Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*					R-1 Program Element (Number/Name) PE 0604501N *I Advanced Above Water Sensors*							
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
Total Program Element	368.696	28.297	67.167	77.852	-	77.852	-	-	-	-	-	-
3232: *Multi-Mission Signal Processor*	163.366	4.827	3.020	2.967	-	2.967	-	-	-	-	-	-
3236: *Advanced Radar Technology*	162.009	1.857	0.000	0.000	-	0.000	-	-	-	-	-	-
3243: *Shipboard Passive Electro-Optical Infrared Development*	0.000	0.000	44.898	63.947	-	63.947	-	-	-	-	-	-
3301: *Improved Capabilities SPY-1 Radar*	43.321	9.002	11.189	9.976	-	9.976	-	-	-	-	-	-
3408: *AN/SPS-49 Technical Refresh*	0.000	12.611	8.060	0.962	-	0.962	-	-	-	-	-	-

A. Mission Description and Budget Item Justification

The FY 2022 funding request was reduced by $2.000M to account for the availability of prior year execution balances.

Multi-Mission Signal Processor (MMSP): The development of MMSP provides simultaneous Anti-Air Warfare (AAW)/Ballistic Missile Defense (BMD) multi-mission capability for DDG 51 class ships as part of the Aegis Modernization Program. This capability is utilized for DDG 113 and follow new construction and Aegis Ashore. Modifies SPY-1D transmitters
to enable dual beam for reduced frame times and better reaction time, provides stability for all D(V) waveforms, and avoids operational degradation. The SPY-1 radar system detects, tracks, and supports engagements of a broader range of threats. MMSP improves performance in littoral, ducted clutter, electronic attack (EA), and chaff environments and provides greater commonality in computer programs and equipment. This effort also provides for the development of MMSP on Destroyers Commercial Off The Shelf (COTS) refresh and MMSP technology refresh. MMSP/AEGIS Linear Processing System (ALPS) integration provides adjunct processing for data collection.

MMSP development includes the commencement of technology refresh to support Aegis Modernization due to Diminishing Manufacturing Sources and Material Shortages (DMSMS) and obsolescence issues. MMSP-Restoration (MMSP-R) includes software updates required on new computer platforms. Engineering efforts will be required to assess alternate technologies and determine optimal MMSP architectural solutions, which will include system security requirements. Since FY 2021, $2.9M was reallocated in FY 2020 from SPY-1 (Project 3301) to MMSP (Project 3232) due to increased funding requirement for completion of MMSP-R Engineering Test and Evaluation (ET&E). FY22 funding is required for technology development to support integration of ALPS into MMSP-R, continuation of MMSP-R development to support AEGIS modernization and ACB16 MMSP improvements, MMSP-R ECP/Software updates, completion of MMSP-R ECPs, and Capability Package 22 (CP-22) certification support.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604501N *I Advanced Above Water Sensors*

Advanced Radar Technology (ART): Enterprise Air Surveillance Radar (EASR) will modify an existing radar technology to meet the air surveillance requirements for multiple ship classes. EASR will be one sensor in a suite that is designed to meet the performance needs for ship self-defense, situational awareness and air traffic control. EASR will replace the Volume Search Radar (VSR) in the CVN 78 Class Dual Band Radar system and the AN/SPS-48/49 radar systems in numerous ship classes. The AN/SPS-48 Radars are long-range, three-dimensional (3-D) radars used to search, detect and provide space-stabilized, three-coordinate (range, bearing, height) data for air intercept control and designation to a weapon system. The AN/SPS-49A(V)1 radar system is a long range, two dimensional (2-D), L-Band air surveillance radar installed on USN major combatants. The AN/SPY-4 Volume Search Radar (VSR) is an S-Band active phased array radar deployed on CVN 78 providing volume surveillance and air traffic control. EASR funding will develop a modern 3-D air search radar that addresses the latest requirements for Aviation and Amphibious Warfare Ships and closely conforms to existing combat system interfaces, as well as aligns with existing shipboard space, weight, and power limits. The architecture and acquisition strategy for EASR is intended to drive a lower recurring cost by utilizing the same core technology for both fixed-face and rotating array variants. EASR will provide for engineering of component and system level technology improvements for equipment used by in-service air search radars.

Shipboard Passive Electro-Optical Infrared (SPEIR) Block I will be an open architecture system that addresses near-term capability requirements and associated gaps identified in the 2019 SPEIR Capability Development Document (CDD). This program answers an urgent counter unmanned aircraft system operational need for the Fleet to provide an initial capability by 2026. The SPEIR acquisition leverages technology developed under the Office of Naval Research's (ONR's) Combined EO/IR Surveillance and Response System (CESARS) Science and Technology (S&T) effort, specifically related to the Shipboard Panoramic EO/IR Cueing and Surveillance System (SPECSS). SPEIR Block I will provide a common 360-degree EO/IR Electronic Support (ES) capability to surface ships that will passively find, fix, track, and target current / emerging threats in support of the following warfare missions: Anti-Ship Cruise Missile (ASCM) Defense, Counter-Unmanned Aircraft Systems (UAS), Counter-Fast Attack Craft / Fast In-shore Attack Craft (FAC/FIAC), and Mobility.
SPEIR Block I will consist of a passive Wide Field of View (WFOV) capability with a 360-degree field-of-view optical sensors for autonomous detection and tracking for 24/7 day/night shipboard situational awareness. SPEIR Block I will also include an enhanced, high resolution Narrow-Medium Field of View (NFOV) and laser range-finding capability that will provide 3D target tracking, identification, and threat assessment. SPEIR Block I will have limited integration with shipboard combat systems to exchange target track data and disseminate motion imagery. This program includes risk reduction initiatives for modeling and simulation, sensor protection counter-countermeasures, Sensor Fusion Algorithms and combat system track publishing to enable limited Combat System Integration (CSI). SPEIR Block II will be a future program that will build on the modular open system architecture of Block I to address longer-term capability requirements to include an expanded spatial coverage envelope, Periscope Detection and Discrimination (PDD) and Mine Like Object (MLO) avoidance. SPEIR Block II will also provide full combat system integration and will include a government software development and integration effort for Soft-Kill Coordination System (SKCS) to manage ES engagements. FY22 budget request of $63.947M provides for the first year of Engineering and Manufacturing Development (E&MD) efforts by the SPEIR prime contractor. This will include execution of System Requirements Review/System Functional Review (SRR/SFR) and Preliminary Design Review (PDR) as well as procurement of long lead material for Engineering Development Model (EDM) manufacturing. Other FY22 efforts will include continued development of the test and training programs required to verify and field a wholly new capability to the Fleet, as well as engineering efforts for ship and combat system integration to fully define related requirements and interfaces. Due to new start program delay in FY21, major prime contract award projection slipped from FY21 to FY22. To mitigate the delay, funding allocations were rebalanced between performers to accelerate Government Systems Engineering and Modeling & Simulation efforts to FY21 where technically feasible in order to maintain planned Initial Operating Capability of FY26.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy	Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*	**R-1 Program Element (Number/Name)** PE 0604501N *I Advanced Above Water Sensors*

Improved Capabilities for SPY-1 Radar: These Reliability, Maintainability, and Availability (RM&A) improvements and solid state technology insertions are intended to reduce cascading failures, mitigate obsolescence issues, and improve reliability in support of Anti-Air Warfare (AAW) and Ballistic Missile Defense (BMD) missions while still providing AN/

SPY-1 Radar Total Ownership Cost Reductions. Improvements, such as Solid State Insertion to address Diminishing Manufacturing Sources and Material Shortages (DMSMS), will yield reductions in annual fleet maintenance costs and is a top fleet requirement as part of the AEGIS Wholeness initiative. In addition to RM&A improvements, warfighting improvements funded in this line include: Transmitter Noise Cancellation (TNC) development will include hardware/software to counter low radar cross section, low altitude threats. Side Lobe Blanking (SLB) addresses shortfalls in mixed electronic attack environment while in an Integrated Air and Missile Defense (IAMD) mode. The Ship-Based Non-Cooperative Target Recognition (SBNCTR) program Phases 2, 2A and 3 will develop algorithms to provide classification for targets. Transition of Advanced Calibration Experiment (ACE) Phases 1 and 2 from Baseline 7 into Baseline 9. Incorporate Elevated Radar Advanced Calibration Experiment (ERACE) Phases 1/2 and 3 into Baseline 9. Electronic Attack (EA) and Rapid Radar Capability Improvement Program (R2CIP) develop solutions for evolving EA threats. Due to funding reductions since PB21, some efforts have shifted to a later FY across the FYDP. FY22 funding includes start of ACE Phase 2, and the continuation of development efforts of SBNCTR Phase 2A, TNC phase 1 & 2, EA improvements, Solid State Insertion and Elevated Radar Advanced Calibration Experiment (ERACE) Phase 1/2.

AN/SPS-49 Technology Refresh: AN/SPS-49 is the only Air Surveillance Radar on the LSD 41/49 class ships. Continued degradation and increasingly low radar availability of the AN/SPS-49 Radar is greatly impacting deployed missions, impacting safety of flight and affecting LSD Air Warfare capability and operations and as a result, AN/SPS-49 Technology Refresh is required. This AN/SPS-49 Technology Refresh will include Reliability, Maintainability, and Availability (RM&A) improvements and solid state technology insertions which will reduce cascading failures and mitigate obsolescence issues. In addition, this effort replaces key components to include: transmitter, receiver, exciter, antenna elevation servo control, radar system control, display and signal data processor (SDP). A digital receiver/exciter (DREX) with high-performance computing technology will be a key component in the new system. The current SPS-49 radar has no software so new software is being developed to mimic the current radar functions to maintain compatibility with internal and external interfaces. This effort will improve SPS-49 electronic protection, have increased surveillance range and increased slow moving small target detection, as well as reduce total ownership cost with lower unit cost and smaller size/weight/power requirements. FY 2022 funding will complete development, test and evaluation, validation and integration of a technology refresh of the below deck hardware for the AN/SPS-49A(V)1 Long Range Air Surveillance Radar. FY 2022 funding is to complete subsystem integration, test, evaluation and validation on a prototype radar for the technology refresh of the below deck hardware for the AN/SPS-49A(V)1 Long Range Air Surveillance Radar.

Exhibit R-2, RDT&E Budget Item Justification: PB 2022 Navy					Date: May 2021
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 5: *System Development & Demonstration (SDD)*			R-1 Program Element (Number/Name) PE 0604501N *I Advanced Above Water Sensors*		
B. Program Change Summary ($ in Millions)	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**
Previous President's Budget	30.179	87.809	116.177	-	116.177
Current President's Budget	28.297	67.167	77.852	-	77.852
Total Adjustments	-1.882	-20.642	-38.325	-	-38.325
• Congressional General Reductions	-	-0.392			
• Congressional Directed Reductions	-	-20.250			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.700	0.000			
• SBIR/STTR Transfer	-1.182	0.000			
• Program Adjustments	0.000	0.000	-36.700	-	-36.700
• Rate/Misc Adjustments	0.000	0.000	-1.625	-	-1.625

Change Summary Explanation

- FY 2020 decreases were due to a $.700M reduction from SPY-1 to support higher Navy requirements and $1.182M for SBIR transfer.
- FY 2021 decreases were due to $.392M reduction to all programs within PE 0604501N for undistributed reduction excess to need. $20.250M was reduced from the Shipboard Passive Electro-Optical Infrared (EO/IR) program due to one unit being funded early to need.
- FY 2022 decreases are due to a $34.700M reduction to SPEIR for one year delay and $3,625K for minor rate/misc adjustments.

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*	Project (Number/Name) 3232 / *Multi-Mission Signal Processor*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
3232: *Multi-Mission Signal Processor*	163.366	4.827	3.020	2.967	-	2.967	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Multi-Mission Signal Processor (MMSP): The development of MMSP provides simultaneous Anti-Air Warfare (AAW)/Ballistic Missile Defense (BMD) multi-mission capability for DDG 51 class ships as part of the Aegis Modernization Program. This capability is utilized for DDG 113 and follow new construction and Aegis Ashore. Modifies SPY-1D transmitters to enable dual beam for reduced frame times and better reaction time, provides stability for all D(V) waveforms, and avoids operational degradation. The SPY-1 radar system detects, tracks, and supports engagements of a broader range of threats. MMSP improves performance in littoral, ducted clutter, electronic attack (EA), and chaff environments and provides greater commonality in computer programs and equipment. This effort also provides for the development of MMSP on Destroyers Commercial Off The Shelf (COTS) refresh and MMSP technology refresh. MMSP/AEGIS Linear Processing System (ALPS) integration provides adjunct processing for data collection.

MMSP development includes the commencement of technology refresh to support Aegis Modernization due to Diminishing Manufacturing Sources and Material Shortages (DMSMS) and obsolescence issues. MMSP-Restoration (MMSP-R) includes software updates required on new computer platforms. Engineering efforts will be required to assess alternate technologies and determine optimal MMSP architectural solutions, which will include system security requirements. Since PB21, $2.9M was reallocated in FY20 from SPY-1 (Project 3301) to MMSP (Project 3232) due to increase in funding requirement for completion of MMSP-R Engineering Test and Evaluation (ET&E). FY22 funding is required for technology development to support integration of ALPS into MMSP-R, continuation of MMSP-R development to support AEGIS modernization and ACB16 MMSP improvements, MMSP-R ECP/Software updates, completion of MMSP-R ECPs, and Capability Package 22 (CP-22) certification support.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: SYSTEMS ENGINEERING	4.827	3.020	2.967	0.000	2.967
Articles:	-	-	-	-	-
FY 2021 Plans: - Support ACB16 Phase 2 Certification. - Continue MMSP-R development to support AEGIS Modernization due to DMSMS and obsolescence issues. - Continue to maintain alignment with the Ballistic Missile Defense (BMD) Program and the associated BMD Signal Processor (BSP) adjunct to incorporate BMD capability within MMSP during AEGIS Modernization. - Initiate and complete MMSP-R Engineering Change Proposals (ECPs). - Continue to support Advanced Capability Build (ACB)16 MMSP improvements.					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3232 / *Multi-Mission Signal Processor*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Conduct MMSP-R ACB16 Demo. - Perform MMSP/ALPS requirements analysis and specification updates. - Initiate ACB16 Commercial Off The Shelf (COTS) Refresh ECPs. ***FY 2022 Base Plans:*** - Continue MMSP-R development to support AEGIS Modernization due to DMSMS and obsolescence issues. - Continue to maintain alignment with the BMD Program and the associated BSP adjunct to incorporate BMD capability within MMSP during AEGIS Modernization. - Continue to support ACB16 MMSP improvements. - Initiate MMSP-R ECP/Software updates. - Commence MMSP-R/ALPS technology development. - Radar Integrated Product Team (IPT) support of certification for Capability Package 22 (CP-22). ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Slight reduction in FY 2022 funding aligns with planned technology refresh development efforts.					
Accomplishments/Planned Programs Subtotals	4.827	3.020	2.967	0.000	2.967

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• OPN/0900: *BLI 0900/ OPN DDG Modernization*	564.966	512.155	583.136	-	583.136	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Multi-Mission Signal Processor (MMSP) provides simultaneous AAW/BMD Multi-mission capability for AEGIS Modernization Program and leverages BMD 4.0.1 and SPY-1D (V) designs. Lockheed Martin (Moorestown, New Jersey) is awarded a sole source, cost-plus-fixed-fee, level-of-effort job order under a Basic Ordering Agreement (BOA) via NSWC Crane in support of the AEGIS weapons system, AN/SPY-1 radar. Efforts include engineering services and incidental supplies for radar readiness enhancements and improvements. Work will be performed in Moorestown, New Jersey. The current period of performance on the BOA is through August 2023 and will continue under a follow-on BOA. MMSP development efforts support integration of BMD 5.0 signal processing, and will lead to the OPN/SCN procurement

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3232 / *Multi-Mission Signal Processor*

for shore sites and shipsets. MMSP technology refresh will be incorporated into Baseline 9 and follow. MMSP/ALPS integration provides adjunct processing for data collection.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3232 / *Multi-Mission Signal Processor*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SYSTEM ENGINEERING	SS/CPFF	Lockheed Martin : Moorestown, NJ	115.186	2.900	May 2020	0.000		0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	C/CPFF	AEGIS Techrep : Moorestown, NJ	5.641	0.105	Mar 2020	0.105	Jan 2021	0.150	Dec 2021	-		0.150	-	-	-
SYSTEM ENGINEERING	SS/FP	APL/JHU : Laurel, MD	5.111	0.050	Dec 2019	0.000		0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	WR	CSCS : Dahlgren, VA	1.694	0.062	Nov 2019	0.062	Jan 2021	0.072	Nov 2021	-		0.072	-	-	-
SYSTEM ENGINEERING	WR	NRL : Washington, DC	3.273	0.108	Nov 2019	0.157	Dec 2020	0.170	Nov 2021	-		0.170	-	-	-
SYSTEM ENGINEERING	MIPR	MIT/LL : Lexington, MA	1.453	0.000		0.000		0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	WR	NSWC/DD : Dahlgren, VA	9.520	0.801	Nov 2019	0.548	Nov 2020	0.452	Oct 2021	-		0.452	-	-	-
SYSTEM ENGINEERING	WR	SCSC : Wallops Island, VA	0.019	0.000		0.000		0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	WR	NSWC/CR : Crane, IN	6.966	0.496	Nov 2019	1.433	Jan 2021	1.646	Oct 2021	-		1.646	-	-	-
SYSTEM ENGINEERING	WR	NSWC/PHD : Port Hueneme, CA	4.395	0.206	Nov 2019	0.451	Nov 2020	0.213	Oct 2021	-		0.213	-	-	-
SYSTEM ENGINEERING	WR	Office of Naval Research : Arlington, VA	5.779	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	159.037	4.728		2.756		2.703		-		2.703	-	-	N/A

Remarks

1)Since FY 2021, $2.9M was reallocated in FY 2020 from SPY-1 (Project 3301) to MMSP (Project 3232) due to increase in Lockheed Martin funding requirement for completion of MMSP-R Engineering Test and Evaluation (ET&E).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3232 / *Multi-Mission Signal Processor*

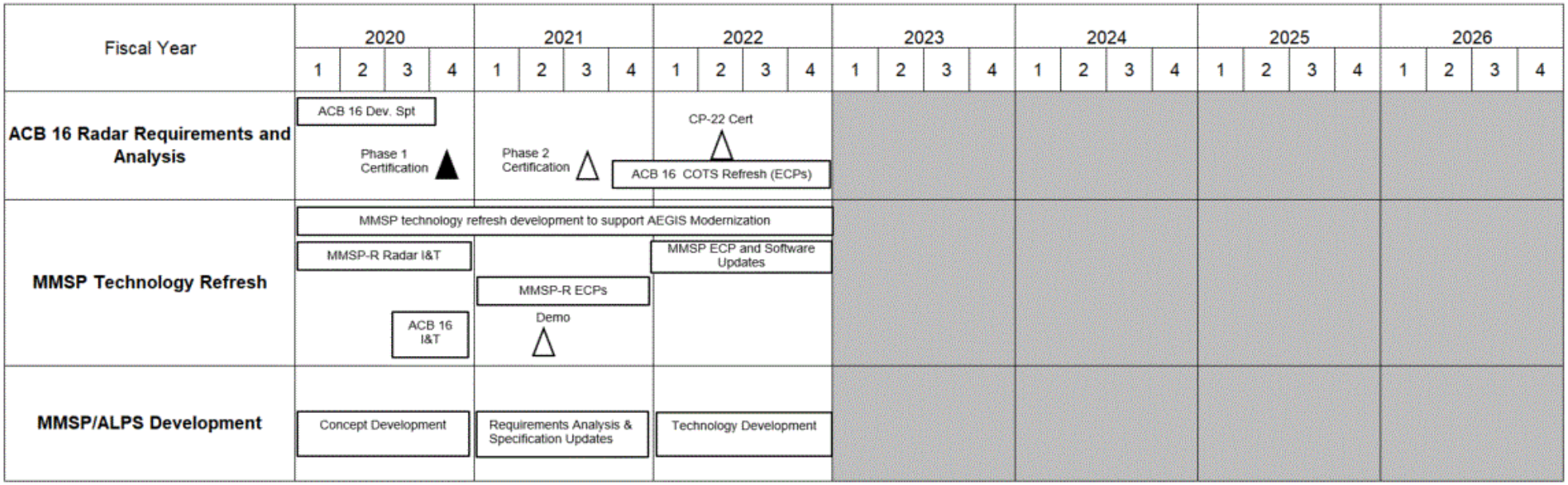
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	PEOIWS2 : Washington, DC	0.256	0.010	Sep 2020	0.010	Jan 2021	0.010	Jan 2022	-		0.010	-	-	-
Support Management Services	C/CPIF	SPA : Washington, DC	0.271	0.089	Mar 2020	0.254	Dec 2020	0.254	Nov 2021	-		0.254	-	-	-
Support Management Services	SS/CPIF	SPA (Bridge) : Washington, DC	1.403	0.000		0.000		0.000		-		0.000	-	-	-
Support Management Services	C/CPIF	SPA (SEAPORT) : Washington, DC	2.247	0.000		0.000		0.000		-		0.000	-	-	-
Support Management Services	C/CPFF	CACI : Washington, DC	0.094	0.000		0.000		0.000		-		0.000	-	-	-
Support Management Services	C/CPFF	TMB : Washington, DC	0.031	0.000		0.000		0.000		-		0.000	-	-	-
Support Management Services	C/CPFF	Strategic Insight : Washington, DC	0.027	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	4.329	0.099		0.264		0.264		-		0.264	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	163.366	4.827		3.020		2.967		-		2.967	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3232 / *Multi-Mission Signal Processor*



ACB 16 COTS Refresh continues beyond the FYDP.
CP-22 Certification was added to Baseline 9.2.3 schedule.
MMSP Technology Refresh continues beyond the FYDP.
MMSP-R Radar I&T includes MMSP-R ET&E.
MMSP/ALPS continues beyond the FYDP.
ACB16 Radar Requirements and Analysis schedule has been adjusted to align with the updated ACB16 Combat System schedule.
The Baseline 9.2.3 program replaced the MMSP-R Multi-Mission Exercise (MMEX) Radar level testing with an ACB16 Demo to perform combat system level testing.

Acronyms:
ACB: AEGIS Capability Build
ALPS: AEGIS Linear Processing System
COTS: Commericial Off The Shelf
CP: Capability Package
ECP: Engineering Change Proposal
ET&E: Engineering Test & Evaluation
I&T: Integration & Test

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3232 / *Multi-Mission Signal Processor*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3232				
ACB16 Development Support	1	2020	3	2020
MMSP Technology Refresh to Support AEGIS Modernization	1	2020	4	2022
MMSP-R Radar Integration & Test	1	2020	4	2020
MMSP/ALPS Concept Development	1	2020	4	2020
MMSP-R ACB16 Integration and Test	3	2020	4	2020
ACB16 Phase 1 Certification	4	2020	4	2020
MMSP-R ECPs	1	2021	4	2021
MMSP/ALPS Requirements Analysis and Specifications Update	1	2021	4	2021
MMSP-R Demo	2	2021	2	2021
ACB16 Phase 2 Certification	3	2021	3	2021
ACB16 COTS Refresh (ECPs)	4	2021	4	2022
MMSP ECP and Software Updates	1	2022	4	2022
MMSP/ALPS Technology Development	1	2022	4	2022
CP-22 Certification Support	2	2022	2	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*	Project (Number/Name) 3236 / *Advanced Radar Technology*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
3236: *Advanced Radar Technology*	162.009	1.857	0.000	0.000	-	0.000	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Advanced Radar Technology (ART): Enterprise Air Surveillance Radar (EASR) will modify an existing radar technology to meet the air surveillance requirements for multiple ship classes. EASR will be one sensor in a suite that is designed to meet the performance needs for ship self-defense, situational awareness and air traffic control. EASR will replace the Volume Search Radar (VSR) in the CVN 78 Class Dual Band Radar system and the AN/SPS-48/49 radar systems in numerous ship classes. The AN/SPS-48 Radars are long-range, three-dimensional (3-D) radars used to search, detect and provide space-stabilized, three-coordinate (range, bearing, height) data for air intercept control and designation to a weapon system. The AN/SPS-49A(V)1 radar system is a long range, two dimensional (2-D), L-Band air surveillance radar installed on USN major combatants. The AN/SPY-4 Volume Search Radar (VSR) is an S-Band active phased array radar deployed on CVN 78 providing volume surveillance and air traffic control. EASR funding will develop a modern 3-D air search radar that addresses the latest requirements for Aviation and Amphibious Warfare Ships and closely conforms to existing combat system interfaces, as well as aligns with existing shipboard space, weight, and power limits. The architecture and acquisition strategy for EASR is intended to drive a lower recurring cost by utilizing the same core technology for both fixed-face and rotating array variants. EASR will provide for engineering of component and system level technology improvements for equipment used by in-service air search radars.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: SYSTEMS ENGINEERING - EASR	1.802	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2021 Plans: N/A					
FY 2022 Base Plans: N/A					
FY 2022 OCO Plans: N/A					
FY 2021 to FY 2022 Increase/Decrease Statement: Decrease due to funding for the EASR program ending in FY 2020.					
Title: PROGRAM MANAGEMENT SUPPORT - EASR	0.055	0.000	0.000	0.000	0.000
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3236 / *Advanced Radar Technology*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
FY 2021 Plans: N/A ***FY 2022 Base Plans:*** N/A ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Decrease due to funding for the EASR program ending in FY 2020.					
Accomplishments/Planned Programs Subtotals	1.857	0.000	0.000	0.000	0.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

Advanced Radar Technology (ART)/EASR: The EASR Acquisition is a planned competitive procurement based on a radar specification that incorporates the latest requirements for aviation and amphibious warfare ships, closely conforms to existing combat system interfaces, and includes physical Space Weight and Power (SWAP) Not-to-Exceed (NTE) interface requirements from:

- CVN 79+, LHA, LPD 29+ and FFG(X)
- CVN, LHA, LPD and LHD for back-fit

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*	Project (Number/Name) 3236 / *Advanced Radar Technology*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering - S2F	C/CPFF	Northrop Grumman - ES : Baltimore, MD	0.608	0.000		0.000		0.000		-		0.000	-	-	-
Systems Engineering - EASR	C/CPIF	EASR E&MD Contractor - Raytheon : Marlborough, MA	111.843	1.802	Nov 2019	0.000		0.000		-		0.000	-	-	-
Systems Engineering - EXI	SS/CPFF	Raytheon : Portsmouth, RI	1.910	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	114.361	1.802		0.000		0.000		-		0.000	-	-	N/A

Remarks

FY 2020 funding was prioritized from Warfare Centers/support contractors to Raytheon for Engineering and Manufacturing Development.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering - EASR	WR	NSWC/DD : Dahlgren, VA	15.335	0.000		0.000		0.000		-		0.000	-	-	-
Government Engineering - EASR	WR	NSWC/CR : Crane, IN	2.800	0.000		0.000		0.000		-		0.000	-	-	-
Government Engineering - EASR	WR	NSWC/PHD : Port Hueneme, CA	2.414	0.000		0.000		0.000		-		0.000	-	-	-
Government Engineering - EASR	WR	NSWC/ PHI : Philadelphia, PA	0.275	0.000		0.000		0.000		-		0.000	-	-	-
Government Engineering - EASR	WR	NRL : Washington, DC	1.513	0.000		0.000		0.000		-		0.000	-	-	-
Government Engineering - EASR	SS/CPFF	JHU/APL : Baltimore, MD	9.109	0.000		0.000		0.000		-		0.000	-	-	-
Government Engineering - EASR	WR	SCSC : Wallops Island, VA	0.232	0.000		0.000		0.000		-		0.000	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3236 / *Advanced Radar Technology*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering - EASR	WR	NSWC/CD : Bethesda, Maryland	0.526	0.000		0.000		0.000		-		0.000	-	-	-
Engineering Support - EASR	WR	NAVFAC : Washington, DC	4.698	0.000		0.000		0.000		-		0.000	-	-	-
Engineering Support - EASR	WR	NIWC : San Diego, CA	0.327	0.000		0.000		0.000		-		0.000	-	-	-
Engineering Support - EASR	C/CPIF	SPA : Washington, DC	3.419	0.000		0.000		0.000		-		0.000	-	-	-
Engineering Support - EASR	WR	CIVIL AIR PATROL : Montgomery, AL	0.056	0.000		0.000		0.000		-		0.000	-	-	-
Engineering Support - EASR	WR	NSWC/COR : Corona, CA	0.117	0.000		0.000		0.000		-		0.000	-	-	-
Engineering Support - EASR	WR	DOI : Boise, ID	0.509	0.000		0.000		0.000		-		0.000	-	-	-
Engineering Support - EASR	C/CPIF	SAIC : Andover, MA	0.033	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	41.363	0.000		0.000		0.000		-		0.000	-	-	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering - S2F	WR	NRL : Washington, DC	0.582	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	0.582	0.000		0.000		0.000		-		0.000	-	-	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3236 / *Advanced Radar Technology*

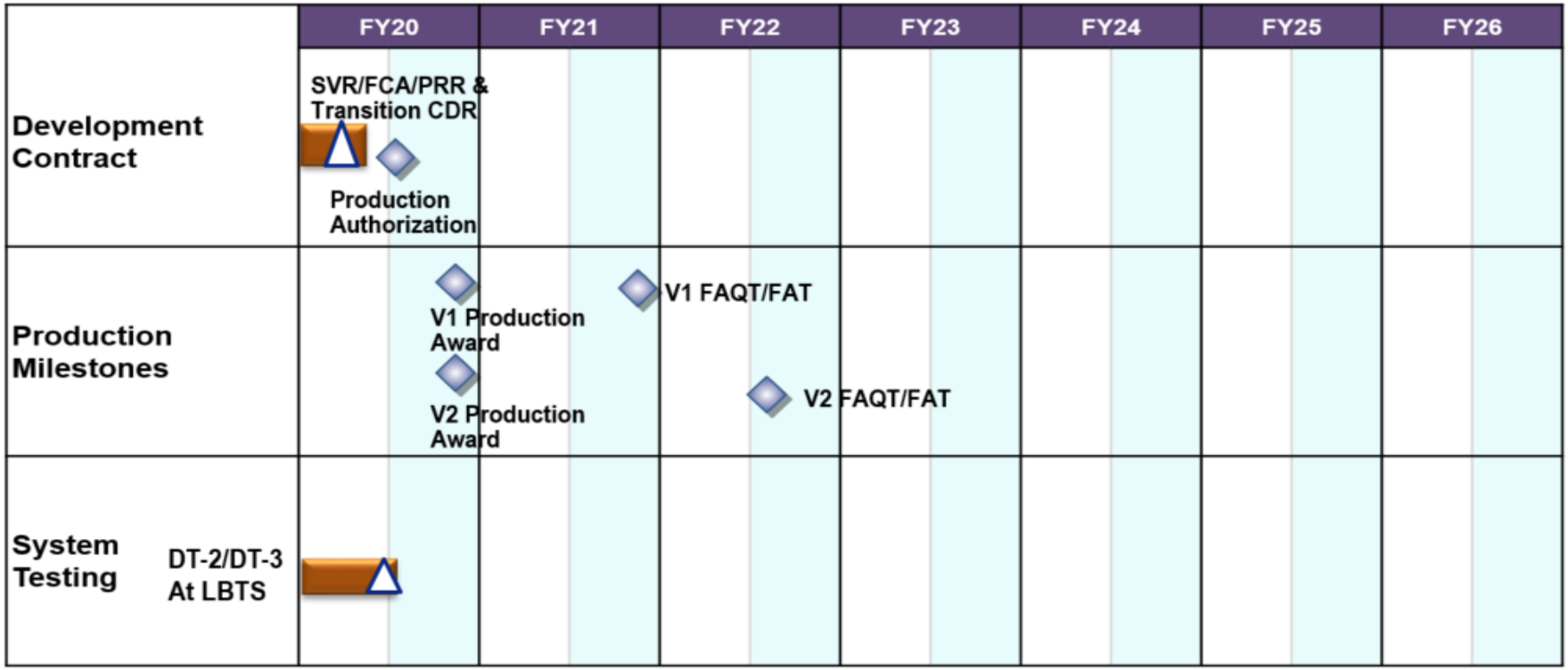
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Support Management Services	C/CPIF	SPA : Washington, DC	2.566	0.000		0.000		0.000		-		0.000	-	-	-
Travel	Allot	TRAVEL : Washington, DC	0.152	0.012	Sep 2020	0.000		0.000		-		0.000	-	-	-
Support Management Services	C/CPIF	CACI : Washington, DC	0.488	0.000		0.000		0.000		-		0.000	-	-	-
Support Management Services	SS/CPIF	SPA (Bridge) : Washington, DC	0.625	0.000		0.000		0.000		-		0.000	-	-	-
Support Management Services	C/CPIF	TMB : Washington, DC	0.639	0.000		0.000		0.000		-		0.000	-	-	-
Support Management Services	C/CPIF	STRATEGIC INSIGHT : Washington, DC	0.152	0.043	Jun 2020	0.000		0.000		-		0.000	-	-	-
Support Management Services	WR	NSWC/DD : Dahlgren, VA	1.081	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	5.703	0.055		0.000		0.000		-		0.000	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	162.009	1.857		0.000		0.000		-		0.000	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3236 / *Advanced Radar Technology*



CDR	Critical Design Review
DT	Developmental Testing
FAQT/FAT	First Article Qualification Test / Factory Acceptance Testing
LBTS	Land Based Test Site
SVR/FCA/PRR	System Verification Review / Functional Configuration Audit / Production Readiness Review

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3236 / *Advanced Radar Technology*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3236				
EASR System Verification Review (SVR)/Functional Configuration Audit (FCA)/ Production Readiness Review (PRR) EASR Transition CDR	1	2020	1	2020
EASR DT2/DT3	1	2020	2	2020
EASR Production Authorization	3	2020	3	2020
EASR V1 Production Award	4	2020	4	2020
EASR V2 Production Award	4	2020	4	2020
EASR V1 FAQT/FAT	4	2021	4	2021
EASR V2 FAQT/FAT	3	2022	3	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy											Date: May 2021	
Appropriation/Budget Activity 1319 / 5					R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*				Project (Number/Name) 3243 / *Shipboard Passive Electro-Optical Infrared Development*			
COST ($ in Millions)	**Prior Years**	**FY 2020**	**FY 2021**	**FY 2022 Base**	**FY 2022 OCO**	**FY 2022 Total**	**FY 2023**	**FY 2024**	**FY 2025**	**FY 2026**	**Cost To Complete**	**Total Cost**
3243: *Shipboard Passive Electro-Optical Infrared Development*	0.000	0.000	44.898	63.947	-	63.947	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Shipboard Passive Electro-Optical Infrared (SPEIR) Block I will be an open architecture system that addresses near-term capability requirements and associated gaps identified in the 2019 SPEIR Capability Development Document (CDD). This program answers an urgent counter unmanned aircraft system operational need for the Fleet to provide an initial capability by 2026. The SPEIR acquisition leverages technology developed under the Office of Naval Research's (ONR's) Combined EO/IR Surveillance and Response System (CESARS) Science and Technology (S&T) effort, specifically related to the Shipboard Panoramic EO/IR Cueing and Surveillance System (SPECSS).

SPEIR Block I will provide a common 360-degree EO/IR Electronic Support (ES) capability to surface ships that will passively find, fix, track, and target current / emerging threats in support of the following warfare missions: Anti-Ship Cruise Missile (ASCM) Defense, Counter-Unmanned Aircraft Systems (UAS), Counter-Fast Attack Craft / Fast In-shore Attack Craft (FAC/FIAC), and Mobility.

SPEIR Block I will consist of a passive Wide Field of View (WFOV) capability with a 360-degree field-of-view optical sensors for autonomous detection and tracking for 24/7 day/night shipboard situational awareness. SPEIR Block I will also include an enhanced, high resolution Narrow-Medium Field of View (NFOV) and laser range-finding capability that will provide 3D target tracking, identification, and threat assessment. SPEIR Block I will have limited integration with shipboard combat systems to exchange target track data and disseminate motion imagery.

This program includes risk reduction initiatives for modeling and simulation, sensor protection counter-countermeasures, Sensor Fusion Algorithms and combat system track publishing to enable limited Combat System Integration (CSI). SPEIR Block II will be a future program that will build on the modular open system architecture of Block I to address longer-term capability requirements to include an expanded spatial coverage envelope, Periscope Detection and Discrimination (PDD) and Mine Like Object (MLO) avoidance. SPEIR Block II will also provide full combat system integration and will include a government software development and integration effort for Soft-Kill Coordination System (SKCS) to manage ES engagements.

FY 2022 budget request of $63.947M provides for the first year of Engineering and Manufacturing Development (E&MD) efforts by the SPEIR prime contractor. This will include execution of System Requirements Review/System Functional Review (SRR/SFR) and Preliminary Design Review (PDR) as well as procurement of long lead material for Engineering Development Model (EDM) manufacturing. Other FY 2022 efforts will include continued development of the test and training programs required to verify and field a wholly new capability to the Fleet, as well as engineering efforts for ship and combat system integration to fully define related requirements and interfaces. Due to new start program delay in FY 2021, major prime contract award projection slipped from FY 2021 to FY 2022. To mitigate the delay, funding

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3243 / *Shipboard Passive Electro-Optical Infrared Development*

allocations were rebalanced between performers to accelerate Government Systems Engineering and Modeling & Simulation efforts to FY 2021 where technically feasible in order to maintain planned Initial Operating Capability of FY 2026.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: SPEIR Block I Systems Engineering	0.000	36.788	14.890	0.000	14.890
Articles:	-	-	-	-	-
FY 2021 Plans: - Conduct Milestone (MS) B preparation and execution - Commence training curriculum development - Commence test planning - Commence test program Modeling and Simulation (M&S) development and maturation - Commence procurement of M&S equipment - Commence development of Modular Open Systems Architecture Testbed - Commence large-scale imagery collection efforts to support machine learning capabilities - Commence development of optimized EO/IR displays - Commence integrated topside design activities with multiple ship classes - Support integration activities to ensure compatibility with AEGIS and SSDS Combat Systems - Commence sensor fusion risk mitigation effort - Commence track publishing risk mitigation effort					
FY 2022 Base Plans: - Award Engineering & Manufacturing Development Contract - Commence support of Engineering Development Model (EDM) hardware and software development and integration - Review and assess contract deliverables - Conduct preparation and support for Integrated Baseline Review (IBR) - Conduct preparation and support for System Requirements Review (SRR)/System Functional Review (SFR) - Conduct preparation and support for Preliminary Design Review (PDR) - Commence preparation for Critical Design Review (CDR) - Continue development of training curriculum - Continue test planning - Continue test program Modeling and Simulation (M&S) development and maturation					
FY 2022 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
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B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Systems engineering decreases from FY 2021 to FY 2022 due to the completion of MS B as well as the acceleration of Government risk reduction and M&S tasks to FY 2021 to mitigate impact of program new start delay to maintain IOC of FY 2026.					
Title: SPEIR Block I Development ***Articles:*** ***FY 2021 Plans:*** - Commence Engineering & Manufacturing Development (E&MD) design activities - Commence integrated topside design activities for DDG 51 class - Commence integration activities to ensure compatibility with AEGIS and SSDS Combat Systems ***FY 2022 Base Plans:*** - Continue Engineering & Manufacturing Development (E&MD) design activities - Prepare for and conduct Integrated Baseline Review (IBR) - Prepare for and conduct System Requirements Review/System Functional Review (SRR/SFR) - Prepare for and conduct Preliminary Design Review (PDR) - Prepare for Critical Design Review (CDR) - Continue integrated topside design activities for DDG 51 class - Continue integration activities to ensure compatibility with AEGIS and SSDS Combat Systems - Commence purchase of Long Lead Material items for up to three (3) Engineering Development Model (EDM) builds ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Increase in FY 2022 funding is required to support first year of E&MD contract execution, including procurement of Long Lead Materials for EDMs. Despite contract award shift to Q1 FY 2022, initial award funding is required in FY 2021 due to requirement to have financial accounting information submitted with the Business Clearance Memo 60 days prior to execution of competitive contract award.	0.000 -	8.110 -	49.057 -	0.000 -	49.057 -
Accomplishments/Planned Programs Subtotals	0.000	44.898	63.947	0.000	63.947

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3243 / *Shipboard Passive Electro-Optical Infrared Development*

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• PE/LI: *OPN/2980: SPEIR Block I*	0.000	0.000	0.000	-	0.000	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

SPEIR will develop initial capability and required upgrades based on integrating technology advances and adding functional capabilities in an evolutionary fashion. Each Block acquisition program will be developed and contracted in an individual yet coordinated and overlapping fashion. Specifically, SPEIR involves the work performed under the CESARS program sponsored by ONR and transitioning the passive EO/IR component (SPECSS) which focuses on designing/architecting an advanced, integrated, EO/IR WFOV surveillance capability system for Naval Surface Platforms. After completion of Milestone B, the SPEIR program will utilize a full and open competition to award a cost plus fixed fee contract for Engineering and Manufacturing Development (E&MD) in FY 2022. This competitive contract will also include fixed price incentive fee options for future procurement of Low Rate Initial Production (LRIP) units following Milestone C planned for FY 2025. The initial E&MD contract will include the procurement of a production-level Technical Data Package (TDP) to support full and open competition for future procurement of additional LRIP and Full Rate Production (FRP) units.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*	Project (Number/Name) 3243 / *Shipboard Passive Electro-Optical Infrared Development*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SPEIR Block 1 Development	C/CPIF	TBD : TBD	0.000	0.000		8.110	Oct 2021	49.057	Jan 2022	-		49.057	-	-	-
		Subtotal	0.000	0.000		8.110		49.057		-		49.057	-	-	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SPEIR Block I Integrated Logistics Support	WR	NSWC Crane : Crane, IN	0.000	0.000		1.800	Jan 2021	0.750	Nov 2021	-		0.750	-	-	-
SPEIR Block I Systems Engineering Support	WR	NSWC Crane : Crane, IN	0.000	0.000		4.400	Jan 2021	2.478	Nov 2021	-		2.478	-	-	-
SPEIR Block I Systems Engineering Support	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.800	Mar 2021	0.600	Nov 2021	-		0.600	-	-	-
SPEIR Block I Systems Engineering Support	WR	NRL : Washington, DC	0.000	0.000		3.200	Feb 2021	1.230	Nov 2021	-		1.230	-	-	-
SPEIR Block I Systems Engineering Support	SS/CPFF	APL : Laurel, MD	0.000	0.000		2.800	Apr 2021	1.800	Nov 2021	-		1.800	-	-	-
SPEIR Block I Systems Engineering Support	MIPR	MIT-LL : Cambridge, MA	0.000	0.000		1.375	Mar 2021	0.600	Nov 2021	-		0.600	-	-	-
SPEIR Block I Platform Integration Studies	C/BA	BIW : Bath, ME	0.000	0.000		0.600	Jul 2021	0.300	Nov 2021	-		0.300	-	-	-
SPEIR Sensor Fusion	MIPR	GTRI : Atlanta, GA	0.000	0.000		0.390	Aug 2021	0.250	Nov 2021	-		0.250	-	-	-
SPEIR Sensor Fusion	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.450	Mar 2021	0.230	Nov 2021	-		0.230	-	-	-
SPEIR Sensor Fusion	SS/CPFF	APL : Laurel, MD	0.000	0.000		1.750	Mar 2021	0.500	Nov 2021	-		0.500	-	-	-
SPEIR Sensor Fusion	WR	NSWC Crane : Crane, IN	0.000	0.000		2.500	Jan 2021	0.900	Nov 2021	-		0.900	-	-	-
SPEIR Track Publishing	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		1.650	Mar 2021	0.500	Nov 2021	-		0.500	-	-	-
SPEIR Track Publishing	SS/CPFF	APL : Laurel, MD	0.000	0.000		0.750	Apr 2021	0.500	Nov 2021	-		0.500	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
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Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
		Subtotal	0.000	0.000		22.465		10.638		-		10.638	-	-	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SPEIR Block I Test Planning/T&E Events	WR	NSWC Crane : Crane, IN	0.000	0.000		2.790	Jan 2021	1.300	Nov 2021	-		1.300	-	-	-
SPEIR Block I Test Planning/T&E Events	WR	NRL : Washington, DC	0.000	0.000		6.008	Feb 2021	0.900	Nov 2021	-		0.900	-	-	-
SPEIR Block I Test Planning/T&E Events	SS/CPFF	APL : Laurel, MD	0.000	0.000		1.750	Apr 2021	0.600	Nov 2021	-		0.600	-	-	-
SPEIR Block I Test Planning/T&E Events	WR	COMOPTEVFOR : Norfolk, VA	0.000	0.000		0.200	Jul 2021	0.152	Dec 2021	-		0.152	-	-	-
		Subtotal	0.000	0.000		10.748		2.952		-		2.952	-	-	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SPEIR Block I Program Management	C/CPFF	SPA ESS (SEAPORT) : Washington, DC	0.000	0.000		1.500	Mar 2021	0.500	Nov 2021	-		0.500	-	-	-
SPEIR Block I Program Management	C/CPFF	TMB BFM (SEAPORT) : Washington, DC	0.000	0.000		1.500	Jul 2021	0.500	Nov 2021	-		0.500	-	-	-
SPEIR Block I Program Management	C/CPFF	BAH (ILS SEAPORT) : Washington, DC	0.000	0.000		0.500	Aug 2021	0.250	Nov 2021	-		0.250	-	-	-
SPEIR Block I Program Management	Sub Allot	NAVSEA Travel : Washington, DC	0.000	0.000		0.075	May 2021	0.050	Oct 2021	-		0.050	-	-	-
		Subtotal	0.000	0.000		3.575		1.300		-		1.300	-	-	N/A

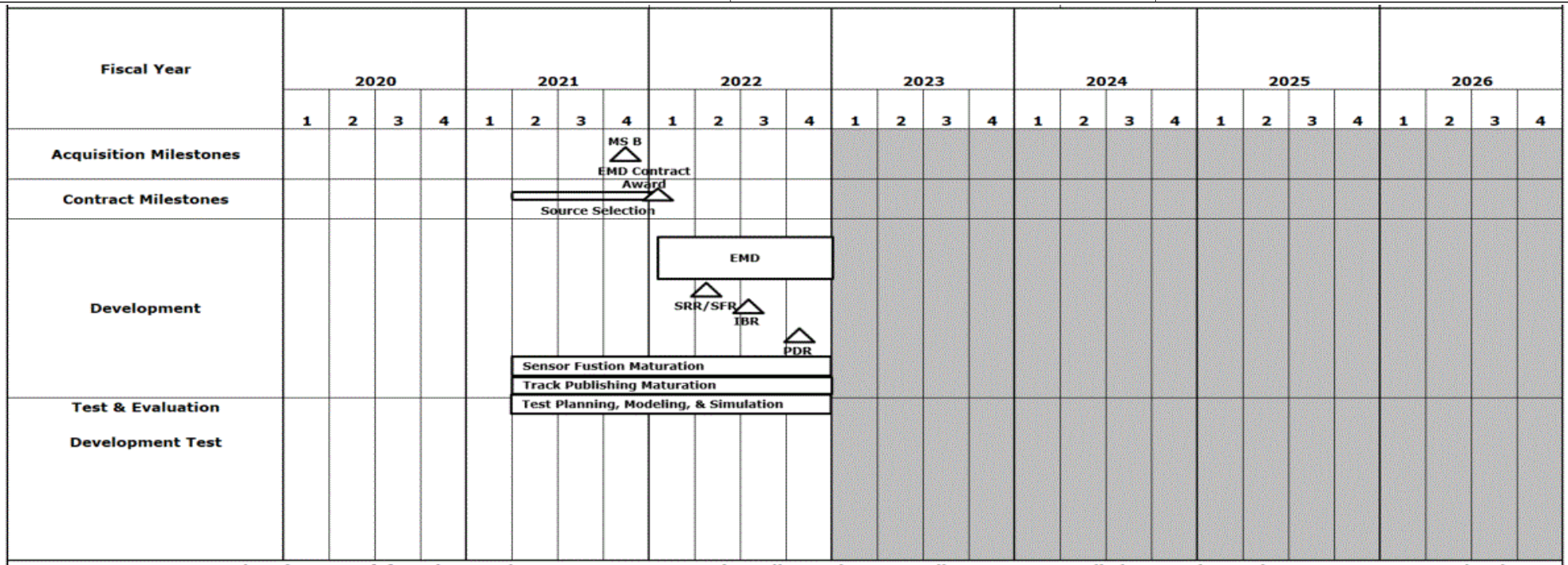
Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3243 / *Shipboard Passive Electro-Optical Infrared Development*

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	0.000		44.898		63.947		-		63.947	-	-	N/A

Remarks

In order to maintain program IOC in FY 2026, Government efforts for Support and Test and Evaluation are being realigned to FY 2021 where feasible for risk reduction and to support allocation for additional FY 2022 funding to prime contract development. This results in the increase in FY 2021 Support and Test and Evaluation requirements in PB22 relative to FY 2021. Due to the challenges in re-creating required environmental conditions for EO/IR systems in a test environment, significant M&S development is required to ensure models can be verified, validated, and accredited for the SPEIR program in support of the overall T&E plan. Additionally, NRL will execute two test and data collection events in FY 2021 with Future Naval Capability (FNC) prototype equipment to build threat models in the EO and IR spectrums and begin populating an image library that will be necessary for machine learning algorithm development to perform automatic target recognition Reduction in FY 2021 Product Development requirement in PB22 relative to FY 2021 is due to delay in prime contract award from Q3 FY 2021 to Q1 FY 2022 as result of delayed program start in FY 2021. Despite contract award in Q1 FY 2022, initial award funding is required in FY 2021 due to requirement to have financial accounting information submitted with the Business Clearance Memo 60 days prior to execution of competitive contract award. Increase in FY 2022 Product Development relative to FY 2021 is due to a full year of contract execution to include two major Systems Engineering Technical Reviews (SETRs). Increase in FY21 Program Management requirement in PB22 relative to FY 2021 is a result of surge support to shorten source selection and execution of Milestone B to maintain overall program schedule after delayed program start in FY 2021. Decrease in Support, Test and Evaluation, and Program Management in FY 2022 relative to FY 2021 is due to a combination of efforts being pulled forward to FY 2021 where feasible and the lack of surge support needed in FY 2022 once program schedule has been re-gained.

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3243 / *Shipboard Passive Electro-Optical Infrared Development*



Acronyms: CDR - EMD - Engineering & Manufacturing Development; IBR - Integrated Baseline Review; MS - Milestone; PDR - Preliminary Design Review; SFR - System Functional Review; SRR - System Requirements Review

Changes from PB21: Reduction of FY22 budget from $65.0M to $44.9M resulted in the extension of the E&MD period by ~9 months. Delay in start of program in FY21 due to status as a new start results in delay of EMD contract award to FY22 from planned FY21 baseline.

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3243 / *Shipboard Passive Electro-Optical Infrared Development*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3243				
Sensor Fusion Maturation	2	2021	4	2022
Track Publishing Maturation	2	2021	4	2022
Test Planning, Modeling & Simulation	2	2021	4	2022
Milestone B	4	2021	4	2021
E&MD Contract Award	1	2022	1	2022
Engineering & Manufacturing Development (E&MD)	1	2022	4	2022
System Requirements Review/System Functional Review (SRR/SFR)	2	2022	2	2022
Integrated Baseline Review (IBR)	3	2022	3	2022
Preliminary Design Review (PDR)	4	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*	Project (Number/Name) 3301 / *Improved Capabilities SPY-1 Radar*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
3301: *Improved Capabilities SPY-1 Radar*	43.321	9.002	11.189	9.976	-	9.976	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Improved Capabilities for SPY-1 Radar: These Reliability, Maintainability, and Availability (RM&A) improvements and solid state technology insertions are intended to reduce cascading failures, mitigate obsolescence issues, and improve reliability in support of Anti-Air Warfare (AAW) and Ballistic Missile Defense (BMD) missions while still providing AN/ SPY-1 Radar Total Ownership Cost Reductions. Improvements, such as Solid State Insertion to address Diminishing Manufacturing Sources and Material Shortages (DMSMS), will yield reductions in annual fleet maintenance costs and is a top fleet requirement as part of the AEGIS Wholeness initiative. In addition to RM&A improvements, warfighting improvements funded in this line include: Transmitter Noise Cancellation (TNC) development will include hardware/software to counter low radar cross section, low altitude threats. Side Lobe Blanking (SLB) addresses shortfalls in mixed electronic attack environment while in an Integrated Air and Missile Defense (IAMD) mode. The Ship-Based Non-Cooperative Target Recognition (SBNCTR) program Phases 2, 2A and 3 will develop algorithms to provide classification for targets. Transition of Advanced Calibration Experiment (ACE) Phases 1 and 2 from Baseline 7 into Baseline 9. Incorporate ERACE Phases 1/2 and 3 into Baseline 9. Electronic Attack (EA) and Rapid Radar Capability Improvement Program (R2CIP) develop solutions for evolving EA threats. Due to funding reductions since FY 2021, some efforts have shifted to a later FY across the FYDP.

FY 2022 funding includes start of ACE Phase 2, and the continuation of development efforts of SBNCTR Phase 2A, TNC phase 1 & 2, EA improvements, Solid State Insertion and Elevated Radar Advanced Calibration Experiment (ERACE) Phase 1/2.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: Improved Capabilities SPY-1 Radar	9.002	11.189	9.976	0.000	9.976
Articles:	-	-	-	-	-
FY 2021 Plans:					
- Conduct ACE Phase 1 Certification Baseline 9					
- Continue SBNCTR Phase 2A development to include integration of other sensors and threats					
- Conduct SBNCTR Phase 2A In Process Review (IPR) #3					
- Conduct TNC Phase 1 regression testing					
- Conduct TNC Phase 2 requirements definition					
- Continue EA improvements technology development, integration and test					
- Continue Radar Improvements Analysis					
- Commence digital Low Noise Amplifier (dLNA) requirements and specification analysis					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3301 / *Improved Capabilities SPY-1 Radar*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Continue ERACE Phase 1/2 development ***FY 2022 Base Plans:*** - Continue SBNCTR Phase 2A development to include integration of other sensors and threats - Conduct SBNCTR Phase 2A integration and test - Conduct TNC Phase 2 IPR #1 - Conduct ERACE Phase 1/2 FLEX Event to test multiple sensors in an at-sea operational environment - Commence Side Lobe Blanking (SLB) requirements analysis and specifications - Continue EA improvements technology development, integration and test - Continue Radar Improvements Analysis - Complete digital Low Noise Amplifier (dLNA) requirements and specification analysis - Continue ERACE Phase 1/2 development ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** Due to FY 2022 funding reduction, ACE Phase 2 Requirements Definition and TNC Phase 1 I&T moved to FY 2023.					
Accomplishments/Planned Programs Subtotals	9.002	11.189	9.976	0.000	9.976

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
• O&MN/1C1C/0702228N: *O&M,N AEGIS Wholeness SPY Transmitter Reliability*	4.328	4.102	4.217	-	4.217	-	-	-	-	-	-
• OPN/2980: *OPN SPY-1 RM&A IMPROVEMENTS*	36.768	28.152	15.667	-	15.667	-	-	-	-	-	-

Remarks

D. Acquisition Strategy

Improved Capabilities SPY-1 Reliability, Maintainability, and Availability (RM&A) will design and develop an Ordnance Alterations (ORDALT) Package for fixes and modifications to known transmitter, signal processor, microwave tube (MWT), and logistic shortcomings. Lockheed Martin Corporation (Moorestown, New Jersey) was

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3301 / *Improved Capabilities SPY-1 Radar*

awarded a Cost Plus Incentive Fee (CPIF) contract effective on Sep 16, 2016 and expires July 16, 2022. The contract supports the development and fielding of the AEGIS Baseline 9 AEGIS weapon system (includes SPY-1 Radar) and integrated AEGIS combat system. These efforts are slated to continue under a sole source, cost-plus-fixed-fee, level-of-effort job order under a Basic Ordering Agreement (BOA) via NSWC Crane in support of the AEGIS weapons system, AN/SPY-1 radar. The current period of performance on the BOA is through August 2023 and will continue under a follow-on BOA. Investment in development of SPY-1 RM&A improvements to address failure mechanisms and improve reliability is planned to continue beyond the FYDP. Radar capability upgrades (SBNCTR, TNC, ACE and ERACE) and reliability improvements will be incorporated into Baseline 9 and follow.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*	Project (Number/Name) 3301 / *Improved Capabilities SPY-1 Radar*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SYSTEM ENGINEERING	MIPR	Office of Naval Research : Arlington, VA	1.000	0.000		0.000		0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	C/CPFF	Raytheon : Sudbury, MA	1.941	0.000		0.000		0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	WR	NSWC/Crane, IN : Crane, IN	15.041	2.020	Oct 2019	2.178	Jan 2021	6.794	Nov 2021	-		6.794	-	-	-
SYSTEM ENGINEERING	SS/CPFF	Lockheed Martin : Moorestown, NJ	14.860	3.709	Dec 2019	5.536	Dec 2020	0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	SS/CPFF	AEGIS Techrep : Moorestown, NJ	0.842	0.222	Mar 2020	0.198	Jan 2021	0.222	Dec 2021	-		0.222	-	-	-
SYSTEM ENGINEERING	SS/FP	APL/JHU : Laurel, MD	1.200	0.410	Dec 2019	0.300	Feb 2021	0.400	Nov 2021	-		0.400	-	-	-
SYSTEM ENGINEERING	WR	CSCS : Dahlgren, VA	0.420	0.190	Oct 2019	0.110	Jan 2021	0.062	Nov 2021	-		0.062	-	-	-
SYSTEM ENGINEERING	WR	NRL : Washington, DC	0.938	0.404	Nov 2019	0.396	Jan 2021	0.404	Nov 2021	-		0.404	-	-	-
SYSTEM ENGINEERING	MIPR	MIT/LL : Lexington, MA	1.104	0.315	Mar 2020	0.315	Jan 2021	0.450	Feb 2022	-		0.450	-	-	-
SYSTEM ENGINEERING	WR	NSWC DD : Dahlgren, VA	3.943	1.225	Oct 2019	1.505	Nov 2020	1.152	Nov 2021	-		1.152	-	-	-
SYSTEM ENGINEERING	WR	NSWC/PHD : Port Hueneme, CA	0.453	0.237	Oct 2019	0.291	Nov 2020	0.132	Nov 2021	-		0.132	-	-	-
SYSTEM ENGINEERING	MIPR	DTIC : Fort Belvior, VA	0.284	0.000		0.000		0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	WR	SCSC Wallops : Wallops Island, VA	0.032	0.000		0.000		0.000		-		0.000	-	-	-
SYSTEM ENGINEERING	C/FFP	Raytheon : Waltham, MA	0.000	0.000		0.000		0.090	Nov 2021	-		0.090	-	-	-
SYSTEM ENGINEERING	WR	NSWC/IH : Indian Head, MD	0.000	0.000		0.090	Feb 2021	0.000		-		0.000	-	-	-
		Subtotal	42.058	8.732		10.919		9.706		-		9.706	-	-	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*	Project (Number/Name) 3301 / *Improved Capabilities SPY-1 Radar*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract

Remarks

1) Since FY 2021, $2.9M was reallocated in FY 2020 from SPY-1 (Project 3301) to MMSP (Project 3232) due to increase in Lockheed Martin funding requirement for completion of MMSP-R Engineering Test and Evaluation (ET&E). In addition, $1.2M was reduced from Project 3301 for SB realignment and to support other Navy requirements.
2) At PB21, Lockheed Martin had no funding allocated under the IWS 1.0 contract. Due to a PEO IWS 1.0 contract ceiling increase, funding will now remain on the IWS 1.0 contract vehicle through 2021. Lockheed Martin funding is transitioning from the PEO IWS 1.0 contract to NSWC Crane in FY22.
3) Raytheon support of ERACE FLEX Testing moved from FY21 to FY22. NSWC Indian Head added to support SCSC Wallops ERACE testing in FY21.

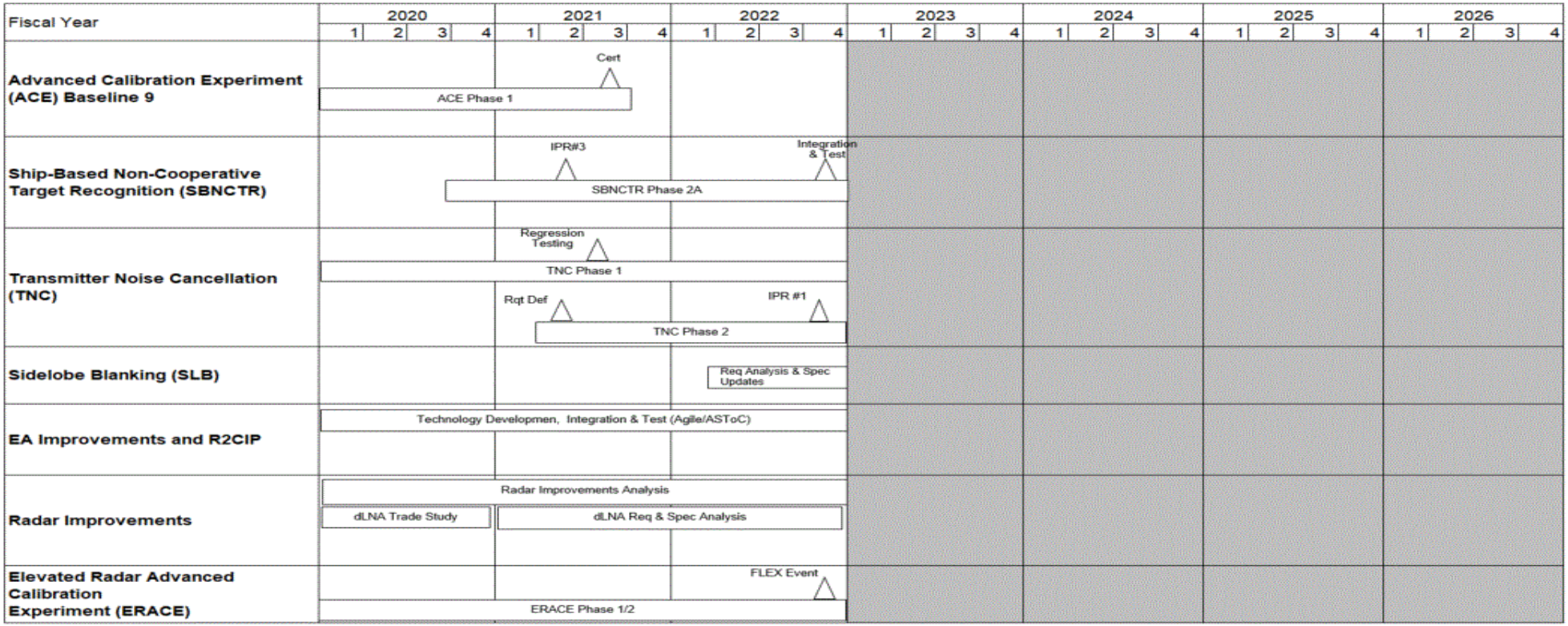
Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Travel	Allot	PEOIWS2 : Washington, DC	0.039	0.020	Oct 2019	0.020	Jan 2021	0.020	Jan 2022	-		0.020	-	-	-
Support Management Services	C/CPIF	SPA : Washington, DC	1.043	0.250	Feb 2020	0.250	Dec 2020	0.250	Nov 2021	-		0.250	-	-	-
Support Management Services	SS/CPIF	SPA (Bridge) : Washington, DC	0.181	0.000		0.000		0.000		-		0.000	-	-	-
		Subtotal	1.263	0.270		0.270		0.270		-		0.270	-	-	N/A

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	43.321	9.002		11.189		9.976		-		9.976	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3301 / *Improved Capabilities SPY-1 Radar*



SBNCTR PHASE 3, SLB, EA Improvements and R2CIP, Radar Improvements and ERACE Phase 3 continue beyond the FYDP.
ACE Phase I Cert shifted to the right 2 QTRs to align with BL 9.2.2. cert and dLNA Requirement and Specification Analysis shifted to the right 2 QTRs to align with anticipated POM 23 funding.
ERACE is targeted to be part of a future capability build. Historically, Radar Improvement efforts focused on transmitter upgrades. Scope has expanded to include Signal Processor and Antenna groups as well as transmitter group. The GAN efforts are included in the overall scope.

Acronyms:
ASToC: AEGIS Speed to Capability
dLNA: digital Low Noise Amplifier (previously DRE)
EA: Electronic Attack
ERACE: Elevated Radar ACE
FLEX: Fleet Exercise
IPR: In-Process Review
R2CIP: Rapid Radar Capability Improvement Program

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3301 / *Improved Capabilities SPY-1 Radar*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3301				
ACE Phase 1 Development	1	2020	3	2021
EA Improvements and R2CIP Technology Development, Integration & Test	1	2020	4	2022
Radar Improvements Analysis	1	2020	4	2022
digital Low Noise Amplifier (dLNA) Trade Study	1	2020	4	2020
digital Low Noise Amplifier (dLNA) Requirements & Specification Analysis	1	2021	4	2022
TNC Phase 2 Requirements Definition	2	2021	2	2021
SBNCTR Phase 2A IPR #3	2	2021	2	2021
ACE Phase 1 Certification	3	2021	3	2021
TNC Phase 1 Regression Testing	3	2021	3	2021
SLB Requirements Analysis and Specification	1	2022	4	2022
SBNCTR Phase 2A Integration & Test	4	2022	4	2022
TNC Phase 2 IPR #1	4	2022	4	2022
ERACE Phase 1/2 Flex Event	4	2022	4	2022

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy			Date: May 2021
Appropriation/Budget Activity 1319 / 5	R-1 Program Element (Number/Name) PE 0604501N / *Advanced Above Water Sensors*	Project (Number/Name) 3408 / *AN/SPS-49 Technical Refresh*	

COST ($ in Millions)	Prior Years	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total	FY 2023	FY 2024	FY 2025	FY 2026	Cost To Complete	Total Cost
3408: *AN/SPS-49 Technical Refresh*	0.000	12.611	8.060	0.962	-	0.962	-	-	-	-	-	-
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

AN/SPS-49 is the only Air Surveillance Radar on the LSD 41/49 class ships. Continued degradation and increasingly low radar availability of the AN/SPS-49 Radar is greatly impacting deployed missions, impacting safety of flight and affecting LSD Air Warfare capability and operations and as a result AN/SPS-49 Technology Refresh is required. This AN/SPS-49 Technology Refresh will include Reliability, Maintainability, and Availability (RM&A) improvements and solid state technology insertions which will reduce cascading failures and mitigate obsolescence issues. In addition, this effort replaces key components to include: transmitter, receiver, exciter, antenna elevation servo control, radar system control, display and signal data processor (SDP). A digital receiver/exciter (DREX) with high-performance computing technology will be a key component in the new system. The current SPS-49 radar has no software so new software is being developed to mimic the current radar functions to maintain compatibility with internal and external interfaces. This effort will improve SPS-49 electronic protection, have increased surveillance range and increased slow moving small target detection, as well as reduce total ownership cost with lower unit cost and smaller size/weight/power requirements. Funding is also to complete development, test and evaluation, validation and integration of a technology refresh of the below deck hardware for the AN/SPS-49A(V)1 Long Range Air Surveillance Radar.

FY 2022 funding is to complete subsystem integration, test, evaluation and validation on a prototype radar for the technology refresh of the below deck hardware for the AN/SPS-49A(V)1 Long Range Air Surveillance Radar.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
Title: AN/SPS-49 Technology Refresh	12.611	8.060	0.962	0.000	0.962
Articles:	-	-	-	-	-
FY 2021 Plans: - Conduct Critical Design Review (CDR) - Receive prototype Build of Material (BOM) - Begin installing for integration tests at NRL and Crane - Commence Test Readiness Reviews as required for integration testing - Build prototype to begin validating models - Begin developing training support plan - Continue collection of Reliability, Availability and Maintainability data - Continue development of provisioning technical data - Kick off Test Readiness Reviews (TRRs)					

Exhibit R-2A, RDT&E Project Justification: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3408 / *AN/SPS-49 Technical Refresh*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2020	FY 2021	FY 2022 Base	FY 2022 OCO	FY 2022 Total
- Begin integration of DREX with Signal Data Processor (SDP) and transmitter designs ***FY 2022 Base Plans:*** - Complete integration of DREX with Signal Data Processor (SDP) and transmitter designs - Complete TRR - Receive prototype delivery ***FY 2022 OCO Plans:*** N/A ***FY 2021 to FY 2022 Increase/Decrease Statement:*** FY 2022 decrease is due to completion of integration, testing and receipt of prototype.					
Accomplishments/Planned Programs Subtotals	12.611	8.060	0.962	0.000	0.962

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

To accomplish the SPS-49 Tech Refresh, the Navy is leveraging an Other Transactional Authority (OTA) contract for Industrial Base Analysis and Sustainment Program (IBAS) Radar Systems Should Cost Model/Prototypes for Defense Affordability and Industrial Base Resiliency awarded by OSD in Q4 FY 2018.

Early start development of technologies funded using Small Business Innovative Research (SBIR), Rapid Insertion Funds (RIF), Technology Insertion Funds (TIF) and OSD's Industrial Base Analysis and Sustainment (IBAS) programs will be integrated to provide a below deck technology refresh of the AN/SPS-49 Long Range Air Surveillance Radar. Funds will be used to perform Initial Technical Review, Analysis of Alternatives, System Requirements Review, System Functional Review, Preliminary Design Review and Critical Design Review.

Funding for the OTA contract is required to complete subsystem development to include transmitter, receiver/exciter, processor and antenna control unit, integration of the subsystems, and integration with the legacy radar including the antenna, conduct test readiness reviews, full system test and evaluation for factory acceptance, and delivery of two Engineering Development Models (EDMs).

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3408 / *AN/SPS-49 Technical Refresh*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
System Engineering	MIPR	Army : Picatinny, NJ	0.000	12.585	Apr 2020	5.738	May 2021	0.000		-		0.000	-	-	-
		Subtotal	0.000	12.585		5.738		0.000		-		0.000	-	-	N/A

Remarks

Since PB21, FY20 funds were reduced due to SBIR reductions. In addition, decrease in FY21 funding is due to contract being fully funded and completion of critical design review, resulting in requirement of government engineering and support services to oversee test events, review technical data packages and validate prototype design.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering	WR	NRL : Washington, DC	0.000	0.000		0.300	Nov 2020	0.150	Oct 2021	-		0.150	-	-	-
Government Engineering	WR	NSWC/Crane : Crane. IN	0.000	0.000		0.600	Nov 2020	0.205	Oct 2021	-		0.205	-	-	-
Government Engineering	WR	NSWC/PHD : Port Hueneme, CA	0.000	0.000		0.045	Nov 2020	0.050	Oct 2021	-		0.050	-	-	-
Government Engineering	WR	NSWC/CD : Bethesda, MD	0.000	0.000		0.060	Nov 2020	0.030	Oct 2021	-		0.030	-	-	-
		Subtotal	0.000	0.000		1.005		0.435		-		0.435	-	-	N/A

Remarks

FY21/22 Government Engineering funding is to oversee review of technical data packages and validate prototype design.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering	WR	NRL : Washington, DC	0.000	0.000		0.680	Oct 2020	0.156	Oct 2021	-		0.156	-	-	-
Government Engineering	WR	NSWC/Crane : Crane. IN	0.000	0.000		0.522	Oct 2020	0.271	Oct 2021	-		0.271	-	-	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3408 / *AN/SPS-49 Technical Refresh*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Government Engineering	WR	NSWC/PHD : Port Hueneme, CA	0.000	0.000		0.100	Oct 2020	0.050	Oct 2021	-		0.050	-	-	-
		Subtotal	0.000	0.000		1.302		0.477		-		0.477	-	-	N/A

Remarks

FY21/22 funding is for government engineering services to support test events.

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2020 Cost	FY 2020 Award Date	FY 2021 Cost	FY 2021 Award Date	FY 2022 Base Cost	FY 2022 Base Award Date	FY 2022 OCO Cost	FY 2022 OCO Award Date	FY 2022 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPIF	DTI : Washington, DC	0.000	0.026	May 2020	0.015	Jul 2021	0.050	Nov 2021	-		0.050	-	-	-
		Subtotal	0.000	0.026		0.015		0.050		-		0.050	-	-	N/A

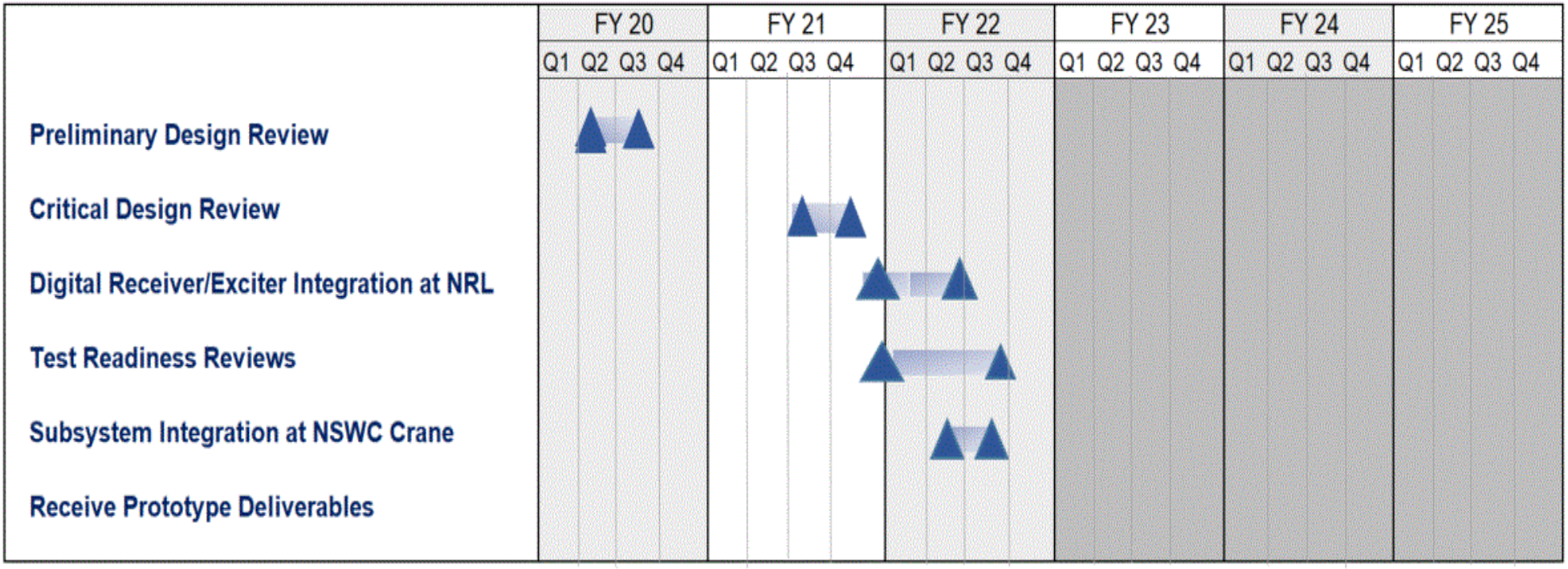
Remarks

FY21/22 Program Management funding is to assist with overseeing review of technical data packages and validate prototype design.

	Prior Years	FY 2020		FY 2021		FY 2022 Base		FY 2022 OCO		FY 2022 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	0.000	12.611		8.060		0.962		-		0.962	-	-	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3408 / *AN/SPS-49 Technical Refresh*



Contract Pop Aug 2023

Budget profile capitalizes on early development contracts funded by Small Business Innovation Research (SBIR), Rapid Innovation Funds (RIF), OSD Industrial Base Analysis and Sustainment (IBAS) Programs.

Exhibit R-4A, RDT&E Schedule Details: PB 2022 Navy		Date: May 2021
Appropriation/Budget Activity 1319 / 5	**R-1 Program Element (Number/Name)** PE 0604501N / *Advanced Above Water Sensors*	**Project (Number/Name)** 3408 / *AN/SPS-49 Technical Refresh*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3408				
Preliminary Design Review (PDR)	2	2020	3	2020
Critical Design Review (CDR)	3	2021	4	2021
Digital Receiver/Exciter Integration/Test at NRL	4	2021	3	2022
Test Readiness Reviews (TRR)	4	2021	4	2022
System/Subsystem Integration Testing at NSWC Crane	2	2022	3	2022