & Platform Integration Studies	1	2022	4	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2033 / *Adv Submarine Systems Development*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Rapid Technology Development: Innovative Technology Transition - Conduct assessment of technology initiatives, SBIR transition work, STTR, Foreign Comparative Tests	1	2022	4	2028

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy											Date: March 2023	
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*				Project (Number/Name) 2096 / *Payload Delivery Development*			
COST ($ in Millions)	**Prior Years**	**FY 2022**	**FY 2023**	**FY 2024 Base**	**FY 2024 OCO**	**FY 2024 Total**	**FY 2025**	**FY 2026**	**FY 2027**	**FY 2028**	**Cost To Complete**	**Total Cost**
2096: *Payload Delivery Development*	43.632	2.506	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	46.138
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Decrease in funds from FY22 to FY23 is due to a change in approach for the Program.

Payload Delivery Development is a program used for the integration of deployable and retrievable payloads with submarines. RDT&EN funding will be used to develop a prototype payload launch and recovery system utilized with submarine large ocean interfaces to accommodate payloads and offboard systems. The project enables launch and recovery of these systems from submarines. This will provide the Submarine Force with the capability to launch and recover payloads and offboard systems of various configurations in support of critical Undersea Warfare (USW) missions, providing battle space awareness and extending war-fighting reach in support of Subsea and Seabed Warfare (SSW) mission objectives. This capability has been identified as a key enabler for the following critical USW mission areas: Intelligence, Surveillance, and Reconnaissance (ISR), Anti-Submarine Warfare (ASW), Anti-Surface Warfare (ASUW), Naval Special Warfare (NSW), Mine Warfare, Subsea and Seabed Warfare (SSW), Counter- Autonomous Underwater Vehicle (AUV) Warfare, Electromagnetic Maneuver Warfare (EMMW), Deception, and Non-Lethal Sea Control. In addition to technology development, the program will support engineering and integration of new and existing technologies to enable rapid prototyping and fielding of future payload capabilities for VIRGINIA Class (VCS) Payload Modules (Block V and VI) and will be in coordination with the Tactical Submarine Evolution Plan (TSEP) objectives for VCS Block VII and/or SSN(x). The prototype system capability will also provide the Fleet [i.e., Commander, Naval Submarine Forces (COMSUBFOR), Unmanned Undersea Vehicle Squadron One (UUVRON ONE), etc.] with the ability to conduct Fleet funded experimentation with unmanned payloads, enabling an agile environment through at-sea demonstrations, which will provide Fleet and acquisition stakeholders with relevant payload employment data to inform Concepts of Operations (CONOPs) and fielding decisions for future systems.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: Payload Handling System (PHS)	2.506	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: Payload Delivery Development includes the development of "middle-ware" handling systems used to deploy and retrieve undersea vehicles, payloads, and offboard systems from submarines. Funding will be used to design and develop a build to print Technical Data Package (TDP) for a system to facilitate the raising, lowering and articulation of payloads into and out of submarine large ocean interfaces (e.g. missile tubes; torpedo tubes) to increase future war fighting capabilities. Additionally, these efforts include the transfer of technology and final design packages to industry for future multi-unit procurement and application on future VIRGINIA Class and other future submarines.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Long lead-time material purchases began in FY20 and continued into FY21. This material will be dispositioned by the end of FY22. Planned FY22 efforts include completion of a build to print Technical Data Package (TDP) that can be transferred to industry for manufacturing to support future integration into VIRGINIA Class submarines. ***FY 2023 Plans:*** N/A ***FY 2024 Base Plans:*** N/A ***FY 2024 OCO Plans:*** N/A					
Accomplishments/Planned Programs Subtotals	2.506	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Project will transition to multiple unmanned vehicle programs to support VIRGINIA Class integration.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 2096 / *Payload Delivery Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development (1)	WR	NUWC NPT : Newport, RI	6.730	0.275	Oct 2021	0.000		0.000		-		0.000	0.000	7.005	-
Product Development	WR	NSWC PD : Philadelphia, PA	17.345	0.850	Oct 2021	0.000		0.000		-		0.000	0.000	18.195	-
Product Development (1)	WR	NUWC KPT : Keyport, WA	8.792	0.600	Oct 2021	0.000		0.000		-		0.000	0.000	9.392	-
Product Development (1)	WR	PSNS : Bremerton, WA	4.379	0.471	Oct 2021	0.000		0.000		-		0.000	0.000	4.850	-
Product Development	WR	NSWC CD : West Bethesda, MD	3.079	0.000		0.000		0.000		-		0.000	0.000	3.079	-
Product Development	WR	NRL : Washington, DC	0.255	0.000		0.000		0.000		-		0.000	0.000	0.255	-
Product Development	FFRDC	ARL/PSU : Arlington, VA	0.285	0.000		0.000		0.000		-		0.000	0.000	0.285	-
Product Development	WR	NSWC DD : Dahlgren, VA	0.026	0.000		0.000		0.000		-		0.000	0.000	0.026	-
Product Development	C/CPFF	DIUx : Mountain View, CA	0.050	0.000		0.000		0.000		-		0.000	0.000	0.050	-
Product Development	WR	PNSY : Portsmouth, NH	0.597	0.000		0.000		0.000		-		0.000	0.000	0.597	-
		Subtotal	41.538	2.196		0.000		0.000		-		0.000	0.000	43.734	N/A

Remarks

(1) Decrease in funds from FY22 to FY23 is due to a change in approach for the Program. The change is due to project cancellation.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	NAVSEA HQ : Washington DC	0.229	0.050	Oct 2021	0.000		0.000		-		0.000	0.000	0.279	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 2096 / *Payload Delivery Development*	

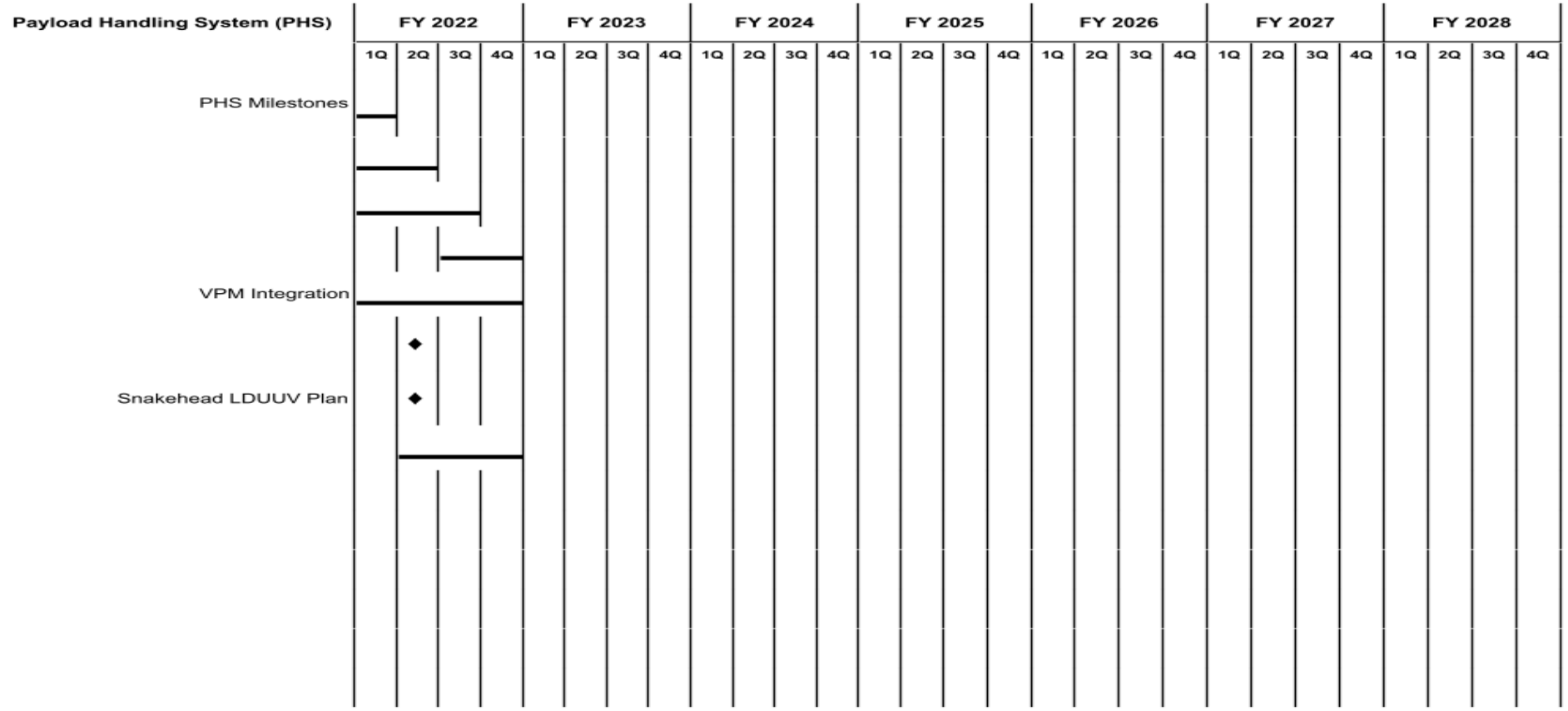
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Management Services	C/CPAF	NTT Data : McLean, VA	1.865	0.260	Nov 2021	0.000		0.000		-		0.000	0.000	2.125	-
		Subtotal	2.094	0.310		0.000		0.000		-		0.000	0.000	2.404	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	43.632	2.506		0.000		0.000		-		0.000	0.000	46.138	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*



2024DON - 0603561N - 2096

Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 2096 / *Payload Delivery Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Payload Handling System (PHS)				
PHS Milestones: Detailed Design	1	2022	1	2022
PHS Milestones: Drawing Development (DWG)	1	2022	2	2022
PHS Milestones: VIRGINIA Class Build to Print TDP Ready	1	2022	3	2022
PHS Milestones: Final disposition of material	3	2022	4	2022
VPM Integration: Group 1 Execution Plan Undersea Dominance Payload Integration (UDPI)	1	2022	4	2022
VPM Integration: Block VI Tech Baseline Lockdown	2	2022	2	2022
Snakehead LDUUV Plan: Award	2	2022	2	2022
Snakehead LDUUV Plan: Phase 2 Vehicle Design & Fabrication	2	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 3391 / *SSN/SSGN Survivability Program*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
3391: *SSN/SSGN Survivability Program*	35.264	11.118	10.848	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	57.230
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

In 2013, OPNAV N97 established SSN/SSGN Survivability Program (S3P) as a separate project area within ASSD to assure SSN/SSGN survivability and the ability of submarines to complete their joint warfighting missions even if covert mobility is compromised.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
Title: SSN/SSGN Survivability Program	11.118	10.848	0.000	0.000	0.000
Articles:	-	-	-	-	-
Description: The details of project activities are SECRET or higher. The SSN/SSGN Survivability Program (S3P) provides Director, Undersea Warfare Division (OPNAV N97) with qualitative and quantitative analysis of potential SSN and SSGN submarine vulnerabilities based on technology threats and operational requirements and recommends countermeasure concepts to mitigate these potential vulnerabilities. S3P informs the entire $10B submarine portfolio with validated analysis which informs risk to submarine survivability and stealth in contested environments. This analysis also informs methods by which stealth can be regained once compromised to execute missions such as weapons employment. S3P conducts technical analysis validated with at-sea testing. The technical analysis is put into an operational context using data from current submarine operations and Fleet war plans. S3P develops technologies and tools to increase the survivability of submarines by recognizing and mitigating sources of acoustic and non-acoustic vulnerabilities that put a submarine at risk when operating in contested waters and the littorals. S3P supports fleet development of Tactics, Techniques, and Procedures (TTPs) that facilitate new or enhance existing warfighting concepts.					
FY 2023 Plans: S3P will address gaps in stealth and survivability for the current SSN/SSGN force to include responding to fleet questions on current tactical vulnerabilities and completion of an annual Operational Survivability Assessment. Work includes: - Conducting analytical and technical work on Tactical Submarine Evolution Plan and future SSN/SSGN survivability design basis.					

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3391 / *SSN/SSGN Survivability Program*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total
- Conducting emerging threat, acoustic, and non-acoustic vulnerability assessment projects including sea tests in stealth requirements and countermeasure concepts. - Collecting and analyzing current submarine operational data to determine and mitigate vulnerabilities driven by operational profiles - Conduct at-sea tests to evaluate Countermeasures development concepts. - Details may be provided in a classified setting. ***FY 2024 Base Plans:*** In FY 2024, S3P funding is shifting from PE 0603561N LI 3391 to PE 0101224N LI 3391 as part of a zero-sum realignment to consolidate management and contracting. ***FY 2024 OCO Plans:*** N/A ***FY 2023 to FY 2024 Increase/Decrease Statement:*** In FY 2024, S3P funding is shifting from PE 0603561N LI 3391 to PE 0101224N LI 3391 as part of a zero-sum realignment to consolidate management and contracting.PE 0603561N PU 3391 will be reduced to zero and 0101224N PU 3391 will be increased the same amount that PE 0603561N PU 3391 was reduced.					
Accomplishments/Planned Programs Subtotals	11.118	10.848	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
• RDTEN/0101224N: *SSBN Security Technology*	44.212	50.761	62.694	-	62.694	63.824	65.572	67.582	69.160	Continuing	Continuing

Remarks

SSBN Security Technology Program is integrated with S3P to ensure technical lines of effort executed by one program are not duplicated by the other

D. Acquisition Strategy

S3P is a non-acquisition activity that investigates, prioritizes, and validates SSN/SSGN survivability issues for peacetime and all phases of war. S3P also proposes and directs development and validation of countermeasure concepts. S3P works to ensure alignment between OPNAV, NAVSEA, ONI, and the Fleet on survivability issues. S3P develops recommendations for stealth requirements to OPNAV N97 and provides technical basis for Tactics, Techniques, and Procedures developed by the Undersea Warfighting Development Command (UWDC). S3P operates under OPNAV N97 and Fleet Flag panel (Operations Review Group) oversight. S3P

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3391 / *SSN/SSGN Survivability Program*

products and metrics are evaluated by the Submarine Operations Group and Operations Review Group. S3P also recommends technical requirements for all matters of submarine survivability to OPNAV N97.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3391 / *SSN/SSGN Survivability Program*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	MIPR	CNA : Alexandria, VA	1.910	1.036	Jan 2022	0.900	Jan 2023	0.000	Jan 2024	-		0.000	0.000	3.846	-
Product Development	SS/CPFF	MIT-LL : Cambridge, MA	2.470	1.375	Oct 2021	1.100	Oct 2022	0.000	Oct 2023	-		0.000	0.000	4.945	-
Product Development	SS/CPFF	JHU/APL : Laurel, MD	7.846	1.037	Oct 2021	0.400	Oct 2022	0.000	Oct 2023	-		0.000	0.000	9.283	-
Product Development	SS/CPFF	UT/ARL : Austin, TX	1.867	0.645	Oct 2021	0.600	Oct 2022	0.000	Oct 2023	-		0.000	0.000	3.112	-
Product Development	WR	NUWC : Newport, RI	5.165	1.015	Oct 2021	1.000	Oct 2023	0.000	Oct 2023	-		0.000	0.000	7.180	-
Product Development	MIPR	NRL : Washington, DC	0.951	0.000		0.750	Dec 2022	0.000	Oct 2023	-		0.000	0.000	1.701	-
Product Development	C/BA	NSMA : Not Specified	2.602	0.650	Mar 2022	0.600	Dec 2022	0.000	Oct 2023	-		0.000	0.000	3.852	-
Product Development	SS/CPFF	Sonalysts : Groton, CT	2.530	1.103	Oct 2021	1.430	Oct 2022	0.000	Oct 2023	-		0.000	0.000	5.063	-
Product Development	WR	NSWCPD : Philadelphia, PA	0.205	0.097	Oct 2021	0.164	Oct 2022	0.000	Oct 2023	-		0.000	0.000	0.466	-
Product Development	SS/CPFF	Lockheed : Not Specified	0.050	0.125	Mar 2022	0.125	Oct 2022	0.000	Oct 2023	-		0.000	0.000	0.300	-
		Subtotal	25.596	7.083		7.069		0.000		-		0.000	0.000	39.748	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel and Corporate	WR	NAVSEA HQ : Not Specified	0.761	0.020	Oct 2021	0.050	Oct 2022	0.000	Oct 2023	-		0.000	0.000	0.831	-
		Subtotal	0.761	0.020		0.050		0.000		-		0.000	0.000	0.831	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 3391 / *SSN/SSGN Survivability Program*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Developmental Test & Evaluation (DT&E)	WR	NSWC : Carderock, MD	7.557	0.847	Apr 2022	1.416	Oct 2022	0.000	Oct 2023	-		0.000	0.000	9.820	-
Developmental Test & Evaluation (DT&E)	SS/CPFF	JHU/APL : Laural, MD	0.000	3.168	Oct 2021	1.953	Oct 2022	0.000	Oct 2023	-		0.000	0.000	5.121	-
		Subtotal	7.557	4.015		3.369		0.000		-		0.000	0.000	14.941	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Management Services	SS/CPFF	NSMA : Not Specified	1.350	0.000	Dec 2021	0.360	Dec 2022	0.000	Dec 2023	-		0.000	0.000	1.710	-
		Subtotal	1.350	0.000		0.360		0.000		-		0.000	0.000	1.710	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	35.264	11.118		10.848		0.000		-		0.000	0.000	57.230	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3391 / *SSN/SSGN Survivability Program*

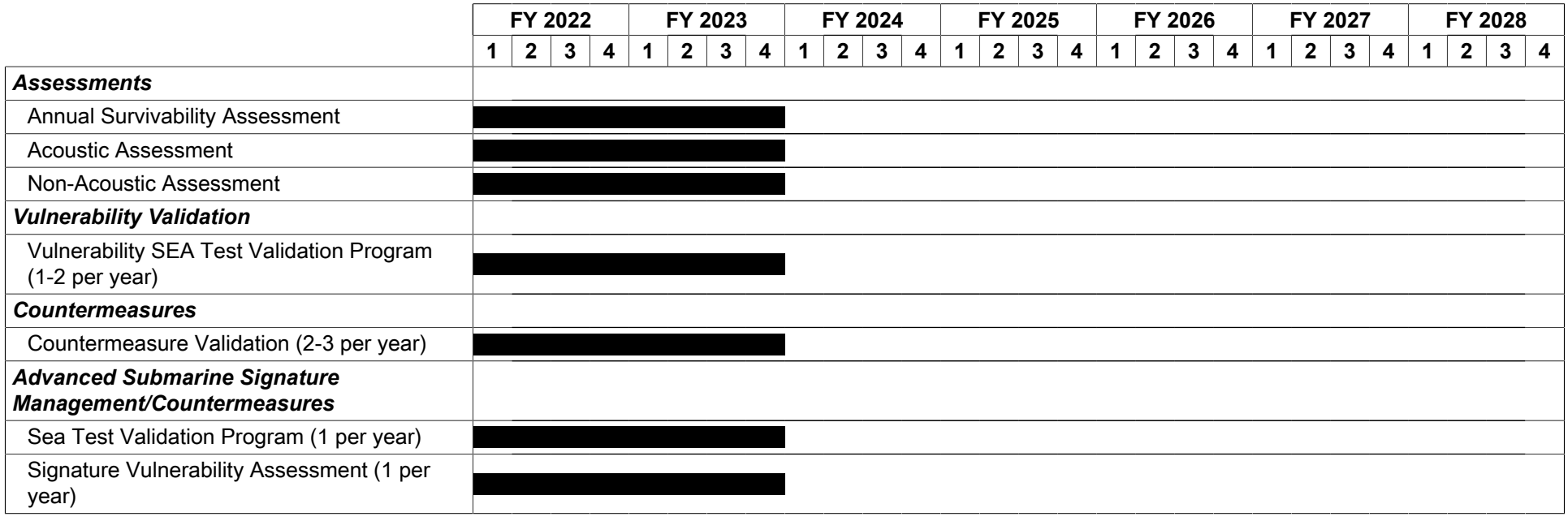


Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 3391 / *SSN/SSGN Survivability Program*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Assessments				
Annual Survivability Assessment	1	2022	4	2023
Acoustic Assessment	1	2022	4	2023
Non-Acoustic Assessment	1	2022	4	2023
Vulnerability Validation				
Vulnerability SEA Test Validation Program (1-2 per year)	1	2022	4	2023
Countermeasures				
Countermeasure Validation (2-3 per year)	1	2022	4	2023
Advanced Submarine Signature Management/Countermeasures				
Sea Test Validation Program (1 per year)	1	2022	4	2023
Signature Vulnerability Assessment (1 per year)	1	2022	4	2023

Exhibit R-2A, RDT&E Project Justification: PB 2024 Navy			Date: March 2023
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / *Advanced Submarine System Development*	Project (Number/Name) 9999 / *Congressional Adds*	

COST ($ in Millions)	Prior Years	FY 2022	FY 2023	FY 2024 Base	FY 2024 OCO	FY 2024 Total	FY 2025	FY 2026	FY 2027	FY 2028	Cost To Complete	Total Cost
9999: *Congressional Adds*	0.000	0.000	5.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	5.000
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

This task will support the development and qualification of NiZn cells and main storage battery design options to evaluate feasibility for insertion into the VIRGINIA Class Block VII technical baseline.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2022	FY 2023
Congressional Add: Nickle-zinc battery deployment for Virgina class	0.000	5.000
FY 2022 Accomplishments: N/A		
FY 2023 Plans: Leverage prior Congressional Add (FY20 Small Business Tech Insertion) and SUB 073/ONR ManTech investment to continue NiZn battery cell performance testing, long string testing, battery management system design development, and other qualification tests as needed. Coordinate transition of NiZn Main Storage Battery research and development from Program Office (SUB 073) to VA Class Program Office (PMS 450) in support of VA Block VII design space exploration. Execute engineering study to evaluate the use of nickel zinc batteries in Large Scale Vehicle (LSV-2) to support increased support system/data acquisition system power demands and extend platform mission profile.		
Congressional Adds Subtotals	0.000	5.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2022 Cost	FY 2022 Award Date	FY 2023 Cost	FY 2023 Award Date	FY 2024 Base Cost	FY 2024 Base Award Date	FY 2024 OCO Cost	FY 2024 OCO Award Date	FY 2024 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	NNS/HII : Newport News, VA	0.000	0.000		0.500	Mar 2023	0.000		-		0.000	0.000	0.500	-
Product Development	SS/CPFF	GD/EB : Groton, CT	0.000	0.000		0.300	Mar 2023	0.000		-		0.000	0.000	0.300	-
Product Development	WR	NSWC Crane : Crane, IN	0.000	0.000		4.200	Mar 2023	0.000		-		0.000	0.000	4.200	-
		Subtotal	0.000	0.000		5.000		0.000		-		0.000	0.000	5.000	N/A

	Prior Years	FY 2022		FY 2023		FY 2024 Base		FY 2024 OCO		FY 2024 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		5.000		0.000		-		0.000	0.000	5.000	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 9999 / *Congressional Adds*

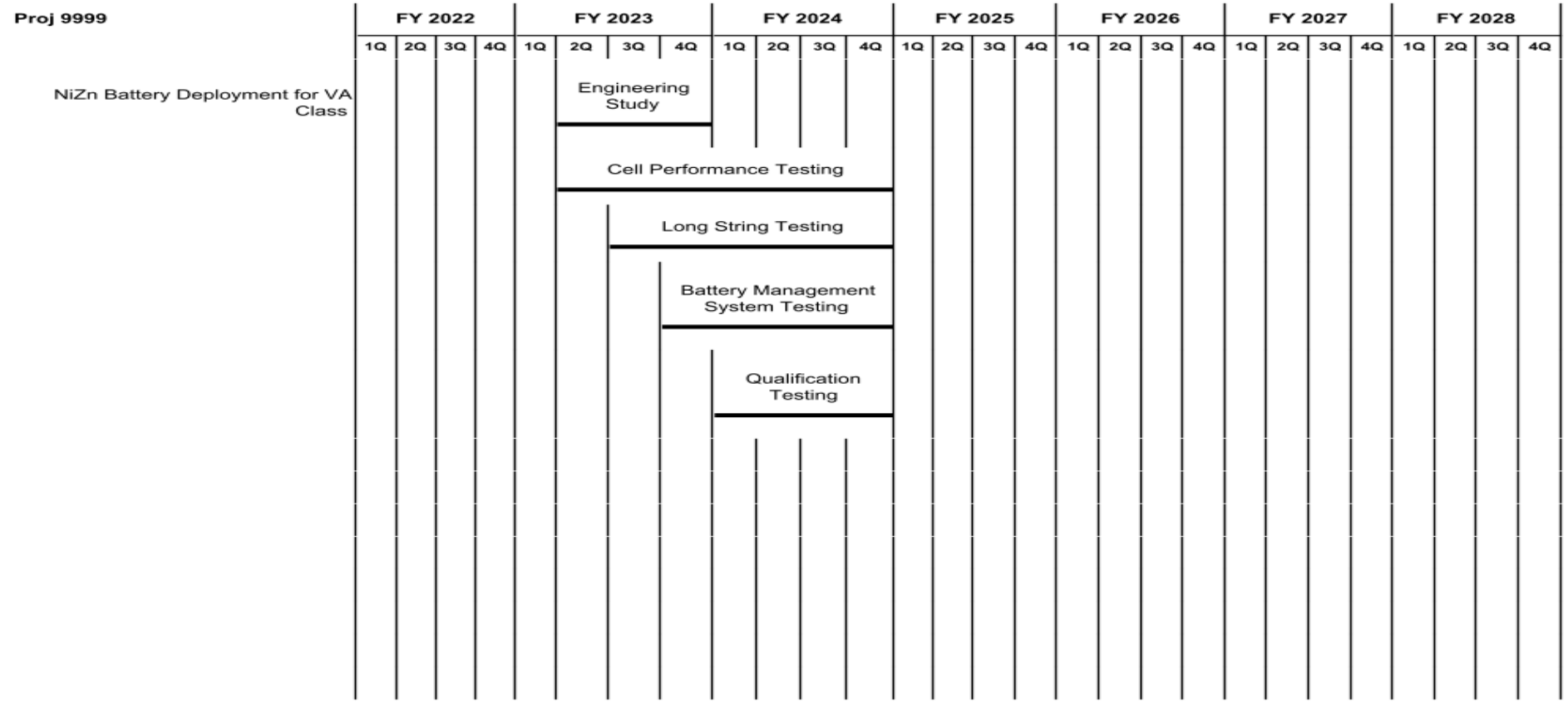


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Exhibit R-4A, RDT&E Schedule Details: PB 2024 Navy		Date: March 2023
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603561N / *Advanced Submarine System Development*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
NiZn Battery Deployment for VA Class: Engineering Study	2	2023	4	2023
NiZn Battery Deployment for VA Class: Cell Performance Testing	2	2023	4	2024
NiZn Battery Deployment for VA Class: Long String Testing	3	2023	4	2024
NiZn Battery Deployment for VA Class: Battery Management System Testing	4	2023	4	2024
NiZn Battery Deployment for VA Class: Qualification Testing	1	2024	4	2024