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Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319: <i>Research, Development, Test & Evaluation, Navy / BA 7: Operational Systems Development</i>					R-1 Program Element (Number/Name) PE 0205620N / <i>Surface ASW Cmbt Sys Integr</i>							
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
Total Program Element	293.944	25.478	29.572	29.348	-	29.348	29.849	30.441	31.046	31.666	Continuing	Continuing
1916: <i>Surface ASW System Improvement</i>	293.944	25.478	29.572	29.348	-	29.348	29.849	30.441	31.046	31.666	Continuing	Continuing

A. Mission Description and Budget Item Justification

The objective of this Program Element (PE) is to significantly improve existing AN/SQQ-89A(V)15 Surface Ship Anti-Submarine Warfare (ASW) sonar system capabilities through quick and affordable development and integration of emergent, transformational technologies in support of Surface, Littoral, and Theater ASW (TASW) as 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 improvements are developed.

ASW 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 U.S. 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. U.S. 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-89A(V)15 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. The AN/SQQ-89A(V)15 COTS-based Surface Ship ASW Combat System is planned as a backfit program for CG47 (select CG59-73 Baseline 3 and 4 ships) and all 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.

Undersea Warfare (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.

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This PE includes funding for the AN/SQQ-89A(V)15 Surface Ship ASW Test & Evaluation (T&E) program, which conducts testing and analysis to support certification of AN/SQQ-89A(V)15 Surface Ship ASW Combat System ACBs prior to fielding. Additionally, finalization of Test & Evaluation Master Plans (TEMPs) and AN/SQQ-89(V) Developmental Test (DT) and Operational Test (OT) events are conducted under this program.

This PE includes funding for the AN/SQQ-89A(V)15 Surface Ship Engineering Measurement Program (SSEMP), which will measure the performance of existing and new AN/SQQ-89A(V)15 Surface Ship ASW Combat System Technical Insertion (TI)/ACB baselines, and enables data-based assessment of the capabilities and shortfalls in the performance of these systems in realistic scenarios.

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

This PE 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 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	26.321	29.572	29.323	-	29.323
Current President's Budget	25.478	29.572	29.348	-	29.348
Total Adjustments	-0.843	0.000	0.025	-	0.025
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.843	0.000			
• Rate/Misc Adjustments	0.000	0.000	0.025	-	0.025

Change Summary Explanation

FUNDING CHANGES SINCE PREVIOUS PRESIDENT'S BUDGET:

- FY 2019 decrease of \$-0.843M reflects Small Business Innovation Research (SBIR) transfer.
- FY 2021 increase of \$+0.025M reflects general and Navy Working Capital Fund (NWCF) specific rate adjustments.

FY 2020 TO FY 2021 BUDGET REQUEST DECREASE:

- FY 2020 (\$29.572M) to FY 2021 (\$29.348M) decrease (\$-0.224M) is driven by the schedule shift of ACB-21 Step 3 land-based testing and ACB-21 delivery events from 1Q21 to 1Q22 (as outlined below). With the ACB-21 Step 3 land-based testing and ACB-21 delivery events shifting to FY 2022, efforts to develop capabilities focused on improving the attack/engage phase of the kill chain and increase performance of a ship as a contributor to strike group performance can be accelerated.

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SCHEDULE CHANGES SINCE PREVIOUS PRESIDENT'S BUDGET:

The ACB-21 schedule adjustments listed below are driven by the Fleet's top ASW priority - to update the AN/SQQ-89A(V)15 Surface Ship ASW Combat System Undersea Control Functional Segment (UCFS). Shifting the ACB-21 schedule to the right in order to incorporate UCFS updates allows for improved system stability while eliminating an extra baseline configuration (Technical Insertion (TI)-20/ACB-21).

- Moved ACB-21 Step-3 Land-Based Test from 1Q21 to 1Q22.
- Moved ACB-21 Delivery (to System Integrator/Production Program) from 3Q21 to 1Q22.
- Moved ACB-21 Step-4 At-Sea Test from 3Q22 to 1Q23.

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy										Date: February 2020		
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0205620N / <i>Surface ASW Cmbt Sys Integr</i>				Project (Number/Name) 1916 / <i>Surface ASW System Improvement</i>			
COST (\$ in Millions)	Prior Years	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
1916: <i>Surface ASW System Improvement</i>	293.944	25.478	29.572	29.348	-	29.348	29.849	30.441	31.046	31.666	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Surface Anti-Submarine Warfare (ASW) Systems Improvements Project will support essential performance enhancements to the AN/SQQ-89A(V)15 Surface Ship ASW Combat System. This project will improve Measures of Performance (MOP) by enhancing operator interface methods and tools; active and passive detection; tracking, classification, and localization; Torpedo Detection, Classification, and Localization (TDCL); sonobuoy data processing and display capabilities; and increasing acoustic sensor frequency bandwidth (Operational Requirements Document (ORD) #667-76-05 titled 'AN/SQQ-89 Improvement Program' and Test & Evaluation Master Plan (TEMP) 802-2).

This Project will take advantage of the AN/SQQ-89A(V)15 Surface Ship ASW Combat System Open System Architecture (OSA) and Acoustic Rapid Commercial-Off-The-Shelf (COTS) Insertion (ARCI) initiatives to integrate TDCL and ASW sonar and combat system capability improvements. The AN/SQQ-89A(V)15 Surface Ship ASW Combat System is planned as a backfit program for CG47 (select CG59-73 Baseline 3 and 4 ships) and all DDG51 class ships.

The OSA and high performance COTS processing hardware on ships fielded with the AN/SQQ-89A(V)15 Surface Ship ASW Combat System provides an opportunity to integrate emergent, transformational ASW and Undersea Warfare (USW) technological improvements that were previously unachievable. The ASW/USW suites on these ships will require periodic upgrades to remain effective well into the 21st century and to pace the threat. Software upgrades developed under this Project will 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 (2) years to the AN/SQQ-89A(V)15 Surface Ship ASW Combat System production program via an Advanced Capability Build (ACB) spiral development process (ACB-19, ACB-21, etc.) by inserting maturing ASW and USW technologies.

Primary areas of ASW and USW improvements 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)

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Title: AN/SQQ-89A(V)15 Surface Ship ASW Advanced Capability Build (ACB) Development</p> <p align="right">Articles:</p> <p>Description: Develop enhancements to the AN/SQQ-89A(V)15 Surface Ship Anti-Submarine Warfare (ASW) Combat System Open System Architecture (OSA) via the integration of transformational technologies through the four step ACB spiral development process. These items will be integrated and delivered to CG47 and DDG51 class AN/SQQ-89A(V)15 Surface Ship ASW Combat System backfit production programs via ACB updates.</p> <p>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.</p> <p>ACB rapidly addresses problems/deficiencies in processing, capability, or operations within the following areas of the AN/SQQ-89A(V)15 Surface Ship ASW 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, Torpedo Detection Classification and Localization (TDCL), Torpedo Defense (TD), and adaptive beamforming.</p> <p>ACB requirements are generated through discussions with the Fleet, then vetted and provided as direction by the Chief of Naval Operations (CNO), OPNAV 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-17, ACB-19) 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.</p>	20.348	21.561	21.182	0.000	21.182
	-	-	-	-	-

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

	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>Additionally, advanced development capabilities from the submarine Advanced Processing Build (APB) and Advanced Surveillance Build (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.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue the development and initiate the integration of enhancements to AN/SQQ-89A(V)15 for ACB-21. Develop capabilities focused on improving the attack/engage phase of the kill chain via updates to the Undersea Fire Control Functional Segment (UCFS) for ACB-21. - 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 Sonar Tactical Decision Aid (STDA) development. - Update facilities and processes to harden the day-to-day business practices of the ACB program against cyber attacks. - Extend Classified Communications Network developed under Submarine APB to the ACB community. - Continue transition to a Continuous Integration/Continuous Delivery (CI/CD) pipeline approach for ACB software within a DevSecOps delivery framework. <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Complete TI-22 trade studies to support ACB-21 integration and ACB-23 development. - Continue planning for Step 3 land-based testing of ACB-21. - Initiate planning for Step 4 at-sea test of ACB-21. - Initiate planning for ACB-21 Return-On-Investment (ROI) testing. - Initiate planning and development for ACB-23. Anticipate developing capabilities continuing 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. - Begin ACB deliveries via DevSecOps framework. <p>FY 2021 OCO Plans: N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>					

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)						
		FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
FY 2021 decrease is driven by the schedule shift of ACB-21 Step 3 land-based testing and ACB-21 delivery events from 1Q21 to 1Q22. With the ACB-21 Step 3 land-based testing and ACB-21 delivery events being shifted to FY 2022, efforts to develop capabilities focused on improving the attack/engage phase of the kill chain and increase performance of a ship as a contributor to strike group performance can be accelerated.						
Title: AN/SQQ-89A(V)15 Surface Ship ASW Test & Evaluation (T&E)		0.700	0.714	0.728	0.000	0.728
Articles:		-	-	-	-	-
Description: The AN/SQQ-89A(V)15 Surface Ship Anti-Submarine Warfare (ASW) Test & Evaluation (T&E) Program conducts testing and analysis to support certification of AN/SQQ-89A(V)15 Surface Ship ASW Combat System Advanced Capability Builds (ACBs) prior to fielding. Additionally, finalization of Test & Evaluation Master Plans (TEMPs) and AN/SQQ-89(V) Developmental Test (DT) and Operational Test (OT) events are conducted under this program. In general, testing events and the testing schedule are driven by the availability of both platform and target assets.						
FY 2020 Plans:						
<ul style="list-style-type: none"> - Conduct ACB-15 OT event. - Finalize planning and confirm resources needed in support of ACB-17 OT/DT events. - Support conduct of AIE for ACB-19 certification. 						
FY 2021 Base Plans:						
<ul style="list-style-type: none"> - Complete planning and conduct ACB-17 DT event. - Work test ship and resources in support of ACB-19 TEMP and ACB-19 DT event. - Continue planning for ACB-17 OT event. 						
FY 2021 OCO Plans:						
N/A						
FY 2020 to FY 2021 Increase/Decrease Statement:						
FY 2021 increase is in line with inflation.						
Title: AN/SQQ-89A(V)15 Surface Ship Engineering Measurement Program (SSEMP)		3.078	3.140	3.203	0.000	3.203
Articles:		-	-	-	-	-
Description: Analyze the AN/SQQ-89A(V)15 Surface Ship ASW Combat 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						

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
<p>collection activities (Initial Operational Test & Evaluation (IOT&E) and Operational Test (OT)) 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.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Support ACB-15 IOT&E/OT data collection and analysis of operational performance. - Begin ACB-17 IOT&E/OT data collection planning. - Continue analysis of performance data from real-world SSEMP cases/exercises. <p>FY 2021 Base Plans:</p> <ul style="list-style-type: none"> - Support ACB-17 IOT&E/OT data collection. - Continue analysis of performance data from real-world SSEMP cases/exercises. <p>FY 2021 OCO Plans:</p> <p>N/A</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p> <p>FY 2021 increase is in line with inflation.</p>					
<p>Title: AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade</p> <p align="right">Articles:</p> <p>Description: Cyber security capability development to align future AN/SQQ-89A(V)15 Surface Ship ASW Combat System baselines with future AEGIS integrated combat system baselines.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - 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 technologies. - Execute cyber penetration testing of Technical Insertion-18 (TI-18) hardware on Advanced Capability Build-19 (ACB-19). - Continue to execute Risk Management Framework (RMF) Assessment & Authorization (A&A) process for various ACB/TI combinations, allowing for continuous, successful platform installations. - Initiate system improvements to support Fleet network conditions and cyber response tactics. 	1.352	4.157	4.235	0.000	4.235
	-	-	-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Begin to implement capabilities and update development processes to reduce cyber risks in ACB software (DevSecOps).					
<i>FY 2021 Base Plans:</i> - Implement capabilities and update development processes to reduce cyber risks in ACB software. - Conduct planning for cybersecurity and resiliency improvements for TI-22 on ACB-21. - Continue to execute RMF A&A process for various ACB/TI combinations, allowing for continuous, successful platform installations.					
<i>FY 2021 OCO Plans:</i> N/A					
<i>FY 2020 to FY 2021 Increase/Decrease Statement:</i> FY 2021 increase is in line with inflation.					
Accomplishments/Planned Programs Subtotals	25.478	29.572	29.348	0.000	29.348

C. Other Program Funding Summary (\$ in Millions)											
Line Item	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total	FY 2022	FY 2023	FY 2024	FY 2025	Cost To Complete	Total Cost
• OPN/2136: AN/SQQ-89 <i>Surface ASW Combat System</i>	114.344	121.966	128.664	-	128.664	135.722	138.306	139.602	141.452	Continuing	Continuing
• RDTEN/0603553N/1704: <i>Undersea Warfare</i>	1.078	1.137	1.161	-	1.161	1.183	1.209	1.233	1.258	Continuing	Continuing
• RDTEN/0603561N/0223: <i>Sub Combat System Improvement (ADV)</i>	44.640	51.151	55.418	-	55.418	56.795	58.797	59.851	61.026	Continuing	Continuing

Remarks

D. Acquisition Strategy
- Utilize the Small Business Innovation Research (SBIR) program and full and open competition for new and improved innovative capability development.
- Deliver incremental capability increases in high interest areas, as prescribed by the Fleet and captured in campaign analysis, every two (2) years to the AN/SQQ-89A(V)15 Surface ASW Combat System production program via an ACB spiral development process (ACB-19, ACB-21, etc.) by inserting maturing ASW and USW technologies.

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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.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy												Date: February 2020			
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)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	AAC : NY	6.505	0.000		0.000		0.000		-		0.000	0.000	6.505	-
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	Alion : IL	9.819	1.275	Nov 2018	1.301	Nov 2019	1.275	Dec 2020	-		1.275	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	Adaptive Methods : VA	16.100	0.811	Dec 2018	0.827	Dec 2019	0.810	Dec 2020	-		0.810	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	Applied Physical Sciences : CT	0.993	1.128	Dec 2018	1.151	Jan 2020	1.128	Dec 2020	-		1.128	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	GD-AIS : VA	11.322	0.000		0.000		0.000		-		0.000	0.000	11.322	-
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	In-Depth Engineering : VA	2.975	0.000		0.000		0.000		-		0.000	0.000	2.975	-
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	JHU/APL : MD	50.854	4.804	Dec 2018	4.900	Jan 2020	4.802	Dec 2020	-		4.802	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	Metron : VA	6.450	0.544	Dec 2018	0.555	Jan 2020	0.544	Dec 2020	-		0.544	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	Lockheed Martin : NY	10.205	0.000		0.000		0.000		-		0.000	0.000	10.205	-
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	Lockheed Martin : VA	24.218	4.551	Dec 2018	6.026	Dec 2019	5.905	Dec 2020	-		5.905	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	WR	NSWC/Carderock : MD	21.626	0.000	Nov 2018	0.000		0.000		-		0.000	0.000	21.626	-

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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/SQQ-89A(V)15 Surface ASW ACB Development	WR	NSWC/Dahlgren : VA	1.791	0.121	Dec 2018	0.123	Dec 2019	0.121	Nov 2020	-		0.121	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	WR	NUWC/Newport : RI	21.478	0.275	Nov 2018	0.281	Oct 2019	0.275	Nov 2020	-		0.275	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	Sedna Digital : VA	9.407	0.000		0.000		0.000		-		0.000	0.000	9.407	-
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	UT/ARL : TX	23.200	2.869	Dec 2018	2.926	Jan 2020	2.867	Dec 2020	-		2.867	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface ASW ACB Development	C/CPFF	VAR : VAR*	29.185	2.755	Dec 2018	2.231	Dec 2019	2.190	Dec 2020	-		2.190	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade	C/CPFF	Lockheed Martin : VA	4.200	1.352	Dec 2018	4.157	Dec 2019	4.235	Dec 2020	-		4.235	Continuing	Continuing	Continuing
Subtotal			250.328	20.485		24.478		24.152		-		24.152	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)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
AN/SQQ-89A(V)15 Surface Ship ASW T&E	WR	NUWC/Newport : RI	3.426	0.200	Nov 2018	0.200	Oct 2019	0.204	Nov 2020	-		0.204	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 Surface Ship ASW T&E	WR	VAR : VAR*	3.485	0.500	Dec 2018	0.514	Oct 2019	0.524	Dec 2020	-		0.524	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 SSEMP	C/CPFF	JHU/APL : MD	20.365	2.025	Dec 2018	2.065	Jan 2020	2.106	Dec 2020	-		2.106	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205620N / <i>Surface ASW Cmbt Sys Integr</i>	Project (Number/Name) 1916 / <i>Surface ASW System Improvement</i>
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
AN/SQQ-89A(V)15 SSEMP	WR	NUWC/Newport : RI	4.912	0.475	Nov 2018	0.484	Oct 2019	0.494	Nov 2020	-		0.494	Continuing	Continuing	Continuing
AN/SQQ-89A(V)15 SSEMP	C/CPFF	UT/ARL : TX	6.078	0.578	Dec 2018	0.591	Jan 2020	0.603	Dec 2020	-		0.603	Continuing	Continuing	Continuing
Subtotal			38.266	3.778		3.854		3.931		-		3.931	Continuing	Continuing	N/A

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

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Management Support - Acquisition, Business & Finance	C/CPAF	BAE Systems : MD	2.999	0.000		0.000		0.000		-		0.000	0.000	2.999	-
Program Management Support - Systems Engineering and Technical Assistance (SETA)	C/CPFF	CGI Federal* : VA	1.377	1.129	Nov 2018	1.152	Jan 2020	0.000		-		0.000	0.000	3.658	-
Program Management Support - Systems Engineering and Technical Assistance (SETA)	C/CPFF	TBD (CGI Federal Follow On) : TBD	0.000	0.000		0.000		1.175	Dec 2020	-		1.175	Continuing	Continuing	Continuing
Program Office Travel	Allot	NAVSEA PEO IWS5 : DC	0.974	0.086	Nov 2018	0.088	Nov 2019	0.090	Nov 2020	-		0.090	Continuing	Continuing	Continuing
Subtotal			5.350	1.215		1.240		1.265		-		1.265	Continuing	Continuing	N/A

Remarks
*In addition to program office support, CGI Federal provides technical planning, systems engineering, and test support. CGI Federal also provides Subject Matter Experts (SMEs) as members of AN/SQQ-89A(V)15 Surface Ship Anti-Submarine Warfare (ASW) Combat System Advanced Capability Build (ACB) technical Peer Review Working Groups and Integrated Product Teams (IPTs) in support of designing and refining candidate technologies for inclusion into ACB deliveries.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy								Date: February 2020					
Appropriation/Budget Activity 1319 / 7				R-1 Program Element (Number/Name) PE 0205620N / <i>Surface ASW Cmbt Sys Integr</i>				Project (Number/Name) 1916 / <i>Surface ASW System Improvement</i>					
	Prior Years	FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	293.944	25.478		29.572		29.348		-		29.348	Continuing	Continuing	N/A

Remarks

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205620N / <i>Surface ASW Cmbt Sys Integr</i>	Project (Number/Name) 1916 / <i>Surface ASW System Improvement</i>

Project 1916	FY 2019				FY 2020				FY 2021				FY 2022				FY 2023				FY 2024				FY 2025															
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4												
AN/SQQ-89A(V)15 Advanced Capability Build (ACB) Development Pipeline / Integration	ACB Steps 1 & 2 - Development Pipeline and Integration																																							
AN/SQQ-89A(V)15 Surface Ship ASW Advanced Capability Build Development (ACB-19)	▲	Step 3: Land-Based Test							△	Step 4: At-Sea Test																														
					■ ACB-19 Delivery (to System Integrator/ Production)																																			
AN/SQQ-89A(V)15 Surface Ship ASW Advanced Capability Build Development (ACB-21)									△	Step 3: Land-Based Test			△	Step 4: At-Sea Test																										
									□ ACB-21 Delivery (to System Integrator/ Production Program)								— Step 3: Land-Based Test																							
AN/SQQ-89A(V)15 Surface Ship ASW Advanced Capability Build Development (ACB-23)																	△	Step 4: At-Sea Test			△	Step 4: At-Sea Test																		
									ACB-23 Delivery (to System Integrator/ Production Program)								□																							
AN/SQQ-89A(V)15 Surface Ship ASW Advanced Capability Build Development (ACB-25)																									△	Step 3: Land-Based Test														
																									ACB-25 Delivery (to System Integrator/ Production Program)				□											
AN/SQQ-89A(V)15 Surface Ship ASW Test & Evaluation (T&E)	▲				▲	ACB-17 TEMP			△	ACB-19 AIE Support			▲	ACB-19 TEMP			△	ACB-21 AIE Support			▲	ACB-21 TEMP			△	ACB-23 AIE Support			▲	ACB-23 TEMP										
	▲				▲	ACB-15 OT			▲	ACB-17 DT			▲	ACB-17 OT			▲	ACB-19 DT			▲	ACB-19 OT			▲	ACB-21 DT			▲	ACB-21 DT										
AN/SQQ-89A(V)15 Surface Ship Engineering Measurement Program (SSEMP)	SSEMP																																							
AN/SQQ-89A(V)15 Cyber Security Architecture Upgrade	Cyber Security Upgrades																																							

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205620N / <i>Surface ASW Cmbt Sys Integr</i>	Project (Number/Name) 1916 / <i>Surface ASW System Improvement</i>

Schedule Details

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
Proj 1916				
AN/SQQ-89A(V)15 Advanced Capability Build: AN/SQQ-89A(V)15 Advanced Capability Build Development Pipeline	1	2019	4	2025
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	2022	1	2022
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-21): AN/SQQ-89A(V)15 ACB-21 S/W Delivery to Integrator	1	2022	1	2022
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-21): AN/SQQ-89A(V)15 ACB-21 Step 4 At-Sea Test	1	2023	1	2023
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-23): AN/SQQ-89A(V)15 ACB-23 Step 3 Land-Based Test (LBT)	2	2023	2	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	2024	3	2024
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-25): AN/SQQ-89A(V)15 ACB-25 Step 3 Land-Based Test (LBT)	1	2025	1	2025
AN/SQQ-89A(V)15 Advanced Capability Build (ACB-25): AN/SQQ-89A(V)15 ACB-25 S/W Delivery to Integrator	3	2025	3	2025

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy **Date:** February 2020

Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205620N / <i>Surface ASW Cmbt Sys Integr</i>	Project (Number/Name) 1916 / <i>Surface ASW System Improvement</i>
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Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-17 T&E Master Plan (TEMP)	4	2019	4	2019
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-19 T&E Master Plan (TEMP)	4	2021	4	2021
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-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
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-23 T&E Master Plan (TEMP)	3	2025	3	2025
AN/SQQ-89(V) Test & Evaluation: AN/SQQ-89A(V)15 ACB-21 Developmental Test (DT)	4	2025	4	2025
Surface Ship Engineering Measurement Program (SSEMP): Surface Ship Engineering Measurement Program (SSEMP)	1	2019	4	2025

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0205620N / <i>Surface ASW Cmbt Sys Integr</i>	Project (Number/Name) 1916 / <i>Surface ASW System Improvement</i>

Events by Sub Project	Start		End	
	Quarter	Year	Quarter	Year
AN/SQQ-89A(V)15 Cyber Security Upgrades: AN/SQQ-89A(V)15 Cyber Security Upgrades	1	2019	4	2025