Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204228N *I (U)SURFACE SUPPORT*

COST ($ in Millions)	Prior Years	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
Total Program Element	123.579	32.533	13.733	12.197	-	12.197	20.301	18.301	15.266	15.376	Continuing	Continuing
3311: *Navigation Systems*	123.579	32.533	13.733	12.197	-	12.197	20.301	18.301	15.266	15.376	Continuing	Continuing

A. Mission Description and Budget Item Justification

The Surface Support RDT&E funding will be used for the research, design, development, integration testing, and documentation of the Inertial Navigation System (INS) AN/WSN-12 for all Navy ships and submarines. The INS provides mission critical ship position and attitude data to shipboard sensors (such as radars), combat and weapon systems. The INS uses data from the Global Positioning System (GPS) to periodically update (i.e., reset) its position and internal clock. The INS is the ship's primary position source in the absence of GPS, and it consists of an Inertial Sensor Module (ISM) and a Navigation Processing Module (NPM) that will provide a significant improvement with respect to attitude and velocity data over previous INS. RDT&E funding will support continued system design to create a baseline for Pre-Production Units (PPU), Low Rate Initial Production (LRIP), and Full Rate Production (FRP).

Boundary Defense Capability (BDC) has been renamed Afloat Navigation Cyber Hardening, Observation, and Response (ANCHOR) to better describe the new cybersecurity capability currently in development. Cybersecurity funding will be used for the research, development, documentation and integration testing for cybersecurity hardening and enclave development for navigation systems. Efforts include the development of the Afloat Navigation Cyber Hardening, Observation and Response (ANCHOR) system capabilities, platform specific architectures, Electronic Chart Display and Information System (ECDIS) secure solution for existing unclassified configurations, CYBERSAFE implementation, cybersecurity risk and vulnerability assessments, and threat / mission models for representative groupings of Navigation systems and cybersecurity capabilities. Risk assessments along with requirements development will lead to incremental capability development leveraging the Increment 1 Engineering Development Model (EDM) delivery with updated architectures and system-level modifications. Follow-on capabilities will be developed and added to meet existing threats and requirements.

Time and Frequency Distribution System-Replacement (TFDS-R) funding will be used for the research, development, documentation, and integration testing for the submarine TFDS-R system. TFDS is a Commercial Off the Shelf (COTS) timing system utilizing the precision source signals of GPS to discipline two redundant Rubidium clocks to Universal Coordinated Time (UTC). TFDS provides common time to submarine equipment that utilizes clocking pulses or sinusoidal waveforms for proper operation and maintains accurate time in the event of loss of GPS input (holdover). TFDS uses multiple input power sources for redundancy and provides a built in battery backup. TFDS generates and distributes Precision Time and Timing Interval (PTTI) reference signals to support C4I capabilities needed for Joint, Naval and Allied missions.

Military GPS User Equipment (MGUE) will provide assured Positioning, Navigation, and Timing (PNT) in a GPS degraded environment. Funding will be used for the development of interface and performance requirements, shipboard system architecture definition, and MGUE integration.

Submarine Speed Sensors will provide investigation, development, testing and integration of new Own-Ship Speed sensors to address new capabilities, reduce detection, and improve reliability.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204228N *I (U)SURFACE SUPPORT*

Assured Positioning, Navigation, and Timing (APNT) funding will be used for Alternate GPS-independent sources of Positioning, Velocity, Attitude, and Timing (PVAT) data required to provide fire control solutions, ensure safety of navigation, and support aircraft and combat operations in a GPS degraded/denied environment. This effort provides a secure navigation method using the navigation resources being developed by Office of Naval research (ONR) Future Naval Capabilities (FNC) activity and Small Business Innovation Research (SBIR).

Automated Celestial Navigation System (ACNS) funding will be used for the research, development, Engineering Development Model (EDM), documentation and integration testing of the celestial navigation solution for the NoGAPSS navigation implementation on the fleet. Efforts will leverage ONR celestial navigation research into a reproducible ruggedized system fully integrated into the navigation suite.

Navigation Suite has been renamed Navigation as a Service (NaaS). Navigation as a Service (NaaS) / Computing Infrastructure (CI) funding will be used to develop a capability-based navigation service leveraging common hardware and virtualization across the system of systems. This effort will use rigorous systems engineering to implement a more efficient and sustainable solution set that is common across the Fleet and the Combat Systems to minimize configurations and reduce training required for Sailors.

B. Program Change Summary ($ in Millions)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Previous President's Budget	33.333	13.733	0.000	-	0.000
Current President's Budget	32.533	13.733	12.197	-	12.197
Total Adjustments	-0.800	0.000	12.197	-	12.197
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-			
• Congressional Rescissions	-	-			
• Congressional Adds	-	-			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-	-			
• SBIR/STTR Transfer	-0.800	0.000			
• Program Adjustments	0.000	0.000	0.000	-	0.000
• Rate/Misc Adjustments	0.000	0.000	0.000	-	0.000
• Adjustments to Budget Year	-	-	12.197	-	12.197

Change Summary Explanation

The FY 2023 funding request was reduced by $8.178 million to account for the availability of prior year execution balances.

R-4 PROGRAM SCHEDULE CHANGES:
Boundary Defense Capability (BDC) has changed to Afloat Navigation Cyber Hardening, Observation, and Response (ANCHOR) to better describe the new cybersecurity capability currently in development.

Exhibit R-2, RDT&E Budget Item Justification: PB 2023 Navy	Date: April 2022
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 7: *Operational Systems Development*	**R-1 Program Element (Number/Name)** PE 0204228N *I (U)SURFACE SUPPORT*

Assured Positioning, Navigation, and Timing (APNT) has added new program milestones to list future developmental efforts to provide alternate sources of PNT data in a GPS degraded/denied environment.

Navigation Suite has changed to Navigation as a Service (NaaS). Navigation as a Service (NaaS) is going to provide a capability-based navigation service leveraging common hardware and virtualization across the system of systems, which will minimize configurations and reduce Fleet training requirements.

FY 2023 funding increase reflects the fact that the FY 2022 President's Budget request did not include out-year funding.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy											Date: April 2022	
Appropriation/Budget Activity 1319 / 7					R-1 Program Element (Number/Name) PE 0204228N / *(U)SURFACE SUPPORT*				Project (Number/Name) 3311 / *Navigation Systems*			
COST ($ in Millions)	**Prior Years**	**FY 2021**	**FY 2022**	**FY 2023 Base**	**FY 2023 OCO**	**FY 2023 Total**	**FY 2024**	**FY 2025**	**FY 2026**	**FY 2027**	**Cost To Complete**	**Total Cost**
3311: *Navigation Systems*	123.579	32.533	13.733	12.197	-	12.197	20.301	18.301	15.266	15.376	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

The Surface Support RDT&E funding will be used for the research, design, development, integration testing, and documentation of the Inertial Navigation System (INS) AN/WSN-12 for all Navy ships and submarines. The INS provides mission critical ship position and attitude data to shipboard sensors (such as radars), combat and weapon systems. The INS uses data from the Global Positioning System (GPS) to periodically update (i.e., reset) its position and internal clock. The INS is the ship's primary position source in the absence of GPS, and it consists of an Inertial Sensor Module (ISM) and a Navigation Processing Module (NPM) that will provide a significant improvement with respect to attitude and velocity data over previous INS. RDT&E funding will support continued system design to create a baseline for Pre-Production Units (PPU), Low Rate Initial Production (LRIP), and Full Rate Production (FRP).

Boundary Defense Capability (BDC) has been renamed to Afloat Navigation Cyber Hardening, Observation, and Response (ANCHOR) to better describe the new cybersecurity capability currently in development. Cybersecurity funding will be used for the research, development, documentation and integration testing for cybersecurity hardening and enclave development for navigation systems. Efforts include the development of the Afloat Navigation Cyber Hardening, Observation and Response (ANCHOR) system capabilities, platform specific architectures, Electronic Chart Display and Information System (ECDIS) secure solution for existing unclassified configurations, CYBERSAFE implementation, cybersecurity risk and vulnerability assessments, and threat / mission models for representative groupings of Navigation systems and cybersecurity capabilities. Risk assessments along with requirements development will lead to incremental capability development leveraging the Increment 1 Engineering Development Model (EDM) delivery with updated architectures and system-level modifications. Follow-on capabilities will be developed and added to meet existing threats and requirements.

Time and Frequency Distribution System-Replacement (TFDS-R) funding will be used for the research, development, documentation, and integration testing for the submarine TFDS-R system. TFDS is a Commercial Off the Shelf (COTS) timing system utilizing the precision source signals of GPS to discipline two redundant Rubidium clocks to Universal Coordinated Time (UTC). TFDS provides common time to submarine equipment that utilizes clocking pulses or sinusoidal waveforms for proper operation and maintains accurate time in the event of loss of GPS input (holdover). TFDS uses multiple input power sources for redundancy and provides a built in battery backup. TFDS generates and distributes Precision Time and Timing Interval (PTTI) reference signals to support C4I capabilities needed for Joint, Naval and Allied missions.

Military GPS User Equipment (MGUE) will provide assured Positioning, Navigation, and Timing (PNT) in a GPS degraded environment. Funding will be used for the development of interface and performance requirements, shipboard system architecture definition, and MGUE integration.

Submarine Speed Sensors will provide investigation, development, testing and integration of new Own-Ship Speed sensors to address new capabilities, reduce detection, and improve reliability.

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*

Assured Positioning, Navigation, and Timing (APNT) funding will be used for Alternate GPS-independent sources of Positioning, Velocity, Attitude, and Timing (PVAT) data required to provide fire control solutions, ensure safety of navigation, and support aircraft and combat operations in a GPS degraded/denied environment. This effort provides a secure navigation method using the navigation resources being developed by Office of Naval research (ONR) Future Naval Capabilities (FNC) activity and Small Business Innovation Research (SBIR).

Automated Celestial Navigation System (ACNS) funding will be used for the research, development, Engineering Development Model (EDM), documentation and integration testing of the celestial navigation solution for the NoGAPSS navigation implementation on the fleet. Efforts will leverage ONR celestial navigation research into a reproducible ruggedized system fully integrated into the navigation suite.

Navigation Suite has been renamed Navigation as a Service (NaaS). Navigation as a Service (NaaS) / Computing Infrastructure (CI) funding will be used to develop a capability-based navigation service leveraging common hardware and virtualization across the system of systems. This effort will use rigorous systems engineering to implement a more efficient and sustainable solution set that is common across the Fleet and the Combat Systems to minimize configurations and reduce training required for Sailors.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Title: AN/WSN-12 Inertial Navigation System - Replacement (INS-R)	6.119	2.462	2.372	0.000	2.372
Articles:	-	-	-	-	-
FY 2022 Plans: Complete NPM Low Rate Initial Production (LRIP) Complete AN/WSN-12 development Complete ILA certification Continue AN/WSN-12 testing					
FY 2023 Base Plans: Continue AN/WSN-12 follow-on development Begin ISM Full Rate Production (FRP) Begin NPM Full Rate Production (FRP) Complete AN/WSN-12 testing Conduct AN/WSN-12 PRR					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: $0.090M decrease due to AN/WSN-12 follow-on development effort.					
Title: Cybersecurity	2.867	1.500	0.672	0.000	0.672

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Articles:	-	-	-	-	-
FY 2022 Plans: NAV Enclave Cross Domain Solution (CDS) Phase II Begin ANCHOR increment I development ANCHOR prototype I development and integration ***FY 2023 Base Plans:*** Continue NAV Enclave Cross Domain Solution (CDS) Phase II Continue ANCHOR increment I development ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** $0.828 decrease due to completion of ANCHOR prototype I development and integration.					
Title: Time Frequency Distribution System (TFDS) Replacement	1.900	0.500	0.000	0.000	0.000
Articles:	-	-	-	-	-
FY 2022 Plans: Begin and complete Low Rate Initial Production (LRIP) Conduct EQT testing ***FY 2023 Base Plans:*** None ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** $0.5M decrease due to completion of LRIP.					
Title: Military GPS User Equipment (MGUE)	5.541	3.556	0.800	0.000	0.800
Articles:	-	-	-	-	-
FY 2022 Plans: Complete M-Code integration Conduct antenna and receiver integration and testing ***FY 2023 Base Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Conduct TI-22 early integration and testing Begin TI-24 FOC integration and testing ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** $2.756M decrease due to completion of M-code integration.					
Title: Submarine Speed Sensors (SSS)	1.500	0.900	0.400	0.000	0.400
Articles:	-	-	-	-	-
FY 2022 Plans: Complete TEMPALT Update Complete Factory Acceptance Test (FAT) Conduct at-sea test event Continue Indicator-Transmitter Tech Refresh ***FY 2023 Base Plans:*** Begin new Submarine Speed Sensor development effort as part of Phase 2 design effort. Conduct Environmental Qualification Testing (EQT) Continue Indicator-Transmitter Tech Refresh ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** $0.5M decrease due to completion of various testing events in FY22.					
Title: Assured Positioning, Navigation, and Timing (APNT)	3.600	3.200	1.150	0.000	1.150
Articles:	-	-	-	-	-
FY 2022 Plans: Continue APNT ACNS processing and distribution cabinet integration ***FY 2023 Base Plans:*** Complete APNT ACNS processing and distribution cabinet integration ***FY 2023 OCO Plans:***					

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** $2.05M decrease due to transition from cabinet integration in FY22 to various land-based and shipboard testing efforts in FY23.					
Title: Automated Celestial Navigation System (ACNS)	6.040	0.372	5.335	0.000	5.335
Articles:	-	-	-	-	-
FY 2022 Plans: Continue system development, testing and evaluation ***FY 2023 Base Plans:*** Continue system testing and evaluation Complete system development Complete shipboard installation ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** $4.963M increase is required to support completion of ACNS development, and continuation of testing and evaluation that was deferred from FY22 due to under-execution reduction in FY22					
Title: Navigation as a Service (NaaS) / Computing Infrastructure (formerly Navigation Suite)	3.667	0.500	0.921	0.000	0.921
Articles:	-	-	-	-	-
FY 2022 Plans: NaaS System Requirements Review (SRR) Conduct NaaS Critical Design Review (CDR) ***FY 2023 Base Plans:*** Continue NaaS development and initiate NaaS prototype ***FY 2023 OCO Plans:*** N/A ***FY 2022 to FY 2023 Increase/Decrease Statement:*** $0.421M increase required to initiate NaaS Prototype Development.					
Title: Navigation Support	1.299	0.743	0.547	0.000	0.547

Exhibit R-2A, RDT&E Project Justification: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total
Articles:	-	-	-	-	-
FY 2022 Plans: Provide engineering, logistics, and programmatic support for AN/WSN-12, Cybersecurity, TFDS, MGUE, SSS, ACNS, APNT, and NaaS.					
FY 2023 Base Plans: Provide engineering, logistics, and programmatic support for AN/WSN-12, Cybersecurity, TFDS, MGUE, SSS, ACNS, APNT, and NaaS. Specifically, support system integration, testing, and evaluation at multiple land-based and shipboard sites.					
FY 2023 OCO Plans: N/A					
FY 2022 to FY 2023 Increase/Decrease Statement: $0.196M decrease due to PB23 adjustments to support the various Navigation development efforts. Specifically, support system integration, testing, and evaluation at multiple land-based and shipboard sites.					
Accomplishments/Planned Programs Subtotals	32.533	13.733	12.197	0.000	12.197

C. Other Program Funding Summary ($ in Millions)

Line Item	FY 2021	FY 2022	FY 2023 Base	FY 2023 OCO	FY 2023 Total	FY 2024	FY 2025	FY 2026	FY 2027	Cost To Complete	Total Cost
• OPN/0670: *Other Navigation*	72.771	72.300	98.079	-	98.079	94.073	80.077	88.529	88.362	Continuing	Continuing

Remarks

D. Acquisition Strategy

AN/WSN-12 Inertial Sensor Module (ISM) CPIF/CPFF/FFP contract competitively awarded in FY 2016. Contract includes options for conducting R&D milestones, manufacture of Engineering Development Models (EDM) and Pre-Production Units (PPU), and manufacture of Low Rate Initial Production (LRIP) and Full Rate Production (FRP).

Assured Positioning, Navigation, and Timing (APNT) has added new program milestones to list future developmental efforts to provide alternate sources of PNT data in a GPS
degraded/denied environment.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204228N / *(U)SURFACE SUPPORT*	Project (Number/Name) 3311 / *Navigation Systems*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering/ Design	WR	SPAWAR Atlantic : Little Creek, VA	16.845	8.950	Oct 2020	2.248	Oct 2021	1.250	Oct 2022	-		1.250	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	SPAWAR Pacific : San Diego, CA	1.875	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	WR Systems : Norfolk, VA	19.627	3.500	Oct 2020	4.908	Oct 2021	6.379	Oct 2022	-		6.379	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Penn State/ARL : Warminster, PA	4.668	0.500	Oct 2020	0.150	Oct 2021	0.100	Oct 2022	-		0.100	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC Dahlgren : Dahlgren, VA	2.643	4.316	Oct 2020	3.000	Oct 2021	1.600	Oct 2022	-		1.600	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC Dam Neck : Dam Neck, VA	0.340	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC PHD : Port Hueneme, CA	0.122	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NUWC Newport : Newport, RI	0.680	0.400	Oct 2020	0.300	Oct 2021	0.150	Oct 2022	-		0.150	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Old Dominion University : Suffolk, VA	0.450	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Northrop Grumman : Charlottesville, VA	42.522	3.500	Oct 2020	0.212	Oct 2021	0.300	Oct 2022	-		0.300	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	SPAWAR Atlantic : Charleston, SC	1.530	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC Philadelphia : Philadelphia, PA	1.237	0.300	Oct 2020	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Electric Boat : Groton, CA	0.953	0.000		0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	John Hopkins, APL : Laurel, MD	16.376	7.051	Oct 2020	1.800	Oct 2021	1.243	Oct 2022	-		1.243	Continuing	Continuing	Continuing
Systems Engineering/ Design	C/CPFF	Draper : Cambridge, MA	5.675	2.136	Oct 2020	0.372	Oct 2021	0.628	Oct 2022	-		0.628	Continuing	Continuing	Continuing
Systems Engineering/ Design	WR	NSWC Crane : Crane, IN	0.121	0.000		0.000		0.000		-		0.000	0.000	0.121	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2023 Navy			Date: April 2022
Appropriation/Budget Activity 1319 / 7	R-1 Program Element (Number/Name) PE 0204228N / *(U)SURFACE SUPPORT*	Project (Number/Name) 3311 / *Navigation Systems*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Systems Engineering/ Design	WR	Submarine Special Projects : Washington, DC	0.000	0.000		0.000		0.000		-		0.000	0.000	0.000	-
Systems Engineering/ Design	MIPR	COMOPTEVFOR : Norfolk, VA	0.021	0.000		0.000		0.000		-		0.000	0.000	0.021	-
Systems Engineering/ Design	WR	SPAWAR 5.0 : San Diego, CA	0.093	0.000		0.000		0.000		-		0.000	0.000	0.093	-
Systems Engineering/ Design	TBD	Carnegie Mellon : Not Specified	0.400	0.000		0.000		0.000		-		0.000	0.000	0.400	-
		Subtotal	116.178	30.653		12.990		11.650		-		11.650	Continuing	Continuing	N/A

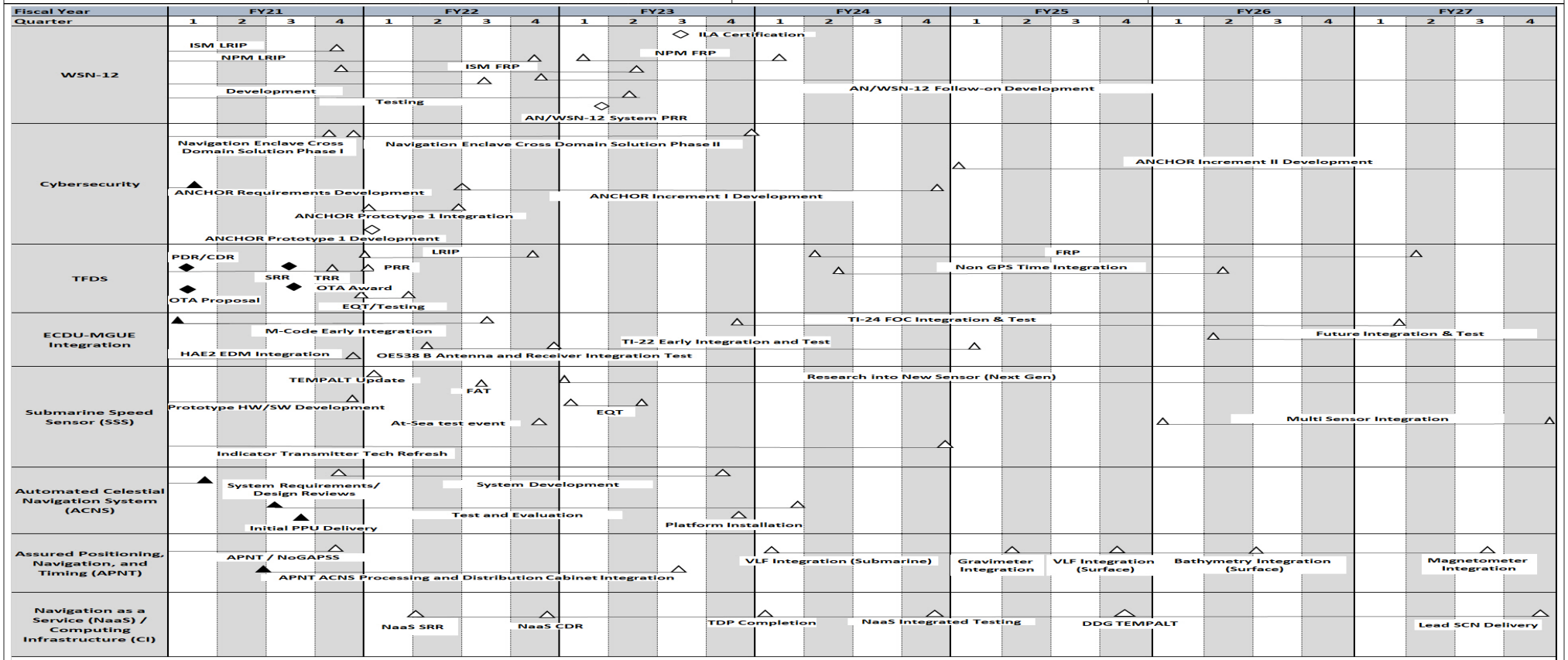
Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2021 Cost	FY 2021 Award Date	FY 2022 Cost	FY 2022 Award Date	FY 2023 Base Cost	FY 2023 Base Award Date	FY 2023 OCO Cost	FY 2023 OCO Award Date	FY 2023 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management	C/CPFF	Various : Not Specified	7.401	1.880	Oct 2020	0.743	Oct 2021	0.547	Oct 2022	-		0.547	Continuing	Continuing	Continuing
		Subtotal	7.401	1.880		0.743		0.547		-		0.547	Continuing	Continuing	N/A

	Prior Years	FY 2021		FY 2022		FY 2023 Base		FY 2023 OCO		FY 2023 Total	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	123.579	32.533		13.733		12.197		-		12.197	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*



Acronym List:

- ACNS: Automated Celestial Navigation System
- AoA: Analysis of Alternatives
- APNT: Assured Position, Navigation and Timing
- BDC: Boundary Defense Capability
- CDR: Critical Design Review
- CDS: Cross Domain Solution
- CPD: Capability Production Document
- DOTC: Defense Ordnance Technology Consortium
- ECDU: Enhanced Control Display Unit
- EDM: Eningeering Development Model
- EQT: Environment Qualification Test
- FRP: Full Rate Production
- FAT: Factory Acceptance Test
- FOT&E: Follow-on Test and Evaluation
- HAE2: Host Application Equipment
- HW: Hardware
- ILA: Integrated Logistics Assessment
- IOT&E: Initial Operational Test and Evaluation
- ISM: Inertial Sensor Module
- LRIP: Low Rate Initial Production
- M-Code: Military Code
- NPM: Navigation Processor Module
- OTRR: Operational Test Readiness Review
- OTA: Other Transaction Agreement
- PDR: Preliminary Design Review
- PPU: Pre-Production Unit
- PRR: Production Readiness Review
- SCDU: Secondary Control Display Unit
- SRR: System Requirements Review
- SW: Software
- SSDS: Ship Self Defense System
- TEMP: Test and Evaluation Master Plan
- TFDS-R: Time Frequency Distribution System Replacement
- TRD: Technical Requirements Document

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
3311 RDTE				
AN/WSN-12: AN/WSN-12 ILA Certification	3	2023	3	2023
AN/WSN-12: ISM Production: AN/WSN-12 ISM LRIP	1	2021	4	2021
AN/WSN-12: ISM Production: AN/WSN-12 ISM FRP	4	2021	2	2023
AN/WSN-12: NPM Production: AN/WSN-12 NPM LRIP	1	2021	4	2022
AN/WSN-12: NPM Production: AN/WSN-12 NPM FRP	1	2023	1	2024
AN/WSN-12: AN/WSN-12 Development	1	2021	3	2021
AN/WSN-12: AN/WSN-12 Developmental Testing	1	2021	2	2023
AN/WSN-12: AN/WSN-12 System PRR	1	2023	1	2023
AN/WSN-12: AN/WSN-12 Follow-on Development	4	2022	4	2027
Cybersecurity: Cybersecurity Navigation Enclave Cross Doman Solution Phase I	1	2021	4	2021
Cybersecurity: Cybersecurity Navigation Enclave Cross Domain Solution Phase II	4	2021	4	2023
Cybersecurity: Cybersecurity ANCHOR Requirements Development	1	2021	1	2021
Cybersecurity: Cybersecurity ANCHOR Increment I Development	2	2022	4	2024
Cybersecurity: Cybersecurity ANCHOR Increment II Development	1	2025	4	2027
Cybersecurity: Cybersecurity ANCHOR Prototype 1 Integration	1	2022	2	2022
Cybersecurity: Cybersecurity ANCHOR Prototype 1 Development	1	2022	1	2022
TFDS: TFDS-R OTA Proposal	1	2021	1	2021
TFDS: TFDS-R OTA Award	3	2021	3	2021
TFDS: TFDS-R SRR	3	2021	3	2021
TFDS: TFDS-R PDR	1	2021	1	2021
TFDS: TFDS-R CDR	1	2021	1	2021
TFDS: TFDS-R EQT/Testing	4	2021	1	2022

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
TFDS: TFDS-R TRR	4	2021	4	2021
TFDS: TFDS-R PRR	1	2022	1	2022
TFDS: TFDS-R LRIP	1	2022	4	2022
TFDS: TFDS-R FRP	2	2024	2	2027
TFDS: TFDS-R Non GPS Time Integration	2	2024	2	2026
MGUE: MGUE M-Code Integration	1	2021	3	2022
MGUE: MGUE HAE2 Integration	1	2021	4	2021
MGUE: MGUE OE538B Antenna and Receiver Integration Test	2	2022	4	2022
MGUE: MGUE TI-22 Early Integration and Test	4	2022	1	2025
MGUE: MGUE TI-24 FOC Integration and Test	4	2023	1	2027
MGUE: MGUE Future Integration and Test	2	2026	4	2027
SSS: SSS TEMPALT Update	1	2022	1	2022
SSS: SSS At-Sea Test Event	4	2022	4	2022
SSS: SSS FAT	3	2022	3	2022
SSS: SSS Prototype HW/SW Development	1	2021	4	2021
SSS: SSS EQT	1	2023	2	2023
SSS: SSS Research New Sensor	1	2023	4	2027
SSS: SSS Indicator-Transmitter Tech Refresh	1	2021	4	2024
SSS: SSS Multi Sensor Integration	1	2026	4	2027
ACNS: ACNS System Requirement/Design Reviews	1	2021	1	2021
ACNS: ACNS Initial PPU Delivery	3	2021	3	2021
ACNS: ACNS System Development	4	2021	4	2023
ACNS: ACNS System Test and Evaluation	2	2021	1	2024
ACNS: ACNS Platform Installation	4	2023	4	2023
APNT: APNT NoGAPSS	1	2021	4	2021
APNT: APNT ACNS Processing and Distribution Cabinet Integration	2	2021	3	2023

Exhibit R-4A, RDT&E Schedule Details: PB 2023 Navy		Date: April 2022
Appropriation/Budget Activity 1319 / 7	**R-1 Program Element (Number/Name)** PE 0204228N / *(U)SURFACE SUPPORT*	**Project (Number/Name)** 3311 / *Navigation Systems*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
APNT: APNT VLF Integration (Submarine)	1	2024	1	2024
APNT: APNT Gravimeter Integration	2	2025	2	2025
APNT: APNT VLF Integration (Surface)	4	2025	4	2025
APNT: APNT Bathymetry Integration (Surface)	3	2026	3	2026
APNT: APNT Magnetometer Integration	3	2027	3	2027
NaaS: NaaS SRR	2	2022	2	2022
NaaS: NaaS CDR	4	2022	4	2022
NaaS: NaaS TDP Completion	1	2024	1	2024
NaaS: Naas Integration Testing	4	2024	4	2024
NaaS: NaaS DDG TEMPALT	4	2025	4	2025
NaaS: NaaS Lead SCN Delivery	4	2027	4	2027