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Exhibit R-2, RDT&E Budget Item Justification: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
Total Program Element	1,444.951	107.333	88.415	96.694	-	96.694	108.456	96.360	93.715	90.525	Continuing	Continuing
0223: <i>Sub Combat System Improvement (ADV)</i>	767.545	56.339	60.360	60.407	-	60.407	61.847	61.682	60.867	62.109	Continuing	Continuing
2033: <i>Adv Submarine Systems Development</i>	631.024	35.599	28.055	36.287	-	36.287	46.609	34.678	32.848	28.416	Continuing	Continuing
3391: <i>SSN/SSGN Survivability Program</i>	46.382	10.572	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	56.954
9999: <i>Congressional Adds</i>	0.000	4.823	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.823

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 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) "Navigation Plan 2022"; addressing threats posed by strategic adversaries China and Russia. This project targets all force design imperatives rapidly providing unique capabilities to expand distance and generate decision advantage.

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.

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<p>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.</p> <p>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, Ohio and Columbia classes of SSBNs, as well as backfits. The LVA project also sustains the prototype LVA on USS Maryland.</p> <p>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.</p> <p>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.</p> <p>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</p>		

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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 Infrastructure
 - Large Scale Vehicle (LSV)
 - Large Scale Vehicle Recapitalization
 - Intermediate Scale Measurement System (ISMS)
 - High Gain Measurement System (HGMS)
 - Acoustic Range Detachment (ARD) Ranges Recapitalization
 - 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 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 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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Previous President's Budget	110.146	88.415	89.074	-	89.074
Current President's Budget	107.333	88.415	96.694	-	96.694
Total Adjustments	-2.813	0.000	7.620	-	7.620
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	0.422	0.000			
• SBIR/STTR Transfer	-3.235	0.000			
• Program Adjustments	0.000	0.000	9.000	-	9.000

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• Rate/Misc Adjustments	0.000	0.000	-1.380	-	-1.380
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Congressional Add Details (\$ in Millions, and Includes General Reductions)

Project: 9999: *Congressional Adds*

Congressional Add: *Nickle-zinc battery deployment for Virginia class*

Congressional Add Subtotals for Project: 9999

Congressional Add Totals for all Projects

	FY 2023	FY 2024
	4.823	0.000
Congressional Add Subtotals for Project: 9999	4.823	0.000
Congressional Add Totals for all Projects	4.823	0.000

Change Summary Explanation

FUNDING CHANGES SINCE THE PREVIOUS PRESIDENT'S BUDGET AT THE OVERALL PE LEVEL:

- FY 2023 net decrease of \$-2.813M reflects the Small Business Innovative Research (SBIR) transfer (\$-3.235M) and the incorporation of a programmatic and cancelled accounts reprogrammings (\$+0.422M).
- FY 2025 net increase of \$7.620M reflects the planned ramp up in design, planning, systems integration testing and the initiation of significant long lead time material procurements of HGMS and ISMS range components in support of ARD Range Recapitalization (\$+9.000M) and the incorporation of miscellaneous rate adjustments (\$-1.380M).

INFORMATION AT THE PROJECT LEVEL:

PROJECT 0223:

FUNDING CHANGES: The FY 2024 (\$60.360M) to FY 2025 (\$60.407M) net budget increase (\$+0.047M) reflects the planned phasing of Project Rebound's incorporation into Advanced Processing Build (APB) / Submarine Warfare Federated Tactical Systems (SWTFS) and the incorporation of miscellaneous rate adjustments.

SCHEDULE CHANGES: APB-23 'Step 4 At-Sea Test' has shifted from 3Q24 to 1Q25 and the 'Transition to PEO UWS Production Programs' has shifted from 4Q24 to 2Q25 as a result of the Fleet being unable to provide a test SSN until 1Q25. Test events and the subsequent transition are contingent on platform availability. This six (6) month shift will allow for the continued development and inclusion of added capability into APB-23. This shift has not affected APB-25 or APB-27.

PROJECT 2033:

FUNDING CHANGES: FY 2024 (\$28.055M) to FY 2025 (\$36.287M) increase (\$+8.232M) due to planned ramp up in design, planning, systems integration testing and the initiation of significant long lead time material procurements of HGMS and ISMS range components in support of ARD Range Recapitalization. Without the increased funding, range capabilities will be impacted.

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy										Date: March 2024		
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
0223: <i>Sub Combat System Improvement (ADV)</i>	767.545	56.339	60.360	60.407	-	60.407	61.847	61.682	60.867	62.109	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), and Bow Conformal Array (BCA) 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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Title: Advanced Processing Build (APB)	44.239	46.260	45.487	0.000	45.487
Articles:	-	-	-	-	-
Description: 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 simulated by the Submarine Multi-Mission Team Trainer (SMMTT), in a realistic tactical environment.					

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

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<p>Step 4: At-sea testing on an operational submarine.</p> <p>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 APB (e.g APB-23, APB-25, APB-27, etc.) and allows for development of longer lead technologies. The content of a specific APB (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.</p> <p>The Navy continues to pursue 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 development, security, and operations (DevSecOps) environment. This process better aligns with industry practice and enables SWFTS 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 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 4 testing regimes will be maintained.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - 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. 					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<ul style="list-style-type: none"> - Continue to refine continuous DevSecOps process and software pipeline in coordination with PEO UWS 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. - Support Fleet efforts to develop ML/AI based automation tools via the Harbinger project. - Support PEO UWS cyber efforts to obtain Authority to Operate (ATO) for APB. - Conduct Return-On-Investment (ROI) land-based testing of APB-23. - Conduct APB-23 Train-the-Trainers events to assist the Fleet in creating doctrine, tactics, and training materials in support of deployments. - Initiate prototyping and development of APB Futures Tactical Advantage for the Next Generation (TANG) concepts. <p>FY 2025 Base Plans:</p> <ul style="list-style-type: none"> - 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 providing assistance to PEO UWS production program offices with evolutionary combat system re-architecture to improve cybersecurity and speed of delivery, focusing on reducing software certification timelines. - Continue development of ML algorithms, with emphasis on Deep Learning to solve immediate Fleet requirements. - Deliver prototype augmented reality decision support display to Fleet SSNs as directed by OPNAV N97. - 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. - Continue prototyping and development of APB Futures TANG concepts. - Continue to support Fleet efforts to develop ML/AI based automation tools via the Harbinger project. - Initiate updates to APB baseline software code to address technical debt. - Support PEO UWS efforts to adapt newest APB builds to older fielded hardware baselines. - Support signal processing improvements for Large Vertical Array (LVA), Bow Conformal Array (BCA) and NextGen Towed Array. 					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)					
- Update the land-based test facility for software maintenance, hardware refresh, and the addition of new array types.					
FY 2025 OCO Plans: N/A					
FY 2024 to FY 2025 Increase/Decrease Statement: - FY 2024 (\$46.260M) to FY 2025 (\$45.487M) decrease (\$-0.773M) is the result of miscellaneous rate adjustments.					
Title: Project Rebound					
Articles:					
	0.000	1.400	2.400	0.000	2.400
	-	-	-	-	-
FY 2024 Plans: This classified effort supports Advanced Processing Build (APB)/Submarine Warfare Federated Tactical Systems (SWTFS) processing.					
FY 2025 Base Plans: This classified effort supports Advanced Processing Build (APB)/Submarine Warfare Federated Tactical Systems (SWTFS) processing.					
FY 2025 OCO Plans: N/A					
FY 2024 to FY 2025 Increase/Decrease Statement: - FY 2024 (\$1.400M) to FY 2025 (\$2.400M) increase (\$+1.000M) is based on the original phasing of Project Rebound.					
Title: Advanced Sensors					
Articles:					
	7.200	7.550	7.425	0.000	7.425
	-	-	-	-	-
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 2024 Plans: - Continue Open Architecture Telemetry (OAT) Advanced Development Model (ADM) fabrication of 13X array.					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<ul style="list-style-type: none"> - Begin build-test-build process utilizing the completed Universal Test Harness (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 Bow Conformal Array (BCA) development. - Conduct passive sensor acoustic and shock testing in air and in Conformal Acoustic Velocity Sonar (CAVES) matrix. - Study CAVES Wide Aperture Array (WAA) and LVA applications for VA Class Block VII and SSN(X). - Conduct active projector testing in-lab and at-sea environments. - Continue modeling BCA passive performance. - Update BCA active performance with new sensor. <p>FY 2025 Base Plans:</p> <ul style="list-style-type: none"> - Continue OAT design maturation using lessons-learned from FAT. - Conduct in-water testing of prototype OAT. - Continue supporting PEO UWS production programs in BCA and SSN(X) development. - Continue passive sensor acoustic and shock testing. - Conduct next generation transducer performance testing. - Develop test report to document projector performance. - Continue to study CAVES WAA and LVA applications for VA Class Block VII and SSN(X). <p>FY 2025 OCO Plans: N/A</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement:</p> <ul style="list-style-type: none"> - FY 2024 (\$7.550M) to FY 2025 (\$7.425M) decrease (\$-0.125M) is the result of miscellaneous rate adjustments. 					
<p>Title: Large Vertical Array (LVA)</p> <p align="right">Articles:</p> <p>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 pace the threat, adapt to new Navy strategies, and further develop the revolutionary LVA capability. LVA development sustains and maintains the LVA2 ADM, and plans, conducts, and analyzes exercises and tests involving LVA2 and Fleet LVAs. This effort supports new</p>	4.900	5.150	5.095	0.000	5.095
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<p>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.</p> <p>FY 2024 Plans:</p> <ul style="list-style-type: none"> - 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 Undersea Warfare Development Command (UWDC). - Collect array data on faulty or failed array inboard/outboard components. 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. - Support installation of production LVA on USS MARYLAND. - Continue LVA flow noise investigations. <p>FY 2025 Base Plans:</p> <ul style="list-style-type: none"> - Analyze LVA at-sea test results and provide input to signal processing development, SLC, and tactical employment recommendations to UWDC. - Document troubleshooting and repair findings for evaluation and provide findings/recommendations to the production programs for Virginia, Ohio, and Columbia Class Submarines. - Support decommissioning of LVA2 array. - Conduct LVA flow, paint, cleaning, and measurement studies and deliver report. - Develop LVA inspection and cleaning procedure. <p>FY 2025 OCO Plans: N/A</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement:</p> <ul style="list-style-type: none"> - FY 2024 (\$5.150M) to FY 2025 (\$5.095M) decrease (\$-0.055M) is the result of miscellaneous rate adjustments. 					
Accomplishments/Planned Programs Subtotals	56.339	60.360	60.407	0.000	60.407

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

Line Item	FY 2023	FY 2024	FY 2025	FY 2025	FY 2025	FY 2026	FY 2027	FY 2028	FY 2029	Cost To	
			Base	OCO	Total					Complete	Total Cost
• RD TEN/0205620N: <i>Surface ASW Cmbt Sys Integr</i>	27.945	29.973	29.887	-	29.887	30.194	30.413	30.835	31.433	Continuing	Continuing
• RD TEN/0603562N/0770: <i>Adv Sub Supp Equip Prog</i>	3.585	7.791	7.514	-	7.514	6.637	4.910	4.905	5.006	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.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy												Date: March 2024			
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)							
Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
APB, LVA, Advanced Sensor Development	C/CPFF	Adaptive Methods : VA	2.724	0.350	Dec 2022	0.350	Feb 2024	0.350	Dec 2024	-		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	4.105	0.220	Dec 2022	0.175	Feb 2024	0.175	Dec 2024	-		0.175	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	General Dynamics : VA	32.934	1.725	Dec 2022	1.725	Jan 2024	1.725	Dec 2024	-		1.725	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	GA Tech Research Institute : GA	4.372	0.450	Dec 2022	0.450	Nov 2023	0.450	Dec 2024	-		0.450	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	In Depth Engineering : VA	10.436	0.000		0.000		0.000		-		0.000	0.000	10.436	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	JHU/APL : MD	148.019	12.650	Dec 2022	11.975	Dec 2023	11.975	Dec 2024	-		11.975	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	Lockheed Martin : VA	121.401	10.705	Dec 2022	12.100	Nov 2023	12.100	Dec 2024	-		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	12.613	0.865	Dec 2022	0.905	Feb 2024	0.905	Dec 2024	-		0.905	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPAF	NSMA : VA	15.644	0.750	Jan 2023	0.750	Mar 2024	0.750	Jan 2025	-		0.750	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	WR	NSWC/Carderock : MD	42.258	3.370	Nov 2022	3.575	Oct 2023	3.575	Nov 2024	-		3.575	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	WR	NUWC/Newport : RI	145.268	11.975	Nov 2022	12.200	Oct 2023	12.200	Nov 2024	-		12.200	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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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 0223 / <i>Sub Combat System Improvement (ADV)</i>
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Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
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	10.846	0.715	Dec 2022	0.725	Jan 2024	0.725	Dec 2024	-		0.725	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	PSU/ARL : PA	13.863	1.500	Dec 2022	1.575	Jan 2024	1.575	Dec 2024	-		1.575	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	23.619	1.500	Dec 2022	1.500	Nov 2023	1.500	Dec 2024	-		1.500	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	31.689	2.100	Dec 2022	2.225	Jan 2024	2.225	Dec 2024	-		2.225	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	UT/ARL : TX	40.151	2.255	Dec 2022	2.275	Dec 2023	2.275	Dec 2024	-		2.275	Continuing	Continuing	Continuing
APB, LVA, Advanced Sensor Development	C/CPFF	VAR : VAR*	40.230	3.239	Dec 2022	4.485	Dec 2023	3.532	Dec 2024	-		3.532	Continuing	Continuing	Continuing
Project Rebound Development	C/CPFF	VAR : VAR*	0.000	0.000		1.400	Nov 2023	2.400	Dec 2024	-		2.400	Continuing	Continuing	Continuing
Subtotal			739.037	54.369		58.390		58.437		-		58.437	Continuing	Continuing	N/A

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

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 0223 / <i>Sub Combat System Improvement (ADV)</i>
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Management Services (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program 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	3.611	1.900	Dec 2022	1.900	Feb 2024	1.900	Dec 2024	-		1.900	Continuing	Continuing	Continuing
Program Office Travel	Allot	NAVSEA PEO IWS5 : DC	1.123	0.070	Oct 2022	0.070	Oct 2023	0.070	Oct 2024	-		0.070	Continuing	Continuing	Continuing
Subtotal			28.508	1.970		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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	767.545	56.339	60.360	60.407	-	60.407	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 0223 / <i>Sub Combat System Improvement (ADV)</i>
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Project 0223	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
Advanced Processing Build (APB) Development Pipeline	APB Development Pipeline																											
	Project Rebound																											
Advanced Processing Build (APB-21)	▲ Step 4 At-Sea Test ■ Transition to PEO UWS Production Programs																											
Advanced Processing Build (APB-23)	△ Step 4 At-Sea Test □ Transition to PEO UWS Production Programs																											
Advanced Processing Build (APB-25)	△ Step 4 At-Sea Test □ Transition to PEO UWS Production Programs																											
Advanced Processing Build (APB-27)	△ Step 4 At-Sea Test □ Transition to PEO UWS Production Programs																											
Advanced Sensors	TL-29A OAT ADM /EDM Fabrication												EDM Integration/Test				Transition EDM to PEO UWS Production Program											
													EDM At-Sea Test				OAT Development Improvements											
	Hull Array Sensor Development																											
Large Vertical Array (LVA)	USS Maryland Test Planning/Testing/Analysis												Transition to PEO UWS Production Programs															
	688i LVA Feasibility Study																											

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Navy		Date: March 2024
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 0223 / <i>Sub Combat System Improvement (ADV)</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 0223				
Advanced Processing Build (APB): APB Development Pipeline	1	2023	4	2029
Advanced Processing Build (APB): Project Rebound	1	2024	4	2029
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	1	2025	1	2025
APB-23: Transition to PEO UWS Production Programs	2	2025	2	2025
APB-25: At-Sea Test	3	2026	3	2026
APB-25: Transition to PEO UWS Production Programs	4	2026	4	2026
APB-27: At-Sea Test	3	2028	3	2028
APB-27: Transition to PEO UWS Production Programs	4	2028	4	2028
Advanced Sensors: Hull Array Sensor Development	1	2023	4	2029
Advanced Sensors: TL-29A OAT ADM/EDM Fabrication	1	2023	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	2029
Large Vertical Array (LVA): USS Maryland Test Planning/Testing/Analysis	1	2023	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	2029

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy										Date: March 2024		
Appropriation/Budget Activity 1319 / 4					R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>				Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>			
COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
2033: <i>Adv Submarine Systems Development</i>	631.024	35.599	28.055	36.287	-	36.287	46.609	34.678	32.848	28.416	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 levels (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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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>
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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
 - Acoustic Research Detachment (ARD) Ranges 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 Signature Management

- Rapid Technology Development
- Innovative Technology Transfer

Increase in overall budget from FY24 to FY25 due to required increased investment in ARD Range Recapitalization, to modernize the ISMS and HGMS range complexes, in addition to the STAFAC Recapitalization project moving into Systems Test and Integration phase. Without the increased funding, range capabilities will be impacted.

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

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Title: Strategic Capability R&D Infrastructure	29.503	21.543	29.592	0.000	29.592
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, located at the Acoustic Range Detachment (ARD) Bayview, ID, 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					

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

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<p>validation provided by the model experiments has provided significant cost and schedule savings by allowing prototyping at scale, vice with first-of-hull assets. This project funds planning and procurement for lifecycle modernization of the ISMS and HGMS R&D ranges at ARD. ISMS modernization scope will include upgrades and component modernization of the range's transmit and receive arrays; power distribution system, model haul-down system, model location measurement system and all associated mooring, support and anchoring systems. HGMS modernization scope will include array systems; LSV-2 deep moor and array moorings; and obsolescence upgrades to acoustic subsystems, and the ARD radiated noise laboratory and range operations center.</p> <p>This project also funds STAFAC Recapitalization, which modernizes the existing South Toto Acoustic Measurement Facility (STAFAC), which has currently exceeded 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.</p> <p>FY 2024 Plans: LSV-2: Continue to maintain certified LSV-2 for operations in support of RDT&E customers. Continue updates to Electronic Drive Control Electronics (EDCE) testbed and continue EDCE and motor drive sustainment initiatives. Complete multi-year LSV-2 electric motor drive recapitalization process, including delivery of all drive units. Execute testing for VA Hybrid Multi Material Rotor (HMMR), tailcone trial, and flow noise trials.</p> <p>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, towed arrays, and other fleet needs.</p> <p>HGMS: Operate and maintain HGMS acoustic test range underwater and shore-based facilities in support of highly accurate acoustic data from LSV2 operations; begin installation of replacement components as part of toward mid-life recapitalization of the range.</p>					

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

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<p>ARD Ranges Recapitalization: Continue project planning; initiate component and system level design work; conduct advance engineering; conduct specification development; develop material sourcing strategy/vendor identification for ISMS and HGMS long lead time procurements.</p> <p>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.</p> <p>FY 2025 Base Plans: LSV-2: Continue to maintain certified LSV-2 for operations in support of RDT&E customers. Complete "off-design rotor test" and "instrumented propulsor baseline test," plus any other emergent testing as required by SSN(X), VIRGINIA, or COLUMBIA programs.</p> <p>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, towed arrays, and other fleet needs.</p> <p>HGMS: Operate and maintain HGMS acoustic test range underwater and shore-based facilities in support of highly accurate acoustic data from LSV2 operations; begin installation of replacement components as part of critical component mid-life major maintenance.</p> <p>ARD Ranges Recapitalization: Finalize project planning; initiate/complete detailed system design and engineering work; conduct long lead time material procurements for all ISMS and HGMS sub-systems and submerged support infrastructure; begin shore-based sub-component and component level acceptance and system integration testing.</p> <p>STAFAC Recapitalization: Acoustic testing of first article high gain measurement systems including the High Frequency Volumetric Array to validate performance, acoustic calibration of sensors, testing of circuit boards, and engineering oversight of Test & Evaluation efforts. Continue software development for new beamforming capabilities and accelerated life testing of in-water components. Conduct detailed planning for FY26 at-sea</p>					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
<p>deployment of STAFAC array, mooring and power/data cabling. Develop supporting component and system test plans.</p> <p>FY 2025 OCO Plans: N/A</p> <p>FY 2024 to FY 2025 Increase/Decrease Statement: Increase from FY24 to FY25 due to STAFAC Recapitalization project moving into Systems Test and Integration phase, and planned ramp up in design, planning, systems integration testing and the initiation of significant long lead time material procurements of HGMS and ISMS range components in support of ARD Range Recapitalization.</p>					
<p>Title: Long Range R&D</p> <p align="right">Articles:</p> <p>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.</p> <p>FY 2024 Plans: ADVANCED HULL TREATMENTS: Mature next generation hull treatments in coordination with ONR ManTech and continuing development and maturation of hull treatments via continued industrialization, architecture development, testing.</p> <p>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</p>	5.796	6.200	6.375	0.000	6.375
	-	-	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy		Date: March 2024
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Shakedown demo and planning/preparation for follow-on Refinement demo in support of ONR Own Ship Acoustic Monitoring (OSAM) FNC. Complete collaborative planning for 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 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 of prototype test article 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).					
<i>FY 2025 Base Plans:</i>					
ADVANCED HULL TREATMENTS: Conduct full scale at-sea testing and performance evaluation of Advance Hull Treatments installed on VCS Hull C during EDSRA. Continue to mature next generation hull treatments in coordination with ONR ManTech and continuing development and maturation of hull treatments via continued industrialization, architecture development, and small/large scale sample testing.					
ADVANCED SIGNATURE MANAGEMENT (ASM): Continue CONOP and procedural guidance development for ASM integration into Ship Systems. Support execution At-Sea Shakedown demonstration in support of joint NAVSEA and ONR Own Ship Acoustic Monitoring (OSAM) FNC. Conduct data analysis on Refinement Demonstration and planning/ preparation for follow-on Final Demonstration in support of NAVSEA and ONR joint OSAM FNC. The program also executes numerous lines of efforts that are in addition to the OSAM FNC and other technology development efforts, such as integration of program mission with other Program Offices and external organizations such as Commander, Undersea Surveillance (CUS), and provision of guidance to the Fleet. The program will provide interfaces, integration, and enhancements to/with other systems, and continue					

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy		Date: March 2024
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>

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

	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
to work with ONR. Support the data analysis of the Partner Underwater Electro-Magnetic (UEM) Measurement Trials.					
NEXT GENERATION THRUST (NGT): Transition full-scale composite shafting R&D efforts and modeling tool improvement initiatives in support of New SSN propulsion technology development to the SSN(X) project office. Transition funding responsibility for scale-model planning, test article manufacturing, testing, and upgrades to propulsor test facilities to the SSN(X) project office.					
ADVANCED MATERIAL PROPELLER (AMP): Continue follow-on destructive/non-destructive testing of prototype test article 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.					
FY 2025 OCO Plans: N/A					
FY 2024 to FY 2025 Increase/Decrease Statement: Minor increase from FY24 to FY25 due to miscellaneous program adjustments.					
Title: Rapid Technology Development	0.300	0.312	0.320	0.000	0.320
Articles:	-	-	-	-	-
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 2024 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 2025 Base Plans:					

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy	Date: March 2024
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Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
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 2025 OCO Plans: N/A FY 2024 to FY 2025 Increase/Decrease Statement: Minor increase from FY24 to FY25 due to miscellaneous program adjustments.					
Accomplishments/Planned Programs Subtotals	35.599	28.055	36.287	0.000	36.287

C. Other Program Funding Summary (\$ in Millions)											
<u>Line Item</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025 Base</u>	<u>FY 2025 OCO</u>	<u>FY 2025 Total</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>FY 2029</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• OPN/0941: <i>Submarine Support Equipment</i>	116.575	112.526	293.766	-	293.766	312.035	381.744	269.053	103.273	Continuing	Continuing

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

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.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy												Date: March 2024			
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)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	C/FFP	DRS Technologies : Milwaukee, WI	9.840	7.000	Nov 2022	0.000		0.000		-		0.000	0.000	16.840	16.840
Product Development	SS/CPFF	Whitehill Manufacturing : Chester, PA	0.000	0.000		0.000		1.210	Jan 2025	-		1.210	0.000	1.210	1.210
Product Development	SS/CPFF	SEACON Brantner & Associates : El Cajon, CA	0.000	0.000		0.000		2.225	Jan 2025	-		2.225	0.000	2.225	2.620
Product Development	SS/CPFF	International Transducer Corp : Santa Barbara, CA	0.000	0.000		0.000		1.535	Jan 2025	-		1.535	0.000	1.535	1.535
Product Development	WR	NSWC Crane : Crane, IN	1.236	0.307	Dec 2022	0.000	Dec 2023	0.000		-		0.000	0.000	1.543	-
Product Development	WR	NSWC Philadelphia : Philadelphia, PA	1.475	0.383	Nov 2022	0.135	Nov 2023	0.250	Nov 2024	-		0.250	Continuing	Continuing	Continuing
Product Development	WR	NRL : Washington, DC	3.213	0.106	Dec 2022	0.108	Dec 2023	0.150	Dec 2024	-		0.150	0.000	3.577	Continuing
Product Development	SS/CPFF	HII-NNS : Newport News, VA	26.555	1.704	Jan 2023	0.450	Jan 2024	0.400	Jan 2025	-		0.400	Continuing	Continuing	Continuing
Product Development	SS/CPFF	GDEB : Groton, CT	92.984	3.591	Jan 2023	1.299	Jan 2024	1.050	Jan 2025	-		1.050	Continuing	Continuing	Continuing
Product Development	WR	NSWC Carderock : Carderock, MD	114.888	4.957	Nov 2022	6.041	Nov 2023	7.189	Nov 2024	-		7.189	Continuing	Continuing	Continuing
Product Development	FFRDC	ARL/PSU : State College, PA	13.802	1.366	Feb 2023	1.393	Feb 2024	0.960	Feb 2025	-		0.960	Continuing	Continuing	Continuing
Product Development	FFRDC	JHU/APL : Laurel, MD	25.436	0.265	Feb 2023	0.310	Jan 2024	0.350	Jan 2025	-		0.350	Continuing	Continuing	Continuing
Product Development	Various	Various : Various	37.596	0.308	Feb 2023	0.314	Feb 2024	2.236	Feb 2025	-		2.236	Continuing	Continuing	Continuing
Product Development	WR	NUWC Newport : Newport, RI	81.456	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Product Development	FFRDC	APL/University of Washington : Seattle, WA	0.521	0.531	Dec 2022	0.544	Dec 2023	0.945	Dec 2024	-		0.945	0.000	2.541	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>
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Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Product Development	SS/CPFF	Leidos : Reston, VA	0.535	1.567	Nov 2022	1.569	Nov 2023	0.929	Nov 2024	-		0.929	0.000	4.600	Continuing
Product Development	MIPR	NAVFAC EXWC : Port Hueneme. CA	0.000	0.000		0.000		0.240	Feb 2025	-		0.240	0.000	0.240	0.940
Subtotal			409.537	22.085		12.163		19.669		-		19.669	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.
 Several new vendors introduced in FY25 in support of ARD Recap
 Various/VAR is used to group multiple activities with small funding levels. FY24 to FY25 increase due to multiple vendor efforts in support of ARD Recap.

Support (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Contractor Engineering Support	SS/CPFF	Various : Various	21.206	1.163	Jan 2023	1.146	Jan 2024	1.322	Dec 2024	-		1.322	Continuing	Continuing	Continuing
Government Engineering Support	WR	Various : Various	9.271	0.599	Oct 2022	0.807	Oct 2023	1.170	Oct 2024	-		1.170	Continuing	Continuing	Continuing
Travel	WR	NAVSEA HQ : Not Specified	1.633	0.090	Oct 2022	0.110	Oct 2023	0.112	Oct 2024	-		0.112	Continuing	Continuing	Continuing
Subtotal			32.110	1.852		2.063		2.604		-		2.604	Continuing	Continuing	N/A

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

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>
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Test and Evaluation (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Developmental Test & Evaluation (DT&E)	C/CPFF	GDIT : Bayview, ID	8.000	1.839	Nov 2022	2.216	Nov 2023	2.941	Dec 2024	-		2.941	0.000	14.996	Continuing
Developmental Test & Evaluation (DT&E)	SS/CPFF	GDEB : Groton, CT	43.320	2.167	Jan 2023	3.338	Jan 2024	0.900	Jan 2025	-		0.900	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	WR	NSWC Philadelphia : Philadelphia, PA	10.820	0.513	Nov 2022	0.572	Nov 2023	0.550	Nov 2024	-		0.550	0.000	12.455	Continuing
Developmental Test & Evaluation (DT&E)	Various	Various : Various	11.516	0.731	Mar 2023	0.746	Mar 2024	0.450	Mar 2025	-		0.450	0.000	13.443	Continuing
Developmental Test & Evaluation (DT&E)	WR	NUWC Newport : Newport, RI	33.651	0.435	Nov 2022	0.493	Nov 2023	0.203	Nov 2024	-		0.203	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	WR	NSWC Carderock : Carderock, MD	73.631	4.590	Nov 2022	4.997	Nov 2023	7.700	Nov 2024	-		7.700	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	SS/CPFF	HII-NNS : Newport News, VA	7.018	0.631	Jan 2023	0.643	Jan 2024	0.670	Jan 2025	-		0.670	Continuing	Continuing	Continuing
Developmental Test & Evaluation (DT&E)	SS/CPFF	JHU/APL : Laurel, MD	1.421	0.756	Apr 2023	0.824	Apr 2024	0.600	May 2025	-		0.600	0.000	3.601	Continuing
Subtotal			189.377	11.662		13.829		14.014		-		14.014	Continuing	Continuing	N/A

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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	631.024	35.599	28.055	36.287	-	36.287	Continuing	Continuing	N/A

Remarks

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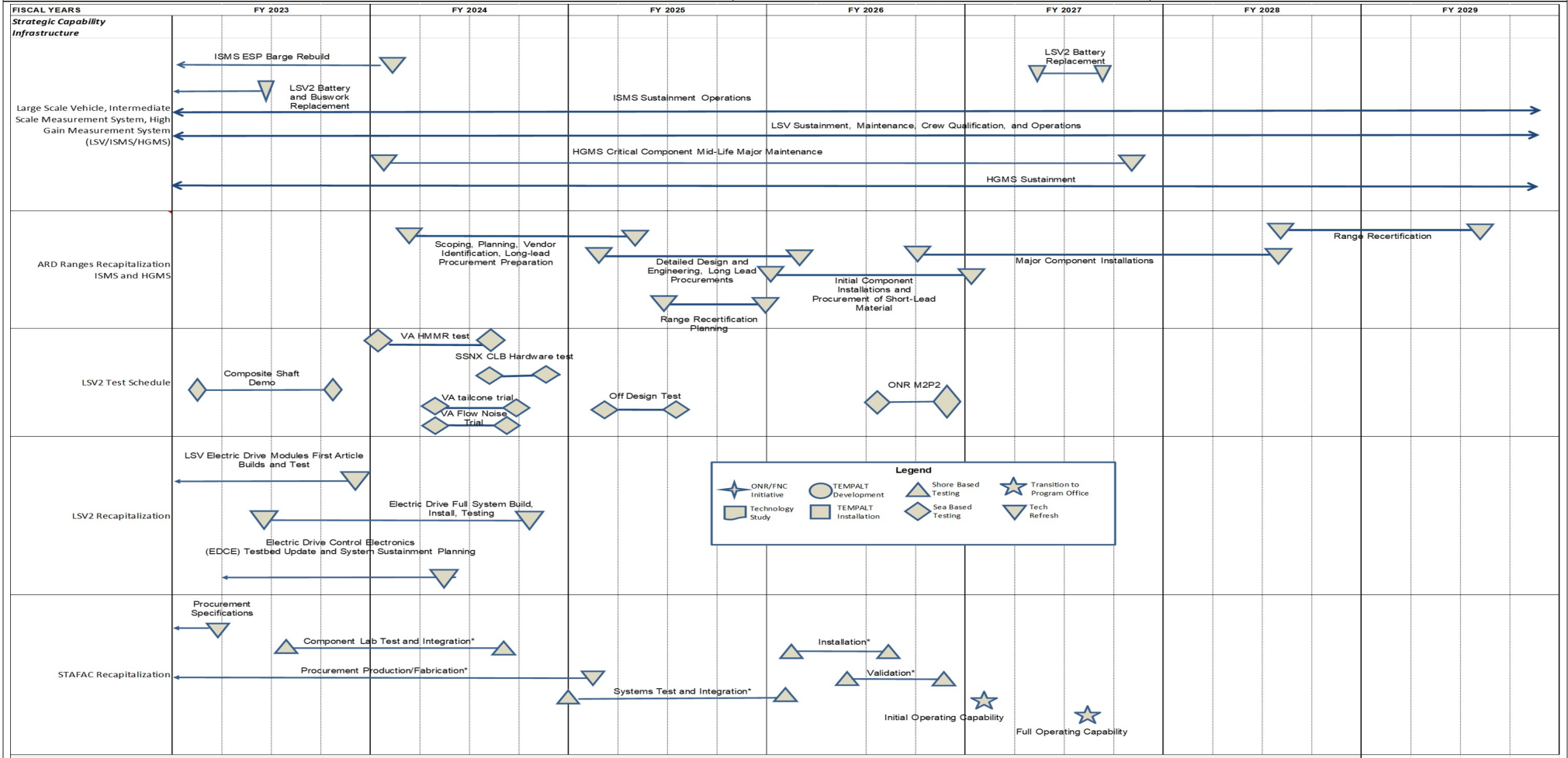
Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy

Date: March 2024

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

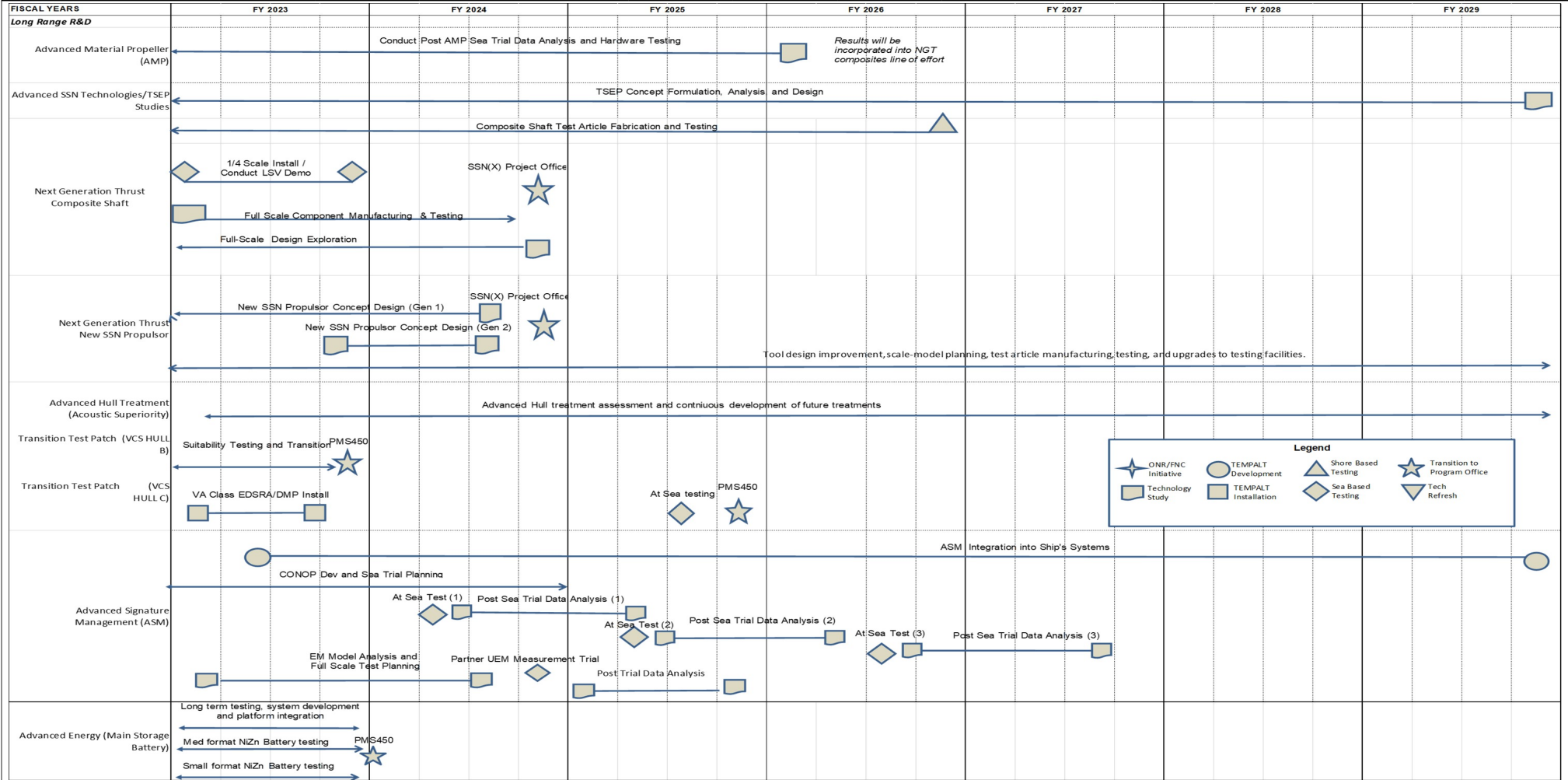


*Major component procurements funded via Submarine Support Equipment OPN; CLB unique measurement technologies funded via COLUMBIA Class RDT&E

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy **Date:** March 2024

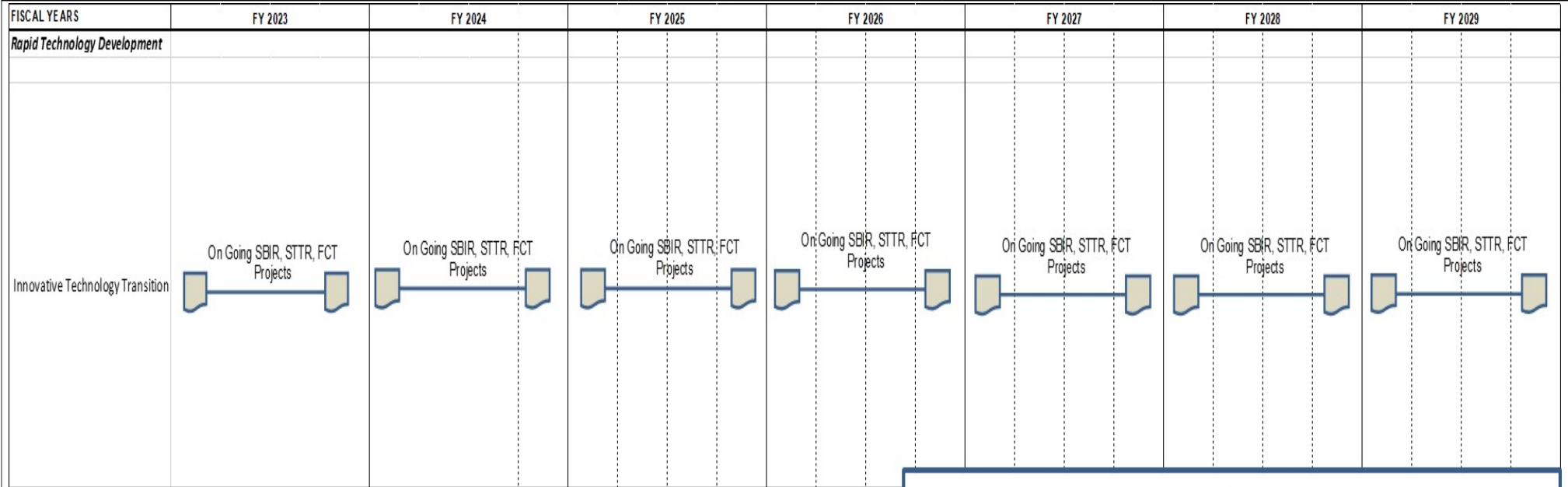
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>
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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy **Date:** March 2024

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

 ONR/FNC Initiative	 TEMPALT Development	 Shore Based Testing	 Transition to Program Office
 Technology Study	 TEMPALT Installation	 Sea Based Testing	 Tech Refresh

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Navy		Date: March 2024
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 2033				
Strategic Capability Infrastructure: ISMS/LSV /HGMS- ISMS ESP Barge Rebuild	1	2023	1	2024
Strategic Capability Infrastructure: ISMS /LSV/HGMS - LSV Sustainment, Maintenance, Crew Qualification and Operations	1	2023	4	2029
Strategic Capability Infrastructure: ISMS /LSV/HGMS - LSV Battery and Buswork Replacement	1	2023	2	2023
Strategic Capability Infrastructure: ISMS /LSV/HGMS - LSV Battery Replacement (4 year replacement cycle)	2	2027	3	2027
Strategic Capability Infrastructure: ISMS/LSV/HGMS - ISMS Range Sustainment Operations	1	2023	4	2029
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	2023	4	2029
Strategic Capability Infrastructure: ARD Recapitalization - Scoping, Planning, Vendor Identification, Long-Lead Procurement Prep	2	2024	2	2025
Strategic Capability Infrastructure: ARD Recapitalization - Detail Design & Engineering, Long-Lead Procurement Orders	1	2025	1	2026
Strategic Capability Infrastructure: ARD Recapitalization - Range Recertification Planning	2	2025	4	2025
Strategic Capability Infrastructure: ARD Recapitalization - Initial Component Installation & Procurement of Short-Lead Material	1	2026	1	2027
Strategic Capability Infrastructure: ARD Recapitalization - Major Component Installations	3	2026	3	2028
Strategic Capability Infrastructure: ARD Recapitalization - Range Recertification	3	2028	3	2029

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Strategic Capability Infrastructure: LSV2 Test Schedule - Composite Shaft Demonstration	1	2023	4	2023
Strategic Capability Infrastructure: LSV2 Test Schedule - VA Flow Noise Test	2	2024	3	2024
Strategic Capability Infrastructure: LSV Test Schedule - VA HMMR Rotor Test	1	2024	3	2024
Strategic Capability Infrastructure: LSV2 Test Schedule - SSN(X) Gen 1 Hardware Test NGT	3	2024	4	2024
Strategic Capability Infrastructure: LSV2 Test Schedule - SSN(X) VA Tailcone Trial	2	2024	3	2024
Strategic Capability Infrastructure: LSV2 Test Schedule - ONR M2P2 Test	3	2026	4	2026
Strategic Capability Infrastructure: LSV2 Test Schedule - Off Design Test	1	2025	3	2025
Strategic Capability Infrastructure: LSV2 Recapitalization - Electric Drive Modules First Article Builds and Test	1	2023	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	2023	2	2024
Strategic Capability Infrastructure: STAFAC Recapitalization - Procurement Specifications	1	2023	1	2023
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) - Post-sea trial data analysis and hardware testing	1	2023	1	2026

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Long Range R&D: SSN(X) - Advanced SSN Technologies/TSEP Studies - TSEP concept formulation, analysis, and design	1	2023	4	2029
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft -Test Article fabrication and testing	1	2023	4	2024
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft -Install/Conduct LSV Demo	1	2023	4	2023
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft - Full Scale Design Exploration	1	2023	4	2024
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft - Transition to SSN(X) Project Office	4	2024	4	2024
Long Range R&D: Next Generation Thrust (NGT) Composite Shaft - Full Scale Component Manufacturing & Testing	1	2023	4	2024
Long Range R&D: Next Generation Thrust New SSN Propulsor - Transition to SSN(X) Project Office	4	2024	4	2024
Long Range R&D: Next Generation Thrust - Tool design improvement, scale-model planning, test article manufacturing, testing, and upgrades to testing facilities	1	2023	1	2029
Long Range R&D: Advanced Hull Treatments - Continuous treatment assessment and development	1	2023	1	2029
Long Range R&D: Transition Test Patch (VCS HULL B) - VA Class Suitability Testing	1	2023	4	2023
Long Range R&D: Transition Test Patch (VCS HULL B) - Transition to VA Class	4	2023	4	2023
Long Range R&D: Transition Test Patch (VCS HULL C) - VA Class EDSRA/DMP Install	1	2023	3	2023
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	2029
Long Range R&D: Advanced Signature Management - CONOP Dev and Sea Trial Planning for Demo	1	2023	4	2024

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 2033 / <i>Adv Submarine Systems Development</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Long Range R&D: Advanced Signature Management - At Sea Test (1)	2	2024	2	2024
Long Range R&D: Advanced Signature Management - Post Sea Trials Data Analysis (1)	2	2024	2	2025
Long Range R&D: Advanced Signature Management - At Sea Test (2)	2	2025	2	2025
Long Range R&D: Advanced Signature Management - Post Sea Trials Data Analysis (2)	2	2025	2	2026
Long Range R&D: Advanced Signature Management - At Sea Test (3)	3	2026	3	2026
Long Range R&D: Advanced Signature Management - Post Sea Trials Data Analysis (3)	3	2026	3	2027
Long Range R&D: Advanced Signature Management - EM Model Testing/Analysis and Full Scale Test Planning	1	2023	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	2023	4	2023
Long Range R&D: Advance Energy (Main Storage Battery) - Medium Format Testing	1	2023	4	2023
Long Range R&D: Advance Energy (Main Storage Battery) - Large Format Testing	4	2023	4	2023
Long Range R&D: Advance Energy (Main Storage Battery) - Long Term Testing System Development & Platform Integration Studies	1	2023	4	2023
Long Range R&D: Advance Energy (Main Storage Battery) - Transition to VA Class	1	2023	1	2023
Rapid Technology Development: Innovative Technology Transition - Conduct assessment of technology initiatives, SBIR transition work, STTR, Foreign Comparative Tests	1	2023	4	2029

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 3391 / <i>SSN/SSGN Survivability Program</i>
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
3391: <i>SSN/SSGN Survivability Program</i>	46.382	10.572	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	56.954
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 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
Title: SSN/SSGN Survivability Program	10.572	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
<p>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.</p> <p>FY 2024 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.</p> <p>FY 2025 Base Plans: N/A</p> <p>FY 2025 OCO Plans:</p>					

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy		Date: March 2024
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 3391 / <i>SSN/SSGN Survivability Program</i>

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total
N/A					
Accomplishments/Planned Programs Subtotals	10.572	0.000	0.000	0.000	0.000

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

<u>Line Item</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025 Base</u>	<u>FY 2025 OCO</u>	<u>FY 2025 Total</u>	<u>FY 2026</u>	<u>FY 2027</u>	<u>FY 2028</u>	<u>FY 2029</u>	<u>Cost To Complete</u>	<u>Total Cost</u>
• RDTEN/0101224N: <i>SSBN Security Technology</i>	49.232	62.694	61.714	-	61.714	63.462	65.472	67.050	68.502	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 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.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 3391 / <i>SSN/SSGN Survivability Program</i>
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Product Development (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Product Development	MIPR	CNA : Alexandria, VA	2.946	0.900	Jan 2023	0.000	Jan 2024	0.000		-		0.000	0.000	3.846	-
Product Development	SS/CPFF	MIT-LL : Cambridge, MA	3.845	1.100	Oct 2022	0.000	Oct 2023	0.000		-		0.000	0.000	4.945	-
Product Development	SS/CPFF	JHU/APL : Laurel, MD	8.883	0.400	Oct 2022	0.000	Oct 2023	0.000		-		0.000	0.000	9.283	-
Product Development	SS/CPFF	UT/ARL : Austin, TX	2.512	0.600	Oct 2022	0.000	Oct 2023	0.000		-		0.000	0.000	3.112	-
Product Development	WR	NUWC : Newport, RI	6.180	1.000	Oct 2023	0.000	Oct 2023	0.000		-		0.000	0.000	7.180	-
Product Development	MIPR	NRL : Washington, DC	0.951	0.750	Dec 2022	0.000	Oct 2023	0.000		-		0.000	0.000	1.701	-
Product Development	C/BA	NSMA : Not Specified	3.252	0.600	Dec 2022	0.000	Oct 2023	0.000		-		0.000	0.000	3.852	-
Product Development	SS/CPFF	Sonalysts : Groton, CT	3.633	1.430	Oct 2022	0.000	Oct 2023	0.000		-		0.000	0.000	5.063	-
Product Development	WR	NSWCPD : Philadelphia, PA	0.302	0.164	Oct 2022	0.000	Oct 2023	0.000		-		0.000	0.000	0.466	-
Product Development	SS/CPFF	Lockheed Martin : Bethesda, MD	0.175	0.125	Oct 2022	0.000	Oct 2023	0.000		-		0.000	0.000	0.300	-
Subtotal			32.679	7.069		0.000		0.000		-		0.000	0.000	39.748	N/A

Support (\$ in Millions)				FY 2023		FY 2024		FY 2025 Base		FY 2025 OCO		FY 2025 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Travel and Corporate	WR	NAVSEA HQ : Not Specified	0.781	0.050	Oct 2022	0.000	Oct 2023	0.000		-		0.000	0.000	0.831	-
Subtotal			0.781	0.050		0.000		0.000		-		0.000	0.000	0.831	N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 3391 / <i>SSN/SSGN Survivability Program</i>
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Assessments	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029							
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q				

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy		Date: March 2024
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 3391 / <i>SSN/SSGN Survivability Program</i>

Vulnerability Validation	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029							
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q				

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy															Date: March 2024				
Appropriation/Budget Activity 1319 / 4										R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>					Project (Number/Name) 3391 / <i>SSN/SSGN Survivability Program</i>				

Countermeasures	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029							
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q				

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 3391 / <i>SSN/SSGN Survivability Program</i>
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Advanced Submarine Signature Management/Countermeasures	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029							
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q				

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Navy		Date: March 2024
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 3391 / <i>SSN/SSGN Survivability Program</i>

Schedule Details

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

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Exhibit R-2A, RDT&E Project Justification: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</i>
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COST (\$ in Millions)	Prior Years	FY 2023	FY 2024	FY 2025 Base	FY 2025 OCO	FY 2025 Total	FY 2026	FY 2027	FY 2028	FY 2029	Cost To Complete	Total Cost
9999: <i>Congressional Adds</i>	0.000	4.823	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	4.823
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 2023	FY 2024
Congressional Add: Nickle-zinc battery deployment for Virginia class	4.823	0.000
FY 2023 Accomplishments: 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.		
FY 2024 Plans: Continue efforts from FY23, utilizing FY23 funding.		
Congressional Adds Subtotals	4.823	0.000

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

N/A

Remarks

D. Acquisition Strategy

N/A

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Exhibit R-4, RDT&E Schedule Profile: PB 2025 Navy **Date:** March 2024

Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</i>
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	FY 2023				FY 2024				FY 2025				FY 2026				FY 2027				FY 2028				FY 2029							
	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q				
Proj 9999 NiZn Battery Deployment for VA Class																																
	Engineering Study																															
	Cell Performance Testing																															
	Long String Testing																															
	Battery Management System Testing																															
	Qualification Testing																															

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Exhibit R-4A, RDT&E Schedule Details: PB 2025 Navy		Date: March 2024
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603561N / <i>Advanced Submarine System Development</i>	Project (Number/Name) 9999 / <i>Congressional Adds</i>

Schedule Details

Events by Sub Project	Start		End	
	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