Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy											Date: March 2019	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*					R-1 Program Element (Number/Name) PE 0205620N *I Surface ASW Cmbt Sys Integr*							
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
Total Program Element	263.743	28.410	26.321	29.572	-	29.572	29.323	29.876	30.474	31.080	Continuing	Continuing
1916: *Surface ASW System Improvement*	263.743	28.410	26.321	29.572	-	29.572	29.323	29.876	30.474	31.080	Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this Program Element (PE) is to significantly improve existing Surface Ship Undersea Warfare (USW) sonar system capabilities through quick and affordable development/integration of emergent, transformational technologies in support of Littoral Anti-Submarine Warfare (ASW), Theater ASW (TASW), and overall efforts required to pace the threat. Detection and classification play uniquely vital roles in the success of any ASW campaign. The Advanced Capability Build (ACB) spiral development process is the primary means by which these USW improvements are developed.

USW remains a Navy core competency in a dynamic and uncertain maritime environment. U.S. adversaries continue to develop asymmetric capabilities and capacities to deter, disrupt, or delay the entry of U.S. and allied naval forces, and pose a constant challenge as we implement the Maritime Strategy. Evolving submarine technologies offer enhanced stealth, speed, endurance, weapons, and operational proficiency, foretelling that the adversary submarine of the future will have a significantly larger sphere of influence, while presenting less vulnerability to USW forces. The effective offensive engagement range of the adversary submarine of the future will continue to match or outrange individual U.S. and multinational platform sensors and weapons in many tactical environments. Submarines are an increasing threat to all Naval and Allied ships, particularly modern diesel subs and faster torpedoes. Not only can the presence of potential hostile submarines delay naval combatant action until they are located and neutralized, submarines can also disrupt all seaborne logistics supply for any ground campaign as well as maritime commerce. USW forces must be effective in all operating environments, ranging from the deep open ocean to the littorals, and are key to countering adversarial anti-access and area denial strategies.

This Project takes advantage of the AN/SQQ-89(V) Open System Architecture (OSA) and Acoustic Rapid Commercial-Off-The-Shelf (COTS) Insertion (ARCI) initiatives to integrate Torpedo Detection, Classification, and Localization (TDCL) and ASW sonar combat system capability improvements. This COTS-based Surface Ship ASW combat system, the AN/SQQ-89A(V)15, is planned as a backfit program for both CG47 (select CG59-73 Baseline 3 and 4 ships) and DDG51 class ships. The Open Architecture (OA) system enables the ACB process and provides budget flexibility to make COTS/OA technology solutions and ARCI-type initiatives affordable. Improvements are tested in the laboratory and at-sea.

USW technology implementation will take advantage of improvements developed under the submarine Advanced Processing Build (APB) and Advanced Surveillance Build (ASB) programs and will in turn share unique improvements developed under this program with the submarine and surveillance USW communities. The ACB and APB programs are managed under a common development organization and 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.

Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy	Date: March 2019
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This Project participates in, and takes advantage of the Tactical Advancements for the Next Generation (TANG) initiative that utilizes Commercial Industrial Design Thinking methodologies to engage the Fleet in generating innovative USW improvement concepts.

This Project includes funding for the Surface Ship Engineering Measurement Program (SSEMP), which will measure the performance of existing and new Surface Ship ASW combat systems and enables data-based assessment of the capabilities and shortfalls in the performance of these systems in realistic scenarios.

This Project includes funding to support cyber security initiatives to align future AN/SQQ-89A(V)15 baselines with future AEGIS Integrated Combat Systems.

This Project contributes to the development of Littoral Combat Ship (LCS) ASW Mission Packages and the Frigate (FFG(X)) program.

B. Program Change Summary ($ in Millions)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Previous President's Budget	29.351	28.421	29.766	-	29.766
Current President's Budget	28.410	26.321	29.572	-	29.572
Total Adjustments	-0.941	-2.100	-0.194	-	-0.194
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.100			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.941	0.000			
• Program Adjustments	0.000	0.000	-0.055	-	-0.055
• Rate/Misc Adjustments	0.000	0.000	-0.139	-	-0.139

Change Summary Explanation

FUNDING:

- FY 2018 decrease of -$0.941M reflects a Small Business Innovative Research (SBIR) transfer.
- FY 2019 decrease of -$2.100M was for a Congressionally directed reduction to the AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade program.
- FY 2020 decrease of -$0.055M for Contractor Services Reform reduction and -$0.139M various rate adjustments.

- FY 2019 to FY 2020 Increase/Decrease Statement: FY 2019 ($26.321M) to FY 2020 ($29.572M) increase (+$3.251M) reflects: 1) the incorporation of a -$2.100M FY 2019 Congressionally directed reduction to the AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade program, and, 2) the funding of additional efforts in FY 2020 required for the AN/SQQ-89A(V)15 Surface Ship ASW ACB Development program to update facilities and processes to harden the day-to-day business practices of the ACB program against cyber attacks.

SCHEDULE: Added ACB-19 Step 4 At-Sea Test in 3Q20, and added ACB-21 Step 4 At-Sea Test in 3Q22.

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy												Date: March 2019
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0205620N / *Surface ASW Cmbt Sys Integr*				Project (Number/Name) 1916 / *Surface ASW System Improvement*			
COST ($ in Millions)	**Prior Years**	**FY 2018**	**FY 2019**	**FY 2020 Base**	**FY 2020 OCO**	**FY 2020 Total**	**FY 2021**	**FY 2022**	**FY 2023**	**FY 2024**	**Cost To Complete**	**Total Cost**
1916: *Surface ASW System Improvement*	263.743	28.410	26.321	29.572	-	29.572	29.323	29.876	30.474	31.080	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Surface ASW Systems Improvements Project will support essential performance enhancements to AN/SQQ-89(V) and Surface Ship Sonar Systems. This project will improve AN/SQQ-89(V) Measures of Performance (MOP) by enhancing operator interface methods and tools, active and passive detection, tracking, classification and localization, torpedo DCL, and sonobuoy data processing and display capabilities, and increasing acoustic sensor frequency bandwidth (Operational Requirements Document #667-76-05 titled 'AN/SQQ-89 Improvement Program'), Test & Evaluation Master Plan (TEMP) 802-2.

This project will take advantage of the TANG initiative, AN/SQQ-89(V) OSA, and ARCI initiatives to integrate a TDCL and ASW sonar and combat system capability improvements. This COTS-based Surface Ship ASW combat system, the AN/SQQ-89A(V)15, is currently planned as a backfit program for both CG 47 (select CG59-73 Baseline 3 and 4 ships) and DDG 51 (All DDG 51 and follow FLT I/II/IIA) class ships. This project has delivered the AN/SQQ-89A(V)15 Pre-Production Prototype, performed installation on board CG73, and conducted subsequent Developmental Test & Evaluation (DT&E) and Initial Operational Test & Evaluation (IOT&E) where the system was found 'Operationally Effective' by Command Operational Test and Evaluation Force (COMOPTEVFOR).

The OSA and high performance COTS processing hardware on ships fielded with the AN/SQQ-89A(V)15 combat system provides an opportunity to integrate emergent, transformational USW technological improvements that were previously unachievable. The USW suites on these ships will require periodic upgrades to remain effective well into the 21st century and to pace the threat. Software upgrades target capability increases in high interest areas as prescribed by the Fleet and captured in campaign analysis. To achieve this, this project will package and deliver incremental upgrades every two years to the AN/SQQ-89A(V)15 production program via an ACB spiral development process (ACB-15, ACB-17, etc.) by inserting maturing USW technologies.

Primary areas of USW improvement are as follows:
- Undersea Fire Control/Engagement
- Medium Frequency (MF) Pulsed Active Sonar
- Continuous Active Sonar (CAS)
- Acoustic Communications
- TDCL
- Torpedo Defense
- Passive Sonar
- Sonar Tactical Decision Aids (STDA)

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Title: AN/SQQ-89A(V)15 Surface Ship ASW Advanced Capability Build (ACB) Development	20.310	21.191	21.561	0.000	21.561
Articles:	-	-	-	-	-
Description: Develop enhancements to the AN/SQQ-89A(V)15 Open System Architecture (OSA) via the integration of transformational technologies through the four step ACB spiral development process, enhanced by the TANG initiative. These items will be integrated and delivered to the CG 47 and DDG 51 class AN/SQQ-89A(V)15 backfit production programs via ACB updates. The ACB 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 in a realistic tactical environment. Step 4 - at-sea testing on an operational surface combatant. Step 4 is conducted only if an appropriate platform is available. ACB rapidly addresses problems/deficiencies in processing, capability or operations within the following areas of the AN/SQQ-89(V) USW combat system architecture; sensor processing, acoustics, fire control, contact management, performance prediction, operator productivity and on-board training, Multi-Function Towed Array (MFTA), Digital Fire Control Interface (DFCI), Mid-Frequency Active (MFA) processing, TDCL, Torpedo Defense and adaptive beamforming. ACB requirements are generated through discussions with the Fleet, then vetted and provided as direction by CNO, N96. Steps 1 and 2 are conducted in a pipeline style parallel to system integration and production. This makes Steps 1 and 2 independent of any particular Build (e.g ACB-15) and allows for development of longer lead technologies. The content of a specific ACB build (every two years on the odd year) is then determined through a series of discussions with the Fleet aimed at selecting the most relevant and mature technologies available in the ACB pipeline. Integration at the String and System level is then performed followed by Steps 3 and 4, as applicable, and transitioned to production.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Additionally, advanced development capabilities from the submarine APB and ASB projects are re-used in ACB, as appropriate. ACB capabilities are also shared with submarine APB and ASB. The ACB development program also resolves issues/deficiencies discovered through the AN/SQQ-89(V) Test & Evaluation program. ***FY 2019 Plans:*** - Complete Technical Insertion-20 (TI-20) trade studies to support ACB-19 integration and ACB-21 development. - Conduct and complete Step 3 land-based testing of ACB-19. - Conduct ACB-19 Return-On-Investment (ROI) testing. - Transition ACB-19 to production. - Initiate planning and development for ACB-21. Anticipate developing capabilities to improve the attack/engage phase of the kill chain, improve contact localization, improve sonobuoy processing, and increase performance of a ship as a contributor to strike group performance. - Continue Common STDA development. - Conduct planning for Step 4 testing of ACB-19. ***FY 2020 Base Plans:*** - Continue the development and initiate the integration of enhancements to AN/SQQ-89A(V)15 for ACB-21. Anticipate developing capabilities to improve the attack/engage phase of the kill chain, improve contact localization, improve sonobuoy processing, and increase performance of a ship as a contributor to strike group performance. - Conduct system integration and commence test preparation of ACB-21 for Step 3 land-based testing. - Conduct TI-22 trade studies to support ACB-21 integration and ACB-23 development. - Conduct Step 4 At-Sea test of ACB-19. - Continue Common STDA development. - Update facilities and processes to harden the day-to-day business practices of the ACB program against cyber attacks. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase ($+0.370M) is in line with inflation associated with the RDT&E,N appropriation.					
Title: AN/SQQ-89(V) Surface Ship USW Test & Evaluation Program	0.700	0.700	0.714	0.000	0.714
Articles:	-	-	-	-	-

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
Description: The AN/SQQ-89(V) Surface Ship USW Test & Evaluation Program conducts testing and analysis to support certification of AN/SQQ-89A(V)15 ACBs prior to fielding. Additionally, AN/SQQ-89(V) Developmental Test (DT) and Operational Test (OT) is conducted under this program. ***FY 2019 Plans:*** - Begin conduct of ACB-15 DT events. - Begin conduct of ACB-15 OT events. - Support conduct of AIE for ACB-17 certification. Work test ship and resources in support of ACB-17 DT and ACB-17 TEMP. ***FY 2020 Base Plans:*** - Finalize a test ship and confirm resources needed in support of ACB-17 OT. - Finalize ACB-17 TEMP. - Support conduct of AIE for ACB-19 certification. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase ($+0.014M) is in line with inflation associated with the RDT&E,N appropriation.					
Title: Surface Ship Engineering Measurement Program (SSEMP)	3.200	3.078	3.140	0.000	3.140
Articles:	-	-	-	-	-
Description: Analyze the AN/SQQ-89(V) sonar system and employment in the operational setting and report results for improvement of future systems, training and employment guidance. Perform Fleet exercise data reconstruction and post-test analysis each year. Conduct selected at-sea data collection activities by providing planning support, ship riders, and analyst support. Evaluate prototype sonar employment tactics, sonar processing and automation algorithms, and communication protocols for the detection, classification, tracking, and intra-Fleet hand-off to Fleet USW assets, and provide summary reports to document results. ***FY 2019 Plans:*** - Conduct ACB-13/ACB-15 Level 4 Operator Test analysis. - Support ACB-15 IOT&E/OT data collection and analysis of operational performance.					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
- Continue analysis of real-world SSEMP cases and exercise performance data. ***FY 2020 Base Plans:*** - Support ACB-15 IOT&E/OT data collection and analysis of operational performance. - Support ACB-17 IOT&E/OT data collection planning. - Continue analysis of real-world SSEMP cases/exercises performance data. ***FY 2020 OCO Plans:*** N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase ($+0.062M) is in line with inflation associated with the RDT&E,N appropriation.					
Title: AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade	4.200	1.352	4.157	0.000	4.157
Articles:	-	-	-	-	-
Description: Cyber security capability development to align future AN/SQQ-89A(V)15 baselines with future AEGIS integrated combat systems. ***FY 2019 Plans:*** - Continue cyber situational awareness and boundary defense capability integration efforts to align with the aggregate AEGIS Secure Combat System Architecture. - Continue efforts to improve existing software to reduce cyber security risks. - Continue development and integration of host and network security capabilities and protections into ACB, to improve system-level cyber security posture. - Support Risk Management Framework (RMF) Assessment and Authorization (A&A) activities of various ACB/TI combinations, allowing for continuous successful platform installations. ***FY 2020 Base Plans:*** - Initiate development of system architecture improvements and moving-target defense capabilities to enable cyber resiliency. - Evaluate and develop improved network and cyber monitoring through the use of advanced analytics and automation techniques. - Initiate system improvements to support Fleet network conditions and cyber response tactics. - Support implementation, testing and initial certification efforts for cyber improvements designed in FY 2019. ***FY 2020 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total
N/A ***FY 2019 to FY 2020 Increase/Decrease Statement:*** FY 2019 to FY 2020 increase ($+2.805M) is driven by: 1) the incorporation of a $-2.100M FY 2019 Congressionally directed reduction to the AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade program, and, 2) the funding of additional efforts in FY 2020 required to support implementation, testing and initial certification efforts for cyber improvements that are being designed in FY 2019.					
Accomplishments/Planned Programs Subtotals	28.410	26.321	29.572	0.000	29.572

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2018	FY 2019	FY 2020 Base	FY 2020 OCO	FY 2020 Total	FY 2021	FY 2022	FY 2023	FY 2024	Cost To Complete	Total Cost
• OPN/2136: *AN/SQQ-89 Surface ASW Combat System*	100.222	114.344	125.237	-	125.237	127.182	132.416	135.022	137.721	Continuing	Continuing
• RDTEN/0603553N/1704: *Undersea Warfare*	1.092	1.122	1.137	-	1.137	1.157	1.184	1.209	1.233	Continuing	Continuing

Remarks

D. Acquisition Strategy

- Via an ACB spiral development process, incorporate evolutionary and transformational technologies into AN/SQQ-89A(V)15 production systems.
- Utilize the Small Business Innovative Research (SBIR) program and full and open competition for new and improved innovative capability development.

E. Performance Metrics

- Deliver incremental capability increases in high interest areas, as prescribed by the Fleet and captured in campaign analysis, every two years to the AN/SQQ-89A(V)15 production program via an ACB spiral development process (ACB-15, ACB-17, etc.) by inserting maturing USW technologies.
- Conduct system qualification testing (SQT) and AEGIS Integration Events (AIE) for all fielded variants of ACB.
- Utilize the SSEMP to evaluate performance of fielded systems.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SQQ-89 S/W Development/Integration	C/CPFF	AAC : NY	6.505	0.000		0.000		0.000		-		0.000	0.000	6.505	-
SQQ-89 S/W Development/Integration	C/CPFF	Alion : IL	7.828	1.991	Nov 2017	1.275	Nov 2018	1.301	Dec 2019	-		1.301	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Adaptive Methods : VA	15.400	0.700	Feb 2018	0.811	Dec 2018	0.827	Dec 2019	-		0.827	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Applied Physical Sciences : CT	0.000	0.993	Nov 2017	1.128	Dec 2018	1.151	Dec 2019	-		1.151	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	GD-AIS : VA	11.322	0.000		0.000		0.000		-		0.000	0.000	11.322	-
SQQ-89 S/W Development/Integration	C/CPFF	In-Depth Engineering : VA	2.975	0.000		0.000		0.000		-		0.000	0.000	2.975	-
SQQ-89 S/W Development/Integration	C/CPFF	JHU/APL : MD	37.936	4.616	Feb 2018	4.804	Dec 2018	4.900	Dec 2019	-		4.900	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Metron : VA	5.450	1.000	Nov 2017	0.544	Dec 2018	0.555	Dec 2019	-		0.555	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Lockheed Martin : NY	10.205	0.000		0.000		0.000		-		0.000	0.000	10.205	-
SQQ-89 S/W Development/Integration	C/CPFF	Lockheed Martin : VA	19.713	4.505	Feb 2018	4.551	Dec 2018	6.026	Dec 2019	-		6.026	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	WR	NSWC/Carderock : MD	7.777	0.356	Jan 2018	0.000	Nov 2018	0.000		-		0.000	0.000	8.133	-
SQQ-89 S/W Development/Integration	WR	NSWC/Dahlgren : VA	1.440	0.351	Feb 2018	0.121	Dec 2018	0.123	Nov 2019	-		0.123	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	WR	NUWC/Newport : RI	16.492	0.115	Nov 2017	0.275	Nov 2018	0.281	Nov 2019	-		0.281	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	Sedna Digital : VA	4.405	0.000		0.000		0.000		-		0.000	0.000	4.405	-
SQQ-89 S/W Development/Integration	C/CPFF	UT/ARL : TX	18.668	2.880	May 2018	2.869	Dec 2018	2.926	Dec 2019	-		2.926	Continuing	Continuing	Continuing
SQQ-89 S/W Development/Integration	C/CPFF	VAR : VAR*	26.507	1.866	Dec 2017	3.598	Dec 2018	2.231	Dec 2019	-		2.231	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
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Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SAST Development/ Integration	C/CPFF	JHU/APL : MD	8.302	0.000		0.000		0.000		-		0.000	0.000	8.302	-
SAST Development/ Integration	WR	NSWC/Carderock : MD	13.493	0.000		0.000		0.000		-		0.000	0.000	13.493	-
SAST Development/ Integration	WR	NUWC/Newport : RI	3.080	0.000		0.000		0.000		-		0.000	0.000	3.080	-
SAST Development/ Integration	C/CPFF	Sedna Digital : VA	5.002	0.000		0.000		0.000		-		0.000	0.000	5.002	-
SAST Development/ Integration	C/CPFF	UT/ARL : TX	1.652	0.000		0.000		0.000		-		0.000	0.000	1.652	-
SAST Development/ Integration	C/CPFF	VAR : VAR*	0.812	0.000		0.000		0.000		-		0.000	0.000	0.812	-
SQQ-89 Cyber Security Development/Integration	C/CPFF	Lockheed Martin : VA	0.000	4.200	Feb 2018	1.352	Dec 2018	4.157	Dec 2019	-		4.157	Continuing	Continuing	Continuing
		Subtotal	224.964	23.573		21.328		24.478		-		24.478	Continuing	Continuing	N/A

Remarks

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

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SSEMP ConductTest/Data Evaluation	C/CPFF	JHU/APL : MD	18.265	2.100	Feb 2018	2.025	Dec 2018	2.065	Dec 2019	-		2.065	Continuing	Continuing	Continuing
SSEMP Conduct/Test/ Data Evaluation	WR	NUWC/Newport : RI	4.412	0.500	Nov 2017	0.475	Nov 2018	0.484	Nov 2019	-		0.484	Continuing	Continuing	Continuing
SSEMP Conduct/Test/ Data Evaluation	C/CPFF	UT/ARL : TX	5.478	0.600	May 2018	0.578	Dec 2018	0.591	Dec 2019	-		0.591	Continuing	Continuing	Continuing
SQQ-89 IV&V/SAT/TEMP Assess./Update	WR	NUWC/Newport : RI	3.226	0.200	Nov 2017	0.200	Nov 2018	0.200	Nov 2019	-		0.200	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SQQ-89 DT/OT/ Miscellaneous T&E	WR	VAR : VAR*	2.985	0.500	Mar 2018	0.500	Dec 2018	0.514	Dec 2019	-		0.514	Continuing	Continuing	Continuing
		Subtotal	34.366	3.900		3.778		3.854		-		3.854	Continuing	Continuing	N/A

Remarks

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

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2018 Cost	FY 2018 Award Date	FY 2019 Cost	FY 2019 Award Date	FY 2020 Base Cost	FY 2020 Base Award Date	FY 2020 OCO Cost	FY 2020 OCO Award Date	FY 2020 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management Support	C/CPAF	BAE Systems : MD	2.999	0.000		0.000		0.000		-		0.000	0.000	2.999	-
Program Management Support	C/CPIF	CGI Federal : VA	0.500	0.877	Jan 2018	1.129	Nov 2018	1.152	Dec 2019	-		1.152	Continuing	Continuing	Continuing
Program Office Travel	Allot	NAVSEA PEO IWS5 : DC	0.914	0.060	Feb 2018	0.086	Nov 2018	0.088	Nov 2019	-		0.088	Continuing	Continuing	Continuing
		Subtotal	4.413	0.937		1.215		1.240		-		1.240	Continuing	Continuing	N/A

	Prior Years	FY 2018		FY 2019		FY 2020 Base		FY 2020 OCO		FY 2020 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	263.743	28.410		26.321		29.572		-		29.572	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

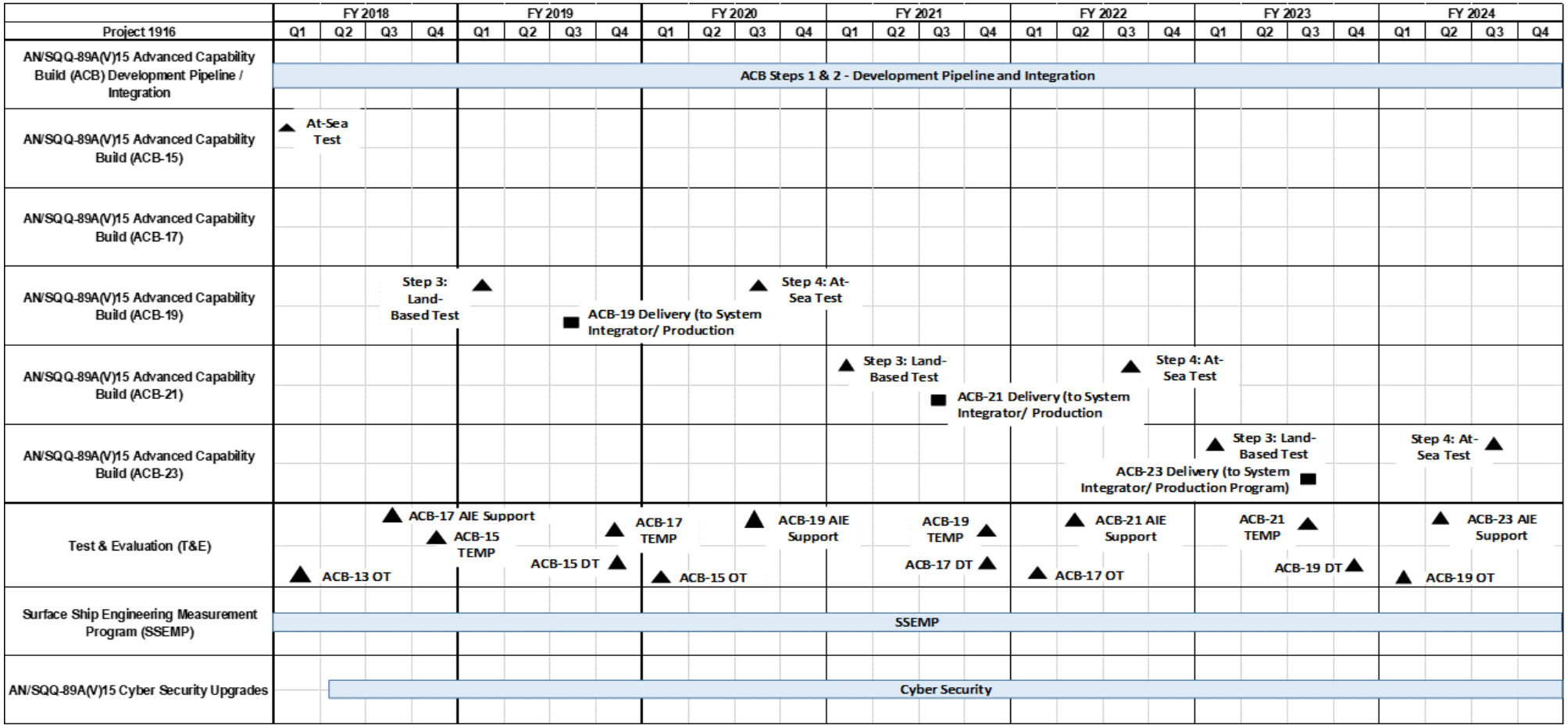

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 1916				
AN/SQQ-89A(V)15 Advanced Capability Build: AN/SQQ-89A(V)15 Advanced Capability Build Development Pipleline	1	2018	4	2024
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-15): AN/SQQ-89A(V)15 ACB-15 Step 4 At-Sea Test	1	2018	1	2018
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-19): AN/SQQ-89A(V)15 ACB-19 Step 3 Land-Based Test (LBT)	1	2019	1	2019
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-19): AN/SQQ-89A(V)15 ACB-19 S/W Delivery to Integrator	3	2019	3	2019
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-19): AN/SQQ-89A(V)15 ACB-19 Step 4 At-Sea Test	3	2020	3	2020
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-21): AN/SQQ-89A(V)15 ACB-21 Step 3 Land-Based Test (LBT)	1	2021	1	2021
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-21): AN/SQQ-89A(V)15 ACB-21 S/W Delivery to Integrator	3	2021	3	2021
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-21): AN/SQQ-89A(V)15 ACB-21 Step 4 At-Sea Test	3	2022	3	2022
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-23): AN/SQQ-89A(V)15 ACB-23 Step 3 Land-Based Test (LBT)	1	2023	1	2023
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-23): AN/SQQ-89A(V)15 ACB-23 S/W Delivery to Integrator	3	2023	3	2023
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-23): AN/SQQ-89A(V)15 ACB-23 Step 4 At-Sea Test	3	2023	3	2023
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-13 Operational Test (OT)	1	2018	1	2018

Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy		Date: March 2019
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0205620N / *Surface ASW Cmbt Sys Integr*	**Project (Number/Name)** 1916 / *Surface ASW System Improvement*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-17 AEGIS Integration Event (AIE)	3	2018	3	2018
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-15 T&E Master Plan (TEMP)	4	2018	4	2018
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-15 Developmental Test (DT)	4	2019	4	2019
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-15 Operational Test (OT)	1	2020	1	2020
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-19 AEGIS Integration Event (AIE)	3	2020	3	2020
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-17 Developmental Test (DT)	4	2021	4	2021
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-19 T&E Master Plan (TEMP)	4	2021	4	2021
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-17 Operational Test (OT)	1	2022	1	2022
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-21 AEGIS Integration Event (AIE)	2	2022	2	2022
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-21 T&E Master Plan (TEMP)	3	2023	3	2023
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-19 Developmental Test (DT)	4	2023	4	2023
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-19 Operational Test (OT)	1	2024	1	2024
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-23 AEGIS Integration Event (AIE)	2	2024	2	2024
Surface Ship Engineering Measurement Program (SSEMP): Surface Ship Engineering Measurement Program (SSEMP)	1	2018	4	2024
AN/SQQ-89A(V)15 Cyber Security Upgrades: AN/SQQ-89A(V)15 Cyber Security Upgrades	2	2018	4	2024