Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy											Date: February 2020	
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*					R-1 Program Element (Number/Name) PE 0603925N *I Directed Energy and Electric Weapon System*							
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	101.334	138.988	135.919	128.845	-	128.845	87.011	50.664	40.806	38.240	Continuing	Continuing
2731: *High Energy Laser Counter ASCM Project (HELCAP)*	0.000	0.000	6.750	38.012	-	38.012	29.952	15.462	6.506	3.251	Continuing	Continuing
3402: *Surface Navy Laser Weapon System (SNLWS)*	47.330	81.048	89.234	56.266	-	56.266	47.198	29.353	29.925	30.527	Continuing	Continuing
9823: *Lasers for Navy applicat*	54.004	32.954	19.935	34.567	-	34.567	9.861	5.849	4.375	4.462	Continuing	Continuing
9999: *Congressional Adds*	0.000	24.986	20.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	44.986

A. Mission Description and Budget Item Justification

This program element will transition Directed Energy and Electric Weapon Systems (DE&EWS) technology from Science and Technology (S&T) research to the Technology Maturation and Risk Reduction phase, ultimately leading to acquisition initiation for the Surface/Subsurface Navy.

DE&EWS consist of multiple breakthrough technologies including: laser weapons that provide for speed-of-light engagements at tactically significant ranges resulting in savings realized by minimizing the use of defensive missiles and projectiles; electromagnetic launch of projectiles that will significantly increase firing ranges imposing greater cost to adversaries of ballistic and air defense missile engagements; enhance the land attack mission; and fielding of high power radio frequency systems for non-kinetic electronic attack and active denial technology, allowing for non-lethal determination of threat intent beyond small arms fire ranges.

Development of DE&EWS includes: Weapons Grade High Energy Lasers, Electromagnetic Railgun (EMRG) Weapon Systems, High Power Radio Frequency Weapon/ Sensor Systems, and other systems/capabilities.

Project 2731 - High Energy Laser Counter ASCM Project (HELCAP): Defeating Anti-Ship Cruise Missiles (ASCMs) with a laser weapon system presents several technical challenges (e.g. high atmospheric turbulence, target acquisition and identification, target tracking, aim point maintenance, automatic aim point placement, jitter control). The High Energy Laser Counter ASCM Project (HELCAP) will assess, develop, experiment, and demonstrate the various laser weapon system technologies and methods of implementation (e.g. laser sources, mission analysis, lethality, advanced beam control with atmospheric mitigation, target and tracking sensors, control systems) required to defeat ASCMs in a crossing engagement.

FY2021 funding will provide for systems engineering, mission analysis, and the design completion, fabrication, and integration of major components of a HELCAP prototype system. Planning and preparations for FY2022-FY2023 system experimentation and demonstrations utilizing the prototype system will also continue.

Project 3402 - The Surface Navy Laser Weapon System (SNLWS) program supports the National Defense Strategy of building a more lethal force by leveraging mature technology to deliver proven laser weapon capability to the Fleet as part of the Navy Laser Family of Systems (NLFoS) initiative with the objective of providing the fleet

with near-term laser weapon capabilities. Additionally, accelerated learning through incorporation of laser weapon Concept of Operations (CONOPs), employment, and maintenance will enable the rapid development and integration of these capabilities with the Navys existing weapon systems. This NLFoS initiative will also develop and validate warfighting requirements for laser weapons to address a variety of threats and to mature technologies and system integration readiness. HELIOS provides a low cost-per-shot capability to address Anti-Surface Warfare and Counter-Intelligence, Surveillance and Reconnaissance (C-ISR) gaps with the ability to dazzle and destroy Unmanned Aerial Systems (UAS) and defeat Fast Inshore Attack Craft (FIAC) while integrated into the AEGIS Combat System on a Flt IIA Destroyer. SNLWS provides industry-developed and government integrated capability to the Fleet in as short a timeframe as possible, thereby addressing the National Defense Strategy direction to foster a culture of innovation. SNLWS includes the development of a laser weapon system in the 60 kW or higher class. Competition was utilized for system development and production efforts. SNLWS leverages mature technology that will deliver a mature laser weapon system capability to the Fleet. SNLWS development leverages the Laser Weapon System (LaWS)/Solid State Laser Quick Reaction Capability (SSL QRC) and Solid State Laser Technology Maturation (SSL TM)/Laser Weapon System Demonstrator (LWSD) efforts.

The FY 2021 funding supports completion of the system build, review and delivery of the Technical Data Package, logistics support material and training, and Packaging, Handling, Storage and Transportation (PHS&T) of one system for conduct of land based testing and subsequent delivery pier side for shipboard installation in a DDG 51 Flt IIA ship during AEGIS Modernization, and conduct of System Operational Verification Testing (SOVT).

Project 9823 - Lasers for Navy Applications: Optical Dazzling Interceptor Navy (ODIN) development provides near-term, directed energy, shipboard Counter-Intelligence, Surveillance, and Reconnaissance (C-ISR) capabilities to dazzle Unmanned Aerial Systems (UASs) and other platforms that address urgent operational needs of the Fleet. FY 2018 was the first year of funding which supports the design, development, procurement and installation of 8 ODIN standalone units over the FYDP, for deployment on DDG 51 Flt IIA surface combatants. The program supports the non-recurring engineering, development, procurement of long lead material, assembly and checkout, system certification, platform integration/installation and sustainment for these ODIN standalone units.

The FY 2021 funding completes procurement, assembly, checkout, integration, T&E and installation of Units 4 and 5; continues procurement, assembly, checkout, integration and T&E of Units 6, 7 and 8; and provides Operation & Sustainment (O&S) of Units 1-5. It should be noted that in order to fully fund the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units, a FY 2020 $9.975 million Below Threshold Reprogramming (BTR) is required.

Project 9999 (PU C440/C547) - Congressional Adds - Railgun Program: Congress added funding in FY2019 and FY2020 for ship-based program/technical development and ship integration related risk reduction. Electromagnetic railgun provides increased capability for the following mission sets: Naval Surface Fire Support (NSFS), Integrated Air and Missile Defense (IAMD), Fast Attack Craft and Fast Inshore Attack Craft (FAC/FIAC), and future potential for Anti-Surface Warfare (ASuW). This funding supports the testing and refinement of pulse current transfer, mount, and hypervelocity projectile component development. In addition, this project supports the continuing effort to define and evolve requirements related to mount and platform interface management and maturations of specifications for tactical railgun weapon system.

Project 9999 (PU C453) - Congressional Add - Surface Navy Laser Weapon System (SNLWS) Program Re-phasing: Congress added funding in FY 2019 for re-phasing of the SNLWS development and fielding effort. This funding supports procurement of HELIOS long lead materials in FY 2019 related to early award of the contract to Lockheed Martin Aculight.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603925N *I Directed Energy and Electric Weapon System*

Project 9999 (PU C516) - Congressional Add - High Energy Laser (HEL) Weapon System for Counter-Unmanned Ariel System (C-UAS) Area defense is a Congressionally directed effort to develop/build a minimized footprint, laser-agonistic beam director and beam control system (M-BD/BCS) to support Commercial Off The Shelf (COTS) lasers >10KW for possible application to Joint Light Tactical Vehicle (JLTV) sized vehicles.

FY2020 funding will provide for systems engineering, design, and fabrication of this M-BD/BCS.

B. Program Change Summary ($ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	142.814	118.169	80.903	-	80.903
Current President's Budget	138.988	135.919	128.845	-	128.845
Total Adjustments	-3.826	17.750	47.942	-	47.942
• Congressional General Reductions	-	-			
• Congressional Directed Reductions	-	-2.250			
• Congressional Rescissions	-	-			
• Congressional Adds	-	20.000			
• Congressional Directed Transfers	-	-			
• Reprogrammings	-0.296	0.000			
• SBIR/STTR Transfer	-3.530	0.000			
• Program Adjustments	0.000	0.000	26.557	-	26.557
• Rate/Misc Adjustments	0.000	0.000	21.385	-	21.385

Congressional Add Details ($ in Millions, and Includes General Reductions)	FY 2019	FY 2020
Project: 9999: *Congressional Adds*		
Congressional Add: *Electromagnetic Railgun*	9.647	0.000
Congressional Add: *SNLWS Program Rephasing*	15.339	0.000
Congressional Add: *High Energy Laser Weapon System for C-UAS Area Defense*	0.000	10.000
Congressional Add: *Railgun*	0.000	10.000
Congressional Add Subtotals for Project: 9999	24.986	20.000
Congressional Add Totals for all Projects	24.986	20.000

Change Summary Explanation

The FY 2019 net funding decrease in the amount of $3.826 million consists of a $3.530 million SBIR/STTR/FTT Assessment; and a $.296 million Below Threshold Reprogramming (BTR) required to cover higher priority requirements.

Exhibit R-2, RDT&E Budget Item Justification: PB 2021 Navy	Date: February 2020
Appropriation/Budget Activity 1319: *Research, Development, Test & Evaluation, Navy I* BA 4: *Advanced Component Development & Prototypes (ACD&P)*	**R-1 Program Element (Number/Name)** PE 0603925N *I Directed Energy and Electric Weapon System*

The FY20 net funding increase in the amount of $17.75 million consists of a Congressional Directed Reduction against HELCAP in the amount of $2.25 million and two Congressional Adds: $10 million for the Electromagnetic Rail Gun Program and $10 million for the HEL Weapon System for C-UAS.

FY20 Schedule change for SNLWS: FQT shifted left; from early FY21 to late FY20 on the schedule.

FY21 Program Adjustments of $47.942 million accounts for an $18.957 million increase for the High Energy Laser Counter ASCM Project (HELCAP) PU 2731 to procure and integrate all major elements of a prototype system to address laser technology for ACSM threats; and a $28.95 million increase for Lasers for Navy Applications PU 9823 in support of the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units as a result of realized cost growth; and a $.035 million rate adjustment.

9823 Lasers for Navy Applications - Program change rationale - A Program Adjustment in the amount of $28.95 million in FY21 and $3.5 million in FY22 was provided to Lasers for Navy Applications PU 9823 in support of the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units as a result of realized cost growth. It should be noted that in order to fully fund the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units, a FY 2020 $9.975 million Below Threshold Reprogramming (BTR) is required.

Product Development: The cost savings originally estimated from production of multiple units by government vice industry have not been realized. The FY 2020 President's Budget request cost per ODIN system (material only) was estimated at approximately $3.63M (8 units = $29M); DON 21 cost per unit (material only) was realized at approximately $5.18M (6 units = $31.1M).

- ODIN is the first of its kind laser system. Non-recurring engineering (NRE) costs increased significantly due to new technology development efforts required for the following system components: lasers, fast steering mirrors, line replaceable units, control software, telescopes with mounted optics, and motor control units and drive assemblies for the gimbal and fine track cameras.

- Software development estimates increased (i.e., 20K estimated lines of code to 42K estimated lines of code, a $7M increase), due to system complexities, capabilities, and concept of employment.

Support: Platform Integration including Installation Control Drawings (ICDs), Ship Installation Drawings (SIDs) and system installation costs were realized at three times the original cost estimate. Below-deck work required for ODIN installations is more extensive than originally programmed.

Test & Evaluation (T&E): Testing of newly developed capabilities required a much higher quantity and quality of aircraft and targets for testing; and subsequent data analysis to validate requisite system capabilities.

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*	

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
2731: *High Energy Laser Counter ASCM Project (HELCAP)*	0.000	0.000	6.750	38.012	-	38.012	29.952	15.462	6.506	3.251	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

Note

This project is not a new start in FY20 as efforts associated with RHEL PH II now titled HELCAP were ongoing in PE 0603801N. Due to technology maturation, a portion of HELCAP program efforts now fall into BA04.

A. Mission Description and Budget Item Justification

The High Energy Laser Counter ASCM Project (HELCAP) will expedite the development, experimentation, integration and demonstration of critical technologies to defeat crossing Anti-Ship Cruise Missiles (ASCM) by addressing the remaining technical challenges, e.g.: atmospheric turbulence, automatic target identification and aim point selection, precision target tracking with low jitter in high clutter conditions, advanced beam control, and higher power HEL development. HELCAP will assess, develop, experiment, and demonstrate the various laser weapon system technologies and methods of implementation required to defeat ASCMs in a crossing engagement.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: High Energy Laser Counter ASCM Project (HELCAP)	0.000	6.750	38.012	0.000	38.012
Articles:	-	-	-	-	-
Description: The High Energy Laser Counter ASCM Project (HELCAP) will expedite the development, experimentation, integration and demonstration of critical technologies to defeat crossing Anti-Ship Cruise Missiles (ASCM) by addressing the remaining technical challenges, e.g.: atmospheric turbulence, automatic target identification and aim point selection, precision target tracking with low jitter in high clutter conditions, advanced beam control, and higher power HEL development. HELCAP will assess, develop, experiment, and demonstrate the various laser weapon system technologies and methods of implementation required to defeat ASCMs in a crossing engagement. HELCAP will leverage the knowledge gained in the Navy Laser Family of Systems (NLFoS) efforts: - Alternative Laser Sources for higher powers, also known as the Ruggedized High Energy Laser (RHEL) activities;					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Solid State Laser Tech Maturation activities that provides initial key enabling technical solutions in high power lasers and beam control, and will provide opportunities for single ship operational and sustainment learning; - Surface Navy Laser Weapon System Increment 1 (SNLWS Inc. 1) project that provides the initial combat system integration and installation knowledge for Aegis platforms, and multi-ship battle force operations knowledge; - Optical Dazzling Interdictor Navy (ODIN) that provides Counter-ISR technical and fleet operational knowledge. This leveraged knowledge and new HELCAP technical solutions to the C-ASCM problem will enable a fully informed decision to rapidly field an integrated, fleet ready, HEL Weapon. HELCAP activities being conducted with advanced technology development (BA 03) funds under PE 0603801N Innovative Naval Prototypes (INP) include technology assessments, laser lethality investigations, and advanced beam control. HELCAP activities being conducted within this program element (PE) include: the laser weapon control system; test site auxiliary prime power and cooling; adapting an OSD 300 kW+ laser source for transport and integration with the prototype system; integrating the beam control testbed from the BA 03 effort; integrating all remaining prototype system elements; and performing experimentation and detect-to-defeat demos conducted within this program element (PE). ***FY 2020 Plans:*** The FY 2020 funding supports automated laser weapon control activities, as well as the initiation of planning and establishment of test assets and test site preparations to enable FY 2022-2023 counter ASCM detect to defeat demonstrations. FY 2020 tasks include: - Perform Systems Engineering activities to ensure that the advanced technology development (BA 03) HELCAP products being produced under PE 0603801N appropriately interface with automated laser weapon control and planned counter ASCM detect to defeat demonstrations. - Perform additional mission analysis to ensure counter ASCM detect to defeat demos are representative of future concepts of operations. - Perform automated laser weapon control system design and fabricate tasks including laser weapon control, laser weapon console, and target acquisition handover. Activities may include requirements flow-down, design reviews, interface documents, and identification of long lead procurements,					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Initiate planning to enable FY 2022-2023 counter ASCM detect to defeat demonstrations. This may include requirements development, draft integrated test plans, confirm test site selection and initial approvals, and identification of long lead test articles. - Initiate establishment of test asset procurements and site preparation to enable FY 2022-2023 counter ASCM detect to defeat demonstrations. OCO: N/A.					
FY 2021 Base Plans: FY2021 funding will provide for systems engineering, mission analysis, and the design completion, fabrication, and integration of major components of a HELCAP prototype system. Planning and preparations for FY2022-FY2023 system experimentation and demonstrations utilizing the prototype system will also continue. FY2021 tasks include: - Perform additional mission analysis to ensure counter ASCM detect to defeat demos are representative of future concepts of operations - Continue to perform Systems Engineering activities to ensure that all elements of the prototype system meet interface and performance requirements for planned counter ASCM detect to defeat experimentation and demonstrations. Prototype system elements include the beam control testbed, 300 kW+ laser source, prototype control system, and auxiliary prime power and cooling. - Complete design and fabricate laser weapon control, prime power, and cooling hardware. - Select one of the laser sources being developed under an OSD laser scaling initiative and adapt it for transport and interface with the other elements of the prototype system - Integrate all prototype system and auxiliary elements including beam control, laser source, laser weapon control, prime power, and cooling. - Continue T&E planning to enable FY22-23 counter ASCM detect to defeat experimentation and demonstrations. This may include requirements development, draft integrated test plans, safety, initial approvals, and identification of long lead test articles. - Continue test asset procurements and site preparation to enable FY22-23 counter ASCM detect to defeat experimentation and demonstrations.					
FY 2021 OCO Plans:					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** Funding for HELCAP efforts increases from $6.75M to $38M in order to procure and initiate integration of major elements of the prototype system. This includes the laser weapon control system; test site auxiliary prime power and cooling; and adapting an OSD 300 kW+ laser source for transport and integration with the prototype system. Additionally, the beam control test bed developed under PE 0603801N will be integrated into the prototype system.					
Accomplishments/Planned Programs Subtotals	0.000	6.750	38.012	0.000	38.012

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
• RDTE/0603801N/2731: *High Energy Laser Counter ASCM Project*	0.000	0.000	29.500	-	29.500	14.000	4.000	0.000	0.000	0.000	47.500

Remarks

D. Acquisition Strategy

The HELCAP is an initiative that provides a flexible prototype system for government experimentation and demonstration of a high-energy laser system capable of defeating an anti-ship cruise missile. Key elements of the prototype system include the beam control testbed, 300 kW+ laser source, prototype control system, and auxiliary prime power and cooling. The industry provider of the beam control testbed (developed under PE 0603801N) was selected through a competitive process and is being designed to accept technology insertion from other industry providers. The 300+ kW laser source will be acquired by selecting one of the laser sources being developed under an OSD laser scaling initiative and adapting it for transport and interface with the other elements of the prototype system. The Naval Surface Warfare Center Dahlgren (NSWCDD) will design and fabricate the control system and auxiliary prime power and cooling systems. NSWCDD government and contractor engineers will then integrate all above elements that make up the prototype and auxiliary systems and perform FY22-23 counter ASCM detect to defeat experimentation and demonstrations at government test sites.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Prototype System Controls, Target Tracking, and Deconfliction (Government team)	WR	NSWC Dahlgren : Dahlgren VA	0.000	0.000		2.500	Oct 2019	3.905	Oct 2020	-		3.905	Continuing	Continuing	Continuing
Prototype System Controls, Target Tracking, and Deconfliction (Contractor Team)	C/CPFF	Booz Allen Hamilton : Dahlgren VA	0.000	0.000		1.750	Dec 2019	1.300	Nov 2020	-		1.300	Continuing	Continuing	Continuing
HELCAP Mission Analysis	WR	NSWC Dahlgren : Dahlgren VA	0.000	0.000		1.000	Oct 2019	1.000	Oct 2020	-		1.000	Continuing	Continuing	Continuing
HELCAP Mission Analysis	C/CPFF	JHU/APL : Laurel MD	0.000	0.000		0.000		1.000	Nov 2020	-		1.000	Continuing	Continuing	Continuing
Design government owned interfaces between the OSD Laser Source and Prototype System	WR	NSWC Dahlgren : Dahlgren VA	0.000	0.000		0.000		0.907	Oct 2020	-		0.907	Continuing	Continuing	Continuing
Adapt OSD Laser Source for Transport and Interface with Prototype System	C/CPFF	TBD : Not Specified	0.000	0.000		0.000		7.000	Nov 2020	-		7.000	Continuing	Continuing	Continuing
Prototype and Support System Integration	WR	NSWC Dahlgren : Dahlgren VA	0.000	0.000		0.000		4.450	Oct 2020	-		4.450	Continuing	Continuing	Continuing
Procure and Assemble Prototype System Power and Cooling Customized Trailers	C/CPFF	TBD : Not Specified	0.000	0.000		0.000		8.000	Nov 2020	-		8.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		5.250		27.562		-		27.562	Continuing	Continuing	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
HELCAP Systems Engineering, Safety,	WR	NSWC Dahlgren : Dahlgren VA	0.000	0.000		1.250	Oct 2019	3.250	Oct 2020	-		3.250	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Management (Government team)															
HELCAP Systems Engineering, Safety, Program Management (Contractor team)	C/CPFF	Multiple : Dahlgren VA	0.000	0.000		0.000		2.900	Oct 2020	-		2.900	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		1.250		6.150		-		6.150	Continuing	Continuing	N/A

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Planning for FY22-23 experimentation and ASCM detect to defeat demonstrations	WR	NSWC Dahlgren & NSWC Port Hueneme : Dahlgren VA & Port Hueneme CA	0.000	0.000		0.000	Oct 2019	1.300	Oct 2020	-		1.300	Continuing	Continuing	Continuing
Test site long lead assets and preparations for FY22-23 experimentation ASCM detect to defeat demonstration	C/CPFF	Holloman Air Force Base & NSWC Port Hueneme : Alamogardo NM & San Nicolas Island CA	0.000	0.000		0.000	Oct 2019	1.500	Jan 2021	-		1.500	Continuing	Continuing	Continuing
Stand Alone Tracker, Adaptive Optics and Other Experimentation	WR	NSWC Dahlgren : Dahlgren VA	0.000	0.000		0.000		1.000	Oct 2020	-		1.000	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.000		3.800		-		3.800	Continuing	Continuing	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
HELCAP Program Management /Engineering Support	C/CPFF	Booz Allen Hamilton : Dahlgren, VA	0.000	0.000		0.250	Oct 2019	0.500	Nov 2020	-		0.500	Continuing	Continuing	Continuing
		Subtotal	0.000	0.000		0.250		0.500		-		0.500	Continuing	Continuing	N/A

	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	0.000	0.000		6.750		38.012		-		38.012	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

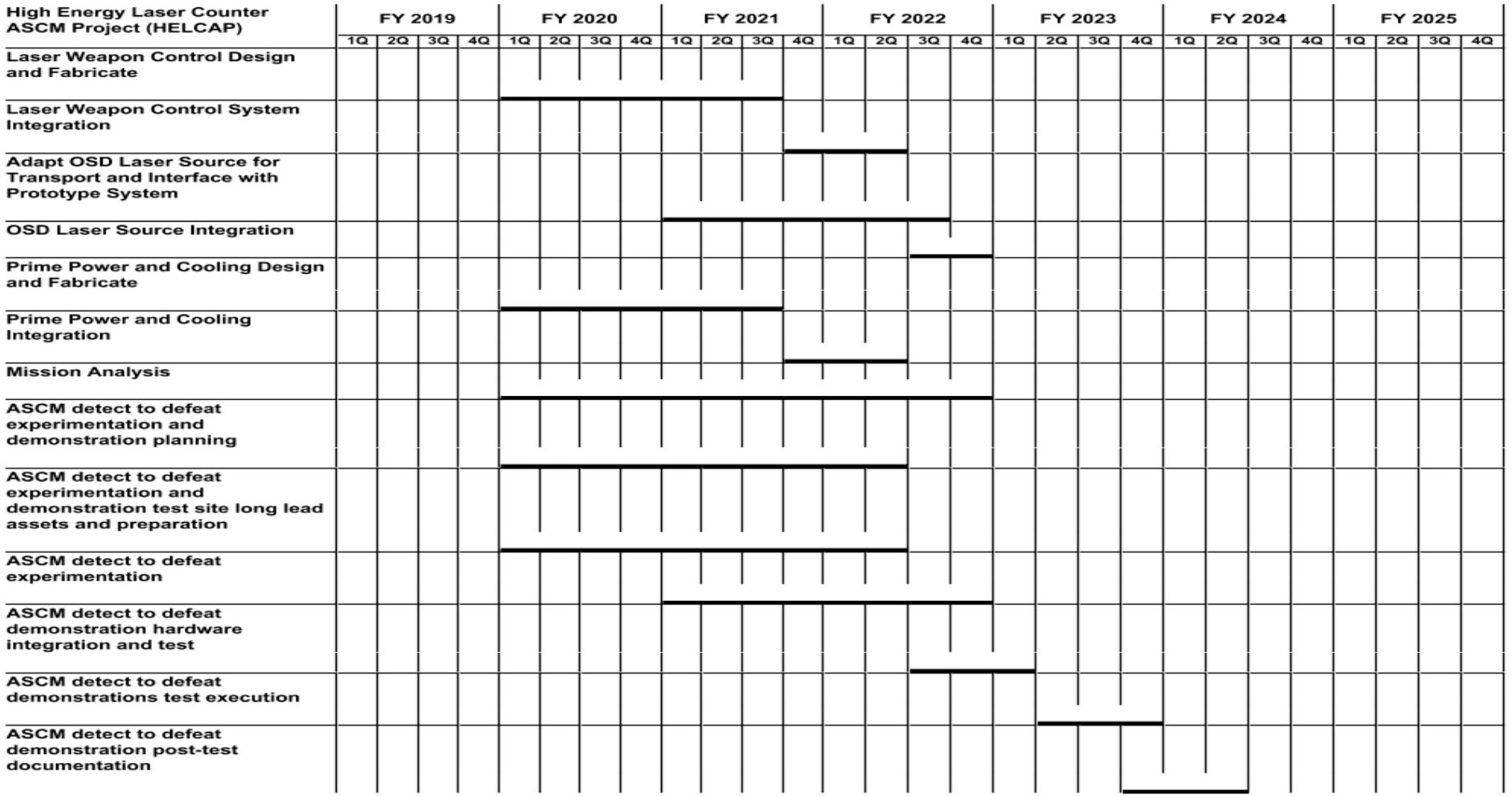

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

2021DON - 0603925N - 2731

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 2731 / *High Energy Laser Counter ASCM Project (HELCAP)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
High Energy Laser Counter ASCM Project (HELCAP)				
Laser Weapon Control Design and Fabricate: HELCAP: Laser Weapon Control Design and Fabricate	1	2020	3	2021
Laser Weapon Control System Integration: HELCAP: Laser Weapon Control System Integration	4	2021	2	2022
Adapt OSD Laser Source for Transport and Interface with Prototype System: HELCAP: Adapt OSD Laser Source for Transport and Interface with Prototype System	1	2021	3	2022
OSD Laser Source Integration: HELCAP: OSD Laser Source Integration	3	2022	4	2022
Prime Power and Cooling Design and Fabricate: HELCAP: Prime Power and Cooling Design and Fabricate	1	2020	3	2021
Prime Power and Cooling Integration: HELCAP: Prime Power and Cooling Integration	4	2021	2	2022
Mission Analysis: HELCAP: Mission Analysis	1	2020	4	2022
ASCM detect to defeat experimentation and demonstration planning: HELCAP: ASCM detect to defeat experimentation and demonstration planning	1	2020	2	2022
ASCM detect to defeat experimentation and demonstration test site long lead assets and preparation: HELCAP: ASCM detect to defeat experimentation and demo test site assets and preparation	1	2020	2	2022
ASCM detect to defeat experimentation: HELCAP: ASCM detect to defeat experimentation	1	2021	4	2022
ASCM detect to defeat demonstration hardware integration and test: HELCAP: ASCM detect to defeat demonstration hardware integration and test	3	2022	1	2023
ASCM detect to defeat demonstrations test execution: HELCAP: ASCM detect to defeat demonstrations test execution	2	2023	4	2023
ASCM detect to defeat demonstration post-test documentation: HELCAP: ASCM detect to defeat demonstration post-test documentation	4	2023	2	2024

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 3402 / *Surface Navy Laser Weapon System (SNLWS)*	

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
3402: *Surface Navy Laser Weapon System (SNLWS)*	47.330	81.048	89.234	56.266	-	56.266	47.198	29.353	29.925	30.527	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 3402 - The Surface Navy Laser Weapon System (SNLWS) program supports the National Defense Strategy of building a more lethal force by leveraging mature technology to deliver proven laser weapon capability to the Fleet as part of the Navy Laser Family of Systems (NLFoS) initiative with the objective of providing the fleet with near-term laser weapon capabilities. Additionally, accelerated learning through incorporation of laser weapon Concept of Operations (CONOPs), employment, and maintenance will enable the rapid development and integration of these capabilities with the Navy's existing weapon systems. This NLFoS initiative will also develop and validate warfighting requirements for laser weapons to address a variety of threats and to mature technologies and system integration readiness. HELIOS provides a low cost-per-shot capability to address Anti-Surface Warfare and Counter-Intelligence, Surveillance and Reconnaissance (C-ISR) gaps with the ability to dazzle and destroy Unmanned Aerial Systems (UAS) and defeat Fast Inshore Attack Craft (FIAC) while integrated into the AEGIS Combat System on a Flt IIA Destroyer. SNLWS provides industry-developed and government integrated capability to the Fleet in as short a timeframe as possible, thereby addressing the National Defense Strategy direction to foster a culture of innovation. SNLWS includes the development of a laser weapon system in the 60 kW or higher class. Competition was utilized for system development and production efforts. SNLWS leverages mature technology that will deliver a mature laser weapon system capability to the Fleet. SNLWS development leverages the Laser Weapon System (LaWS)/Solid State Laser Quick Reaction Capability (SSL QRC) and Solid State Laser Technology Maturation (SSL TM)/Laser Weapon System Demonstrator (LWSD) efforts.

The FY 2021 funding supports completion of the system build, review and delivery of the Technical Data Package, logistics support material and training, and Packaging, Handling, Storage and Transportation (PHS&T) of one system for conduct of land based testing and subsequent delivery pier side for shipboard installation in a DDG 51 Flt IIA ship during AEGIS Modernization, and conduct of System Operational Verification Testing (SOVT).

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: SNLWS Prime Contractor Efforts	58.632	53.818	25.000	0.000	25.000
Articles:	-	-	-	-	-
FY 2020 Plans: - Conduct Critical Design Review (CDR) to assess the system detailed design. - Complete integration of sub-systems to include High Energy Laser Weapon System combined with a C-ISR capability for countering UAS-mounted sensors. - Preparation for and initiation of test events associated with contractor testing and verification of system for delivery.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Conduct test events associated with FQT and verification of system for delivery. - Develop and deliver required contract deliverables/documentation, including life cycle support and training documentation. - Conduct SNLWS Technical Interchange Meetings (TIMs) with PEO IWS and designated field activities. - Provide programmatic and engineering support to SNLWS Integrated Product Teams (IPTs) and Working Groups (WGs). - Design, build, construct and integrate ship representative land based test site enclosure. ***FY 2021 Base Plans:*** - Complete integration of sub-systems to include High Energy Laser Weapon System combined with a C-ISR capability for countering UAS-mounted sensors. - Conduct test events associated with land based test. - Develop and deliver required contract deliverables/documentation, including life cycle support and training documentation. - System Delivery pier side. - Conduct SNLWS Technical Interchange Meetings (TIMs) with PEO IWS and designated field activities. - Provide programmatic and engineering support to SNLWS Integrated Product Teams (IPTs) and Working Groups (WGs). ***FY 2021 OCO Plans:*** N/A. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The decrease in prime contractor funding in FY 21 is a result of the HELIOS system procurement under the base contract being funded in FY 20. The FY 21 funding will be utilized to fund the requisite options to support the system.					
Title: SNLWS Government and Support Engineering Services	22.416	35.416	31.266	0.000	31.266
Articles:	-	-	-	-	-
FY 2020 Plans: - Deliver completed Weapons Domain Laser Controller (WDLC) as GFE to vendor. - Deliver completed Laser Weapon Control System (LWCS) as GFE to vendor. - Deliver completed Deconfliction Safety Software (DSS) as GFE to vendor. - Deliver completed Laser Authorization Key (LAK) as GFE to vendor.					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Complete analysis of Government Furnished Equipment (GFE) performance and implementation of software fixes. - Support conduct of Critical Design Review (CDR). - Continue review of all contractor provided engineering, design, production readiness, and test documentation. - Conduct Technical Interchange Meetings (TIMs) with contractor and government personnel. - Provide programmatic and engineering support to government-led Integrated Product Teams (IPTs) and Working Groups (WGs). - Support execution of planned test events and conduct analysis of test results. - Support Factory Qualification Test (FQT) for components/subsystems/systems. - Review/comment/approve deliverables provided by the contractor. - Update and implement programmatic and technical documentation developed to support all requisite cost, schedule, and performance reporting requirements. - Prepare drawings, support ship checks, support AEGIS Integration, procure long lead material in support of and preparation for land based testing and Shipboard Installation. ***FY 2021 Base Plans:*** - Continue review of all contractor provided engineering, design, production readiness, and test documentation. - Conduct Technical Interchange Meetings (TIMs) with contractor and government personnel. - Provide programmatic and engineering support to government-led Integrated Product Teams (IPTs) and Working Groups (WGs). - Continue AEGIS Combat System software engineering, development, and integration; conduct Levels 1-5 integration and testing. - Provide insight and oversight for development of life cycle support material and training documentation. - Initiate DDG 51 Flight IIA Ship Integration and Installation. - Provide support for contractor led land based test events and provide analysis of results for verification and validation of requirements. ***FY 2021 OCO Plans:*** N/A. ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The decrease in funding from FY20 to FY21 is a result of the level of effort decreasing for development/ oversight, with primary efforts focused on installation, checkout and fleet testing of the system shipboard.					
Accomplishments/Planned Programs Subtotals	81.048	89.234	56.266	0.000	56.266

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The acquisition strategy permits accelerated fielding of laser weapon systems in the Fleet and provides a demand signal for the industrial base to expand the capacity to develop and manufacture this advanced technology. The acquisition strategy consists of the baseline development and production of one unit followed by options to acquire system quantities at firm fixed price that will address operational needs of the Fleet in the requisite timeframe to offset future threats and maintain technological superiority over potential adversaries. SNLWS provides for industry-developed and government integrated capability to the Fleet in as short a timeframe as possible, thereby addressing the National Defense Strategy direction to foster a culture of affordability. SNLWS includes the development of an advanced laser weapon system in the 60 kW or higher class. Competition was utilized for system development and production efforts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*	

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SNLWS Development	C/CPIF	Lockheed Martin Aculight : Bothell, WA	32.000	58.010	Oct 2018	44.505	Oct 2019	0.000		-		0.000	0.000	134.515	-
		Subtotal	32.000	58.010		44.505		0.000		-		0.000	0.000	134.515	N/A

Remarks

FY20 funding was realigned from product development to T&E in order to provide the requisite T&E support of the final product which includes fixture, facility and targets. The base product development completes in FY20.

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SNLWS Systems Engineering, Program Management, GFE/GFI	WR	NSWC Dahlgren : Dahlgren, VA	9.066	9.558	Nov 2018	10.061	Nov 2019	7.988	Nov 2020	-		7.988	Continuing	Continuing	Continuing
SNLWS Ship Installation, Integration & Documentation	C/CPAF	BIW : Bath, ME	0.103	1.106	Jan 2019	3.340	Jan 2020	2.234	Jan 2021	-		2.234	Continuing	Continuing	Continuing
SNLWS Combat System Integration/Licenses	C/CPFF	Lockheed Martin : Moorestown, NJ	1.433	6.817	Nov 2018	1.750	Oct 2019	1.000	Dec 2020	-		1.000	Continuing	Continuing	Continuing
SNLWS Systems Engineering	WR	NSWC Crane : Crane, IN	0.270	0.162	Nov 2018	0.162	Dec 2019	0.162	Nov 2020	-		0.162	Continuing	Continuing	Continuing
SNLWS Systems Engineering	WR	NSWC PHD : Port Hueneme, CA	0.477	0.280	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
SNLWS Systems Engineering	WR	NIWC Pacific : San Diego, CA	0.146	0.199	Dec 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
SNLWS Systems Engineering	WR	NPS : Monterey, CA	0.150	0.050	Jan 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
SNLWS Systems Engineering	MIPR	MIT LL : Lexington, MA	0.005	0.000		0.000		0.000		-		0.000	0.000	0.005	-
SNLWS Systems Engineering	C/CPFF	PSU EOC : Freeport, PA	0.500	0.300	Nov 2018	0.200	Feb 2020	0.200	Dec 2020	-		0.200	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 3402 / *Surface Navy Laser Weapon System (SNLWS)*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SNLWS Technical Director	WR	NSWC Crane : Crane, IN	0.280	0.324	Nov 2018	0.324	Dec 2019	0.324	Dec 2020	-		0.324	Continuing	Continuing	Continuing
SNLWS Product Support	WR	NSWC PHD : Port Hueneme, CA	0.182	0.475	Nov 2018	2.113	Jan 2020	3.000	Nov 2020	-		3.000	Continuing	Continuing	Continuing
SNLWS Installation APM	WR	NSWC Dahlgren DNA : Dam Neck, VA	0.168	0.075	Jul 2019	0.379	Nov 2019	0.300	Nov 2020	-		0.300	Continuing	Continuing	Continuing
SNLWS Radar Cross Section Engineering	WR	NSWC Carderock : Potomac, MD	0.000	0.029	Feb 2019	0.000		0.000		-		0.000	0.000	0.029	-
SNLWS Environmental Engineering	WR	NUWC Newport : Newport, RI	0.000	0.031	May 2019	0.000		0.000		-		0.000	0.000	0.031	-
SNLWS System Installation	C/CPAF	Executing Shipyard : TBD	0.000	0.000		5.000	Jan 2020	7.500	Jan 2021	-		7.500	Continuing	Continuing	Continuing
SNLWS Engineering / Sustainment Support	C/CPIF	Lockheed Martin Aculight : Bothell, WA	0.000	0.000		4.936	Jul 2020	25.000	Dec 2020	-		25.000	Continuing	Continuing	Continuing
SNLWS Installation Engineering	C/CPAF	Third Party Planning (3PP) : Not Specified	0.000	0.005	Sep 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
SNLWS Laser Range Hazard Analysis	WR	NSWC Corona : Corona, CA	0.000	0.021	Dec 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
SNLWS PARASENSE	C/CPFF	Delta : Alexandria, VA	0.000	0.000		0.040	Jan 2020	0.150	Dec 2020	-		0.150	Continuing	Continuing	Continuing
SNLWS Platform Integration/ILS/Installation Support	C/CPFF	CACI : Washington, DC	0.000	0.000		0.184	Jan 2020	0.199	Jan 2021	-		0.199	Continuing	Continuing	Continuing
		Subtotal	12.780	19.432		28.489		48.057		-		48.057	Continuing	Continuing	N/A

Remarks

Executing shipyard for installation is still TBD.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 3402 / *Surface Navy Laser Weapon System (SNLWS)*	

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SNLWS Test & Evaluation	WR	NIWC Pacific : San Diego, CA	0.122	0.000		0.000	Nov 2019	0.000	Nov 2020	-		0.000	Continuing	Continuing	Continuing
SNLWS Test & Evaluation	WR	NSWC PHD : Port Hueneme, CA	0.133	0.657	Nov 2018	0.911	Jan 2020	2.250	Jan 2021	-		2.250	Continuing	Continuing	Continuing
SNLWS Test & Evaluation	WR	NSWC Crane : Crane, IN	0.000	0.150	Nov 2018	1.183	Dec 2019	0.600	Nov 2020	-		0.600	Continuing	Continuing	Continuing
SNLWS Test & Evaluation	WR	NSWC Dahlgren : Dahlgren, VA	0.707	0.152	Nov 2018	0.500	Nov 2019	0.750	Nov 2020	-		0.750	Continuing	Continuing	Continuing
SNLWS Test & Evaluation	C/CPIF	Lockheed Martin Aculight : Bothell, WA	0.000	0.622	Jun 2019	4.377	Oct 2019	0.000		-		0.000	Continuing	Continuing	Continuing
SNLWS Test & Evaluation	WR	NSWC Dahlgren DNA : Dam Neck, VA	0.000	0.000		0.100	Nov 2019	0.100	Nov 2020	-		0.100	Continuing	Continuing	Continuing
SNLWS Test & Evaluation (Targets)	TBD	TBD : TBD	0.000	0.000		3.982	Jan 2020	2.200	Jan 2021	-		2.200	Continuing	Continuing	Continuing
SNLWS Test Site Preparation	WR	SCSC Wallops : Wallops Island, VA	0.000	0.030	Jul 2019	2.500	Nov 2019	0.000		-		0.000	0.000	2.530	-
SNLWS Test Site Preparation	WR	NASA Wallops : Wallops Island, VA	0.000	0.020	Jul 2019	0.180	Jan 2020	0.000		-		0.000	0.000	0.200	-
SNLWS Test & Evaluation	WR	NAWC CL : China Lake, AZ	0.000	0.000		0.300	Nov 2019	0.100	Dec 2020	-		0.100	Continuing	Continuing	Continuing
		Subtotal	0.962	1.631		14.033		6.000		-		6.000	Continuing	Continuing	N/A

Remarks

FY20 funding was realigned from product development to provide the requisite T&E support of the final product which includes fixture, facility, targets, and testing at Wallops.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
SNLWS Program Management/Engineering Support	C/CPFF	GRYPHON Technologies : Washington, D.C.	0.265	0.500	Apr 2019	0.500	Mar 2020	0.000		-		0.000	0.000	1.265	-
SNLWS Program Management/Engineering Support	C/CPIF	SPA : Washington, D.C.	0.950	1.011	Dec 2018	1.212	Feb 2020	1.213	Jan 2021	-		1.213	Continuing	Continuing	Continuing
SNLWS Travel	Sub Allot	NAVSEA : Washington, D.C.	0.014	0.150	Feb 2019	0.150	Feb 2020	0.150	Feb 2021	-		0.150	Continuing	Continuing	Continuing
SNLWS Program Management	C/CPFF	TMB : Washington, D.C.	0.162	0.170	Mar 2019	0.000		0.000		-		0.000	0.000	0.332	-
SNLWS Program Management	C/CPFF	BFM PSS TBD : TBD	0.000	0.000		0.200	Feb 2020	0.700	Dec 2020	-		0.700	Continuing	Continuing	Continuing
SNLWS Program Management	C/CPFF	Strategic Insight : Washington, D.C.	0.197	0.144	Jan 2019	0.145	Feb 2020	0.146	Dec 2020	-		0.146	Continuing	Continuing	Continuing
		Subtotal	1.588	1.975		2.207		2.209		-		2.209	Continuing	Continuing	N/A

Remarks

SNLWS Program Management award is TBD due to the planned competitive award of follow-on contract.

	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	47.330	81.048		89.234		56.266		-		56.266	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

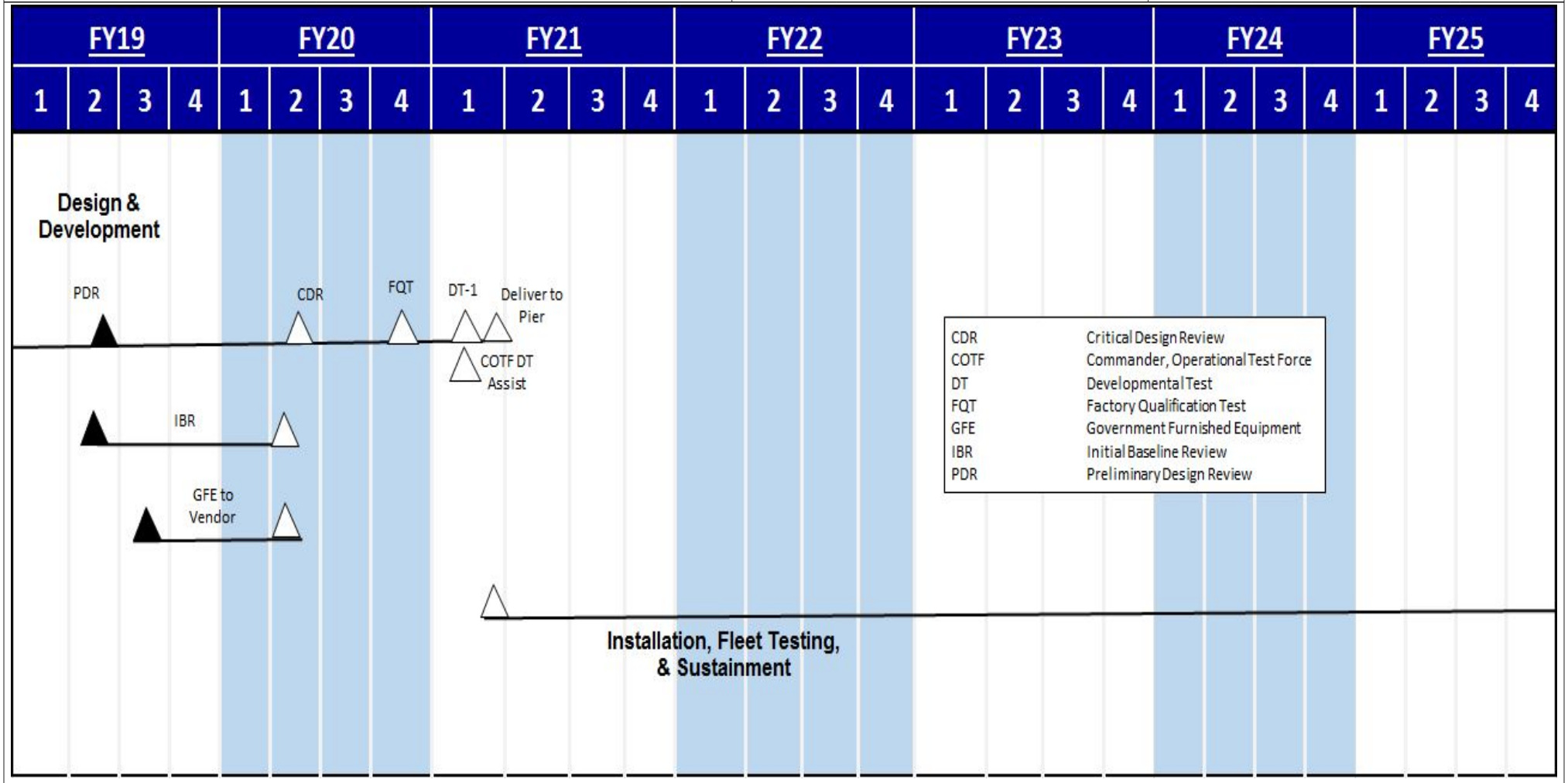

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 3402 / *Surface Navy Laser Weapon System (SNLWS)*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 3402				
SNLWS: Preliminary Design Review	2	2019	2	2019
SNLWS: Initial Baseline Review (IBR)	2	2019	2	2020
SNLWS: GFE to vendor LWCS, DSS, WDLC	3	2019	2	2020
SNLWS: Critical Design Review (CDR)	2	2020	2	2020
SNLWS: Factory Qualification Test (FQT)	4	2020	4	2020
SNLWS: Developmental Test (DT)	1	2021	1	2021
SNLWS: Deliver to Pier	1	2021	1	2021
SNLWS: Installation, Fleet Testing and Sustainment	4	2021	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 9823 / *Lasers for Navy applicat*	

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
9823: *Lasers for Navy applicat*	54.004	32.954	19.935	34.567	-	34.567	9.861	5.849	4.375	4.462	Continuing	Continuing
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 9823 - Lasers for Navy Applications: Optical Dazzling Interceptor Navy (ODIN) development provides near-term, directed energy, shipboard Counter-Intelligence, Surveillance, and Reconnaissance (C-ISR) capabilities to dazzle Unmanned Aerial Systems (UASs) and other platforms that address urgent operational needs of the Fleet. FY 2018 was the first year of funding which supports the design, development, procurement and installation of ODIN standalone units over the FYDP, for deployment on DDG 51 Flt IIA surface combatants. The program supports the non-recurring engineering, development, procurement of long lead material, assembly and checkout, system certification, platform integration/installation and sustainment for these ODIN standalone units.

The FY 2021 funding was provided to complete procurement, assembly, checkout, integration, T&E and installation of Units 4 and 5; continues procurement, assembly, checkout, integration and T&E of Units 6, 7 and 8; and provide Operation & Sustainment (O&S) of Units 1-5. It should be noted that in order to fully fund the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units, a FY 2020 $9.975 million Below Threshold Reprogramming (BTR)is required.

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Title: Optical Dazzling Interdictor, Navy (ODIN)	32.954	19.935	34.567	0.000	34.567
Articles:	-	-	-	-	-
FY 2020 Plans:					
- Complete installation and checkout of Units 1, 2 and 3					
- Continue to provide/conduct Operator and Maintainer training					
- Continue to update/provide Operation and Maintenance Manuals					
- Continue to update/provide Maintenance Index Pages/Maintenance Requirements Cards (MIPs/MRCs)					
- Commence Operation and Sustainment of Units 1 and 2					
- Continue assembly, integration, and checkout of units 4 and 5					
- Complete Test & Evaluation of unit 4					
- Initiate Test & Evaluation of unit 5					
- Commence Installation of Unit 4					
- Initiate procurement of Units 6, 7 and 8 (LLM)					
- Initiate system integration, test and certifications, system operability, and safety for Units 6, 7 and 8					
FY 2021 Base Plans:					
- Commence Installation of Unit 5					

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

B. Accomplishments/Planned Programs ($ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
- Initiate Operation and Sustainment of Unit 3 - Continue system integration, test and certifications, system operability, and safety for Units 6, 7 and 8 - Initiate shipboard documentation and training development for Units 6, 7 and 8 - Complete installation, shipboard test and checkout, conduct system turnover, and support shipboard operations of unit 4 - Complete procurement of Units 6 and 7 - Initiate assembly, integration and checkout of unit 8 - Complete assembly, checkout, integration, and testing of Units 6 and 7. Each unit consists of: Beam Director (Telescope, Optics, Fast Steering Mirrors); Lower Power Lasers (2); Sensors (Coarse Track, Fine Track, ISR Imaging); Computer Rack, Network Switches; Cables; and Operator Laptop. - Operate and sustain Units 1 - 5. ***FY 2021 OCO Plans:*** N/A ***FY 2020 to FY 2021 Increase/Decrease Statement:*** The increase of $14.632 million from FY2020 to FY2021 supports the realized $34.594 million requirement needed for the procurement, assembly, checkout, integration, T&E, and installation; and provide Operation & Sustainment (O&S) of ODIN Units 1-8. It should be noted that in order to fully fund the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units, a FY 2020 $9.975 million Below Threshold Reprogramming (BTR) is required.					
Accomplishments/Planned Programs Subtotals	32.954	19.935	34.567	0.000	34.567

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

D. Acquisition Strategy

The ODIN is a government designed, developed, and produced system that will provide stand alone units for use on DDG 51 class ships. This effort will transition the developed ODIN capabilities to the Fleet, while informing the development of future prototyping capabilities and program of record efforts.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Hardware & Software - Material Buys	C/FFP	NSWC Dahlgren : Dahlgren, VA	16.842	9.635	Nov 2018	3.949	Nov 2019	7.056	Dec 2020	-		7.056	Continuing	Continuing	Continuing
Engineering/Development/ Assembly	WR	NSWC Dahlgren : Dahlgren, VA	10.059	4.495	Oct 2018	2.698	Oct 2019	6.246	Nov 2020	-		6.246	Continuing	Continuing	Continuing
Software Development/ System Rqmts & Design	WR	NSWC Dahlgren : Dahlgren, VA	4.294	2.320	Oct 2018	0.170	Oct 2019	0.500	Nov 2020	-		0.500	Continuing	Continuing	Continuing
Engineering Development	C/CPFF	PSU EOC : Freeport, PA	2.420	2.552	Nov 2018	2.395	Nov 2019	2.395	Dec 2020	-		2.395	Continuing	Continuing	Continuing
Engineering/Development	WR	NSWC PHD : Port Hueneme, CA	0.485	0.287	Nov 2018	0.000		0.000		-		0.000	0.000	0.772	-
Engineering/Development	WR	NSWC Crane : Crane, IN	0.300	0.020	Nov 2018	0.000		0.000		-		0.000	0.000	0.320	-
Engineering/Development	WR	NRL : Washington, D.C.	0.260	0.060	Dec 2018	0.000		0.000		-		0.000	0.000	0.320	-
		Subtotal	34.660	19.369		9.212		16.197		-		16.197	Continuing	Continuing	N/A

Remarks

A Program Adjustment in the amount of $28.95 million in FY21 and $3.5 million in FY22 was provided to Lasers for Navy Applications PU 9823 in support of the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units as a result of realized cost growth. It should be noted that in order to fully fund the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units, a FY 2020 $9.975 million Below Threshold Reprogramming (BTR) is required.

The cost savings originally estimated from production of multiple units by government vice industry have not been realized. The FY 2020 President's Budget request cost per ODIN system (material only) was estimated at approximately $3.63M (8 units = $29M); DON 21 cost per unit (material only) was realized at approximately $5.18M (6 units = $31.1M).

- ODIN is the first of its kind laser system. Non-recurring engineering (NRE) costs increased significantly due to new technology development efforts required for the following system components: lasers, fast steering mirrors, line replaceable units, control software, telescopes with mounted optics, and motor control units and drive assemblies for the gimbal and fine track cameras.

- Software development estimates increased (i.e., twenty thousand estimated lines of code to forty two thousand estimated lines of code, a $7M increase), due to system complexities, capabilities, and concept of employment.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Platform Integration/ ILS/ Installation	C/CPFF	CACI : Washington, D.C.	0.101	0.194	Dec 2018	0.046	Jan 2020	0.047	Jan 2021	-		0.047	Continuing	Continuing	Continuing
Platform Integration/ILS/ Installation	C/CPFF	SWRMC : San Diego, CA	0.000	0.743	Apr 2019	0.905	Feb 2020	1.205	Dec 2020	-		1.205	Continuing	Continuing	Continuing
Safety, Product Support, Security & Operations	WR	NAMRU : San Antonio TX	0.000	0.010	Mar 2019	0.000		0.000		-		0.000	0.000	0.010	-
Safety, Product Support, Security & Operations	WR	AFRL : Wright-Patterson AFB, OH	0.000	0.160	Mar 2019	0.000		0.000		-		0.000	0.000	0.160	-
Installation Engineering	C/CPAF	Third Party Planning (3PP) : Not Specified	0.000	0.010	Apr 2019	0.010	Apr 2020	0.014	Apr 2021	-		0.014	Continuing	Continuing	Continuing
Spares	WR	NSWC Dahlgren : Dahlgren, VA	0.711	0.000		0.150	Feb 2020	0.150	Feb 2021	-		0.150	Continuing	Continuing	Continuing
Installation Engineering	WR	NSWC Dahlgren DNA : Dam Neck, VA	0.000	0.000		0.025	Dec 2019	0.025	Nov 2020	-		0.025	Continuing	Continuing	Continuing
Platform Integration/ILS/ Installation	WR	NSWC Dahlgren : Dahlgren, VA	4.342	2.112	Nov 2018	1.140	Oct 2019	1.480	Nov 2020	-		1.480	Continuing	Continuing	Continuing
Platform Integration	C/CPAF	BIW : Bath, ME	0.244	0.526	Jan 2019	0.300	Jan 2020	0.300	Jan 2021	-		0.300	Continuing	Continuing	Continuing
Platform Integration	C/CPFF	Lockheed Martin : Moorestown, NJ	0.265	0.000		0.000		0.000		-		0.000	0.000	0.265	-
Systems Engineering	WR	NIWC Pacific : San Diego, CA	0.910	0.221	Nov 2018	0.000		0.000		-		0.000	0.000	1.131	-
Safety, Product Support, Security & Operations	WR	NSWC Dahlgren : Dahlgren, VA	5.123	0.985	Nov 2018	0.150	Oct 2019	0.150	Nov 2020	-		0.150	Continuing	Continuing	Continuing
Platform Integration	WR	NSWC Crane : Crane, IN	0.156	0.000		0.000		0.000		-		0.000	0.000	0.156	-
Platform Integration/ILS/ Installation & Spares	WR	NSWC PHD : Port Hueneme, CA	0.840	3.639	Nov 2018	5.474	Oct 2019	12.626	Nov 2020	-		12.626	Continuing	Continuing	Continuing
Packaging, Handling, Storage & Transportation, De-Install, Refurbishment	WR	NSWC Dahlgren : Dahlgren, VA	1.243	0.091	Nov 2018	0.040	Oct 2019	0.040	Nov 2020	-		0.040	Continuing	Continuing	Continuing
Platform Integration	WR	NIWC Pacific : San Diego, CA	0.000	0.000		0.000		0.048	Nov 2020	-		0.048	Continuing	Continuing	Continuing

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Platform Integration/ILS/ Installation	C/CPFF	HRMC : Pearl Harbor, HI	0.000	0.000		0.124	Feb 2020	0.000		-		0.000	0.000	0.124	-
		Subtotal	13.935	8.691		8.364		16.085		-		16.085	Continuing	Continuing	N/A

Remarks

An additional $34.825 million dollars was required in order to fully fund the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units. DON identified an additional $28.950 million in FY2021 and $3.5M in FY2022. It should be noted that in order to fully fund the procurement, assembly, checkout, integration, T&E, installation and sustainment of 8 units, a FY 2020 $9.975 million Below Threshold Reprogramming (BTR)is required.

Platform Integration including Installation Control Drawings (ICDs), Ship Installation Drawings (SIDs) and system installation costs were realized at twice the cost originally estimated. Below-deck work required for ODIN installations is more extensive than originally programmed.

The ODIN Platform Integration/ILS/Installation TBD is due to planned competitive award of follow-on contract.

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Test Planning & Execution	WR	NAWC AD : Patuxent River, MD	0.000	0.160	Mar 2019	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Test Planning & Execution	WR	NSWC PHD : Port Hueneme, CA	0.880	0.698	Nov 2018	0.575	Nov 2019	0.500	Nov 2020	-		0.500	Continuing	Continuing	Continuing
Test Planning & Execution	WR	NSWC Dahlgren : Dahlgren, VA	2.467	2.629	Nov 2018	1.200	Oct 2019	1.200	Nov 2020	-		1.200	Continuing	Continuing	Continuing
Test Planning & Execution	WR	NSWC Crane : Crane, IN	0.622	0.320	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Test Planning & Execution	WR	NIWC Pacific : San Diego, CA	0.000	0.504	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
		Subtotal	3.969	4.311		1.775		1.700		-		1.700	Continuing	Continuing	N/A

Remarks

Testing of newly developed capabilities required a much higher quantity and quality of aircraft and targets for testing; and subsequent data analysis to validate requisite system capabilities.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 9823 / *Lasers for Navy applicat*	

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Program Mgmt/Support	C/CPFF	BFM PSS TBD : TBD	0.000	0.000		0.025	Feb 2020	0.275	Dec 2020	-		0.275	Continuing	Continuing	Continuing
Program Mgmt/Supportt	C/BA	Strategic Insight : Washington, D.C.	0.000	0.076	Jan 2019	0.077	Feb 2020	0.078	Dec 2020	-		0.078	Continuing	Continuing	Continuing
Program Mgmt/Support	C/CPFF	TMB : Washington, D.C.	0.000	0.025	Feb 2019	0.000		0.000		-		0.000	0.000	0.025	-
Program Mgmt/Support	C/CPFF	GRYPHON Technologies : Washington, D.C.	0.748	0.250	Apr 2019	0.250	Mar 2020	0.000		-		0.000	0.000	1.248	-
Travel	Allot	NAVSEA : Washington, D.C.	0.126	0.052	Mar 2019	0.052	Feb 2020	0.052	Feb 2021	-		0.052	Continuing	Continuing	Continuing
Program Mgmt/Support	C/CPIF	SPA : Washington, D.C.	0.566	0.180	Dec 2018	0.180	Feb 2020	0.180	Dec 2020	-		0.180	Continuing	Continuing	Continuing
		Subtotal	1.440	0.583		0.584		0.585		-		0.585	Continuing	Continuing	N/A

Remarks

ODIN Program Management award is TBD due to planned competitive award of follow-on contract.

	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Project Cost Totals	54.004	32.954		19.935		34.567		-		34.567	Continuing	Continuing	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

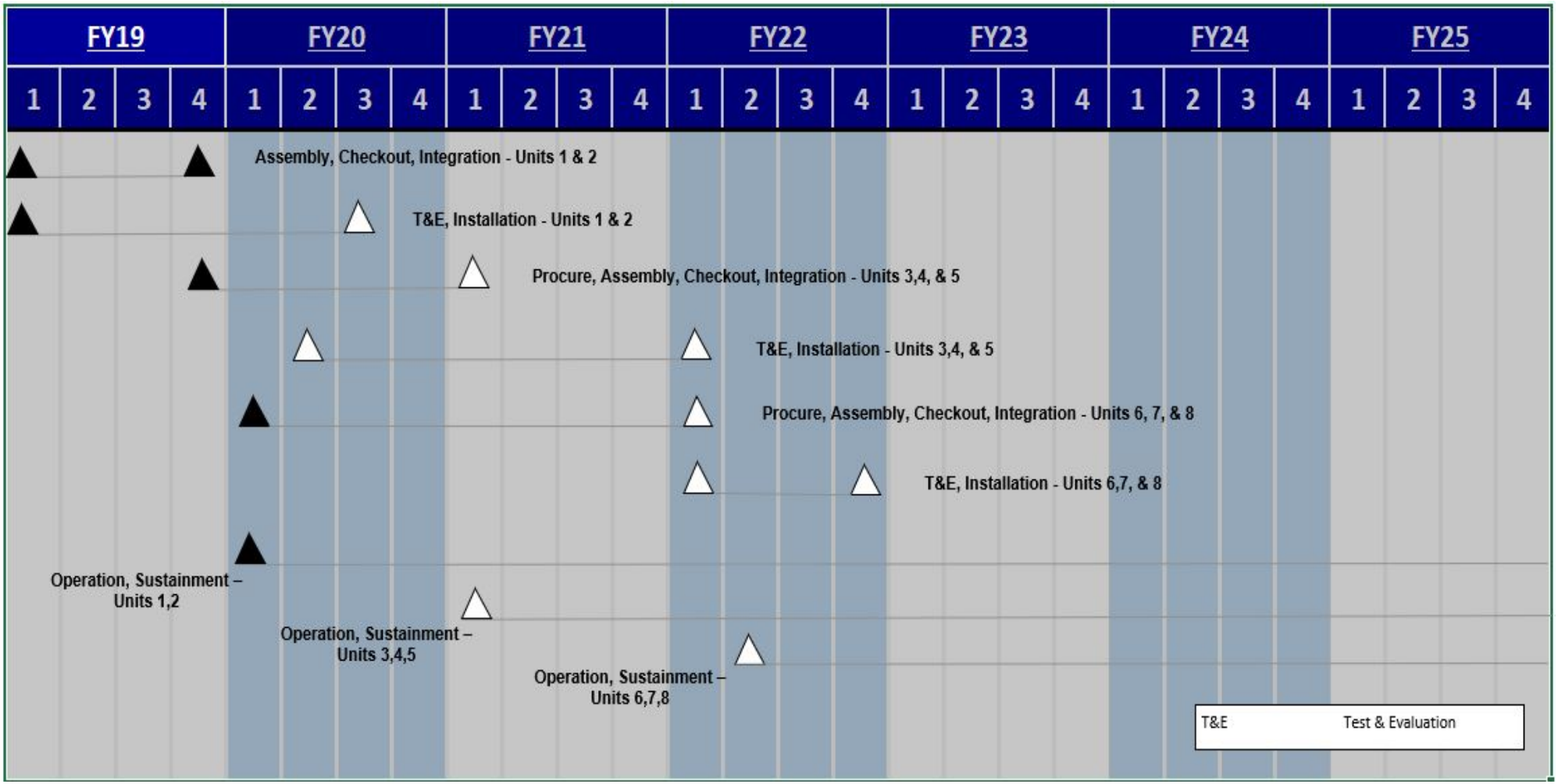

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9823 / *Lasers for Navy applicat*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9823				
Assembly, Checkout, Integration Units 1 and 2	1	2019	4	2019
Test & Evaluation, Installation Units 1 and 2	1	2019	3	2020
Component Procurement, Assembly, Checkout, Integration Units 3, 4 and 5	4	2019	1	2021
Operation and Sustainment Units 1 and 2	1	2020	4	2025
Component Procurement, Assembly, Checkout, Integration Units 6, 7 and 8	1	2020	1	2022
Test & Evaluation, Installation Unit's 3, 4 and 5	2	2020	1	2022
Operation and Sustainment Units 3, 4, 5	1	2021	4	2025
Test & Evaluation, Installation Units 6, 7 and 8	1	2022	4	2022
Operation and Sustainment Units 6, 7 and 8	2	2022	4	2025

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 9999 / *Congressional Adds*	

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
9999: *Congressional Adds*	0.000	24.986	20.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	44.986
Quantity of RDT&E Articles		-	-	-	-	-	-	-	-	-		

A. Mission Description and Budget Item Justification

Project 9999 (PU C453) - Surface Navy Laser Weapon System (SNLWS) Program Re-phasing: Congress added funding in FY19 for re-phasing of the SNLWS development and fielding effort. This funding supports procurement of HELIOS long lead materials related to early award of the contract to Lockheed Martin Aculight.

Project 9999 (PU C440/C457) - Congressional Adds - Railgun Program: Congress added funding in FY19 and FY20 for ship-based program/technical development and ship integration related risk reduction. Electromagnetic railgun provides increased capability for the following mission sets: Naval Surface Fire Support (NSFS), Integrated Air and Missile Defense (IAMD), Fast Attack Craft and Fast Inshore Attack Craft (FAC/FIAC), and future potential for Anti-Surface Warfare (ASuW). This funding supports the testing and refinement of pulse current transfer, mount, and hypervelocity projectile component development. In addition, this project supports the continuing effort to define and evolve requirements related to mount and platform interface management and maturations of specifications for tactical railgun weapon system.

Project 9999 (PU C516) - Congressional Add - High Energy Laser (HEL) Weapon System for Counter-Unmanned Ariel System (C-UAS) Area defense is a Congressionally directed effort to develop/build a minimized footprint, laser-agonistic beam director and beam control system (M-BD/BCS) to support Commercial Off The Shelf (COTS) lasers >10KW for possible application to Joint Light Tactical Vehicle (JLTV) sized vehicles.

FY2020 funding will provide for systems engineering, design, and fabrication of this M-BD/BCS.

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020
Congressional Add: Electromagnetic Railgun	9.647	0.000
FY 2019 Accomplishments: -Upgraded Electric Weapon systems Integration Lab (EWSIL) with hardware/ software necessary to support 5MA (mega-amp) testing and conduct 5MA Articulating Pulse Current Transfer (APCT) test events. -Completed 2MA APCT slip ring testing. -Completed design and fabrication work necessary to add cooling and elevation evaluation capabilities to EWSIL. -Conducted design and fabrication work necessary for prototyping of low-loss coaxial buswork. -Build and refined prototype design for blowback mitigation system for use with railgun system. -Updated the SEP, CM Plan, TRAP and maturation of specifications for tactical RGWS. -Conducted risk Management and coordination and support of sub-system and system level design reviews		

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9999 / *Congressional Adds*

B. Accomplishments/Planned Programs ($ in Millions)	FY 2019	FY 2020
-Performed Topside Integration Platform and System Trade Studies. -Supported the design, development and testing of armatures for HVP from a Railgun -Conducted Magnetic Pulse Generator (MPG) testing, mitigation designs and testing requirements Dev., Test Planning, Ctr. Oversight -Supported railgun system materials testing and analysis at Naval Post-graduate School ***FY 2020 Plans:*** N/A		
Congressional Add: SNLWS Program Rephasing ***FY 2019 Accomplishments:*** - Procured the following long lead materials: Beam Director subsystem and Beam Control subsystem. ***FY 2020 Plans:*** N/A.	15.339	0.000
Congressional Add: High Energy Laser Weapon System for C-UAS Area Defense ***FY 2019 Accomplishments:*** N/A. ***FY 2020 Plans:*** Systems Engineering, design, and fabrication of minimized footprint, laser-agnostic beam director and beam control system (M-BD/BCS).	0.000	10.000
Congressional Add: Railgun ***FY 2019 Accomplishments:*** N/A ***FY 2020 Plans:*** -Continue conducting risk Management and coordination in support of sub-system and system level design reviews. -Continue performing Controls Integration, Pulsed Power Integration Studies, and System Trade Studies. -Continue supporting the design, development and testing of armatures for HVP from a Railgun. -Continue conducting Magnetic Pulse Generator (MPG) testing, mitigation designs and testing requirements development, Test Planning, Ctr. Oversight. -Conduct Pulse Current Transfer (PCT) maturation and risk reduction. -Continue supporting railgun system materials testing and analysis at Naval Post-graduate School.	0.000	10.000
Congressional Adds Subtotals	24.986	20.000

C. Other Program Funding Summary ($ in Millions)

N/A

Remarks

Exhibit R-2A, RDT&E Project Justification: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9999 / *Congressional Adds*

D. Acquisition Strategy

Project 9999 (PU C453) - The SNLWS program supports the National Defense Strategy of building a more lethal force by leveraging mature technology to deliver proven laser weapon capability to the Fleet as part of the Navy Laser Family of Systems (NLFoS) initiative with the objective of providing the fleet with near-term laser weapon capabilities. Additionally, accelerated learning through incorporation of laser weapon CONOPS, employment, and maintenance will enable the rapid development and integration of these capabilities with the Navy's existing weapons systems. This NLFoS initiative will also develop and validate warfighting requirements for laser weapons to address a variety of threats and to mature technologies and system integration readiness. HELIOS provides a low cost-per-shot capability to address Anti-Surface Warfare and Counter-Intelligence, Surveillance and Reconnaissance (C-ISR) gaps with the ability to dazzle and destroy Unmanned Aerial Systems (UAS) and defeat Fast Inshore Attack Craft (FIAC) while integrated into a Flt IIA Destroyer, to include AEGIS integration. SNLWS provides industry-developed and government integrated capability to the Fleet in as short a timeframe as possible, thereby addressing the National Defense Strategy direction to foster a culture of affordability. SNLWS includes the development of an advanced laser weapon system in the 60 kW or higher class. Competition was utilized for system development and production efforts. The acquisition strategy permits accelerated fielding of laser weapon systems in the Fleet and provides a demand signal for the industrial base to expand the capacity to develop and manufacture this advanced technology. The acquisition strategy consists of the baseline development and production of one unit followed by options to acquire system quantities at firm fixed price that will address operational needs of the Fleet in the requisite timeframe to offset future threats and maintain technological superiority over potential adversaries.

Project 9999 (PU C440/C457) - Leverage Naval Surface Warfare Center and UARC resources and competencies to support electromagnetic railgun system engineering activities to mature technologies in support of transition to a Program of Record. These study and prototype activities provide influence on prototype design and test to optimize readiness and capability for transition to a Navy tactical application.

Project 9999 (PU C516) - The High Energy Laser Weapon System for C-UAS Area Defense is an initiative that provides a flexible prototype sub-system for government experimentation and demonstration of a minimized footprint, laser-agonistic beam director and beam control system. MZA of Dayton, OH is the industry provider of this capability.

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9999 / *Congressional Adds*

Product Development ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
C453- SNLWS Development	C/CPIF	Lockheed Martin Aculight : Bothell, WA	0.000	14.990	Nov 2018	0.000		0.000		-		0.000	0.000	14.990	-
C440-HVP/RGS Interface Development	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.850	May 2019	0.000		0.000		-		0.000	0.000	0.850	-
C440- APCT Hardware Fabrication	MIPR	DOTC : DOTC	0.000	0.860	Sep 2019	0.000		0.000		-		0.000	0.000	0.860	-
C440- PCT/Breech Interface and Blowback Mitigation Fabrication	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.200	Sep 2019	0.000		0.000		-		0.000	0.000	0.200	-
C547- Health Monitoring Sensor Development	FFRDC	Virginia Tech : Virginia Tech	0.000	0.000		0.100	May 2020	0.000		-		0.000	0.000	0.100	-
C516 - Minimized Beam Directorr/Beam Control Sys	C/CPFF	MZA : Dayton, OH	0.000	0.000		10.000	Jun 2020	0.000		-		0.000	0.000	10.000	-
		Subtotal	0.000	16.900		10.100		0.000		-		0.000	0.000	27.000	N/A

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
C453- Support SNLWS Development	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.349	Feb 2019	0.000		0.000		-		0.000	0.000	0.349	-
C440-APCT Development Support and Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	1.800	Sep 2019	0.000		0.000		-		0.000	0.000	1.800	-
C440-Mount Component Development, SE Support, and Technical Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.625	May 2019	0.000		0.000		-		0.000	0.000	0.625	-
C440-Blowback Mitigation	FFRDC	APL : Laurel, MD	0.000	0.200	Apr 2019	0.000		0.000		-		0.000	0.000	0.200	-
C440-Mount Platform Interface Development,	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.442	May 2019	0.000		0.000		-		0.000	0.000	0.442	-

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy			Date: February 2020
Appropriation/Budget Activity 1319 / 4	R-1 Program Element (Number/Name) PE 0603925N / *Directed Energy and Electric Weapon System*	Project (Number/Name) 9999 / *Congressional Adds*	

Support ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
Requirements and Specification Management															
C440-Topside Integration / Platform Studies, SE Support, and Technical Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.266	May 2019	0.000		0.000		-		0.000	0.000	0.266	-
C440- System Trade Studies	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.266	May 2019	0.000		0.000		-		0.000	0.000	0.266	-
C547- Advanced Armature and Muzzle Design and Development, SE Support, and Technical Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		1.850	Mar 2020	0.000		-		0.000	0.000	1.850	-
C547- Mount and Controls Development, SE Support, and Technical Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		1.450	Mar 2020	0.000		-		0.000	0.000	1.450	-
C547- Corrosion Prevention and Control Requirements and Specification Management	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.275	Mar 2020	0.000		-		0.000	0.000	0.275	-
C547- Pulse Power Ship Integration Development, SE Support, and Technical Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		1.950	Mar 2020	0.000		-		0.000	0.000	1.950	-
C547- System Trade Studies	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.200	Mar 2020	0.000		-		0.000	0.000	0.200	-
C547- Railgun and HVP Interface Development and Technical Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.225	Mar 2020	0.000		-		0.000	0.000	0.225	-
C547- Program Technical Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.500	Mar 2020	0.000		-		0.000	0.000	0.500	-
		Subtotal	0.000	3.948		6.450		0.000		-		0.000	0.000	10.398	N/A

Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9999 / *Congressional Adds*

Test and Evaluation ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
C440- APCT Test Execution	WR	NSWC Dahlgren : Dahlgren, VA	0.000	1.778	Sep 2019	0.000		0.000		-		0.000	0.000	1.778	-
C440- HVP Risk Reduction and Railgun Testing	WR	NSWC Dahlgren : Dahglren, VA	0.000	0.100	Sep 2019	0.000		0.000		-		0.000	0.000	0.100	-
C440- Railgun Materials Testing	WR	Naval Post Graduate School : San Diego, CA	0.000	0.900	Mar 2019	0.000		0.000		-		0.000	0.000	0.900	-
C547- PCT and Pulse Power Test Execution	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		1.150	Mar 2020	0.000		-		0.000	0.000	1.150	-
C547- HVP Risk Reduction and Railgun Testing	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		1.650	Mar 2020	0.000		-		0.000	0.000	1.650	-
C547- Railgun Testing Materials	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.450	Mar 2020	0.000		-		0.000	0.000	0.450	-
C547- Corrosion Prevention and Control Testing and Analysis	WR	NSWC Dahlgren : Dahlgren, VA	0.000	0.000		0.200	Mar 2020	0.000		-		0.000	0.000	0.200	-
		Subtotal	0.000	2.778		3.450		0.000		-		0.000	0.000	6.228	N/A

Management Services ($ in Millions)

Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	FY 2019 Cost	FY 2019 Award Date	FY 2020 Cost	FY 2020 Award Date	FY 2021 Base Cost	FY 2021 Base Award Date	FY 2021 OCO Cost	FY 2021 OCO Award Date	FY 2021 Total Cost	Cost To Complete	Total Cost	Target Value of Contract
C440- Program Technical Oversight	WR	NSWC Dahlgren : Dahlgren, VA	0.000	1.360	May 2019	0.000		0.000		-		0.000	0.000	1.360	-
		Subtotal	0.000	1.360		0.000		0.000		-		0.000	0.000	1.360	N/A

	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	0.000	24.986		20.000		0.000		-		0.000	0.000	44.986	N/A

Remarks

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9999 / *Congressional Adds*

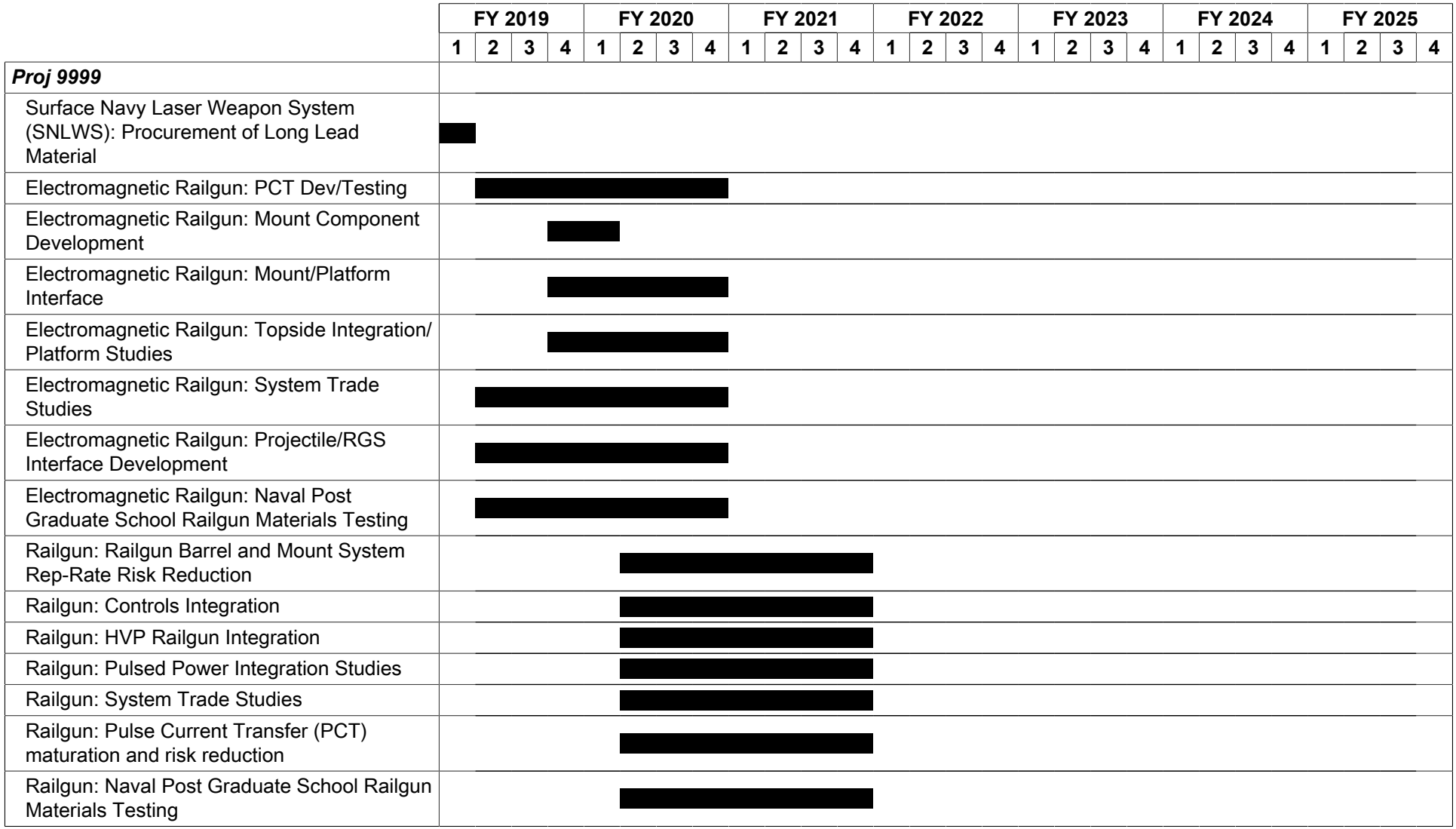

Exhibit R-4, RDT&E Schedule Profile: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9999 / *Congressional Adds*

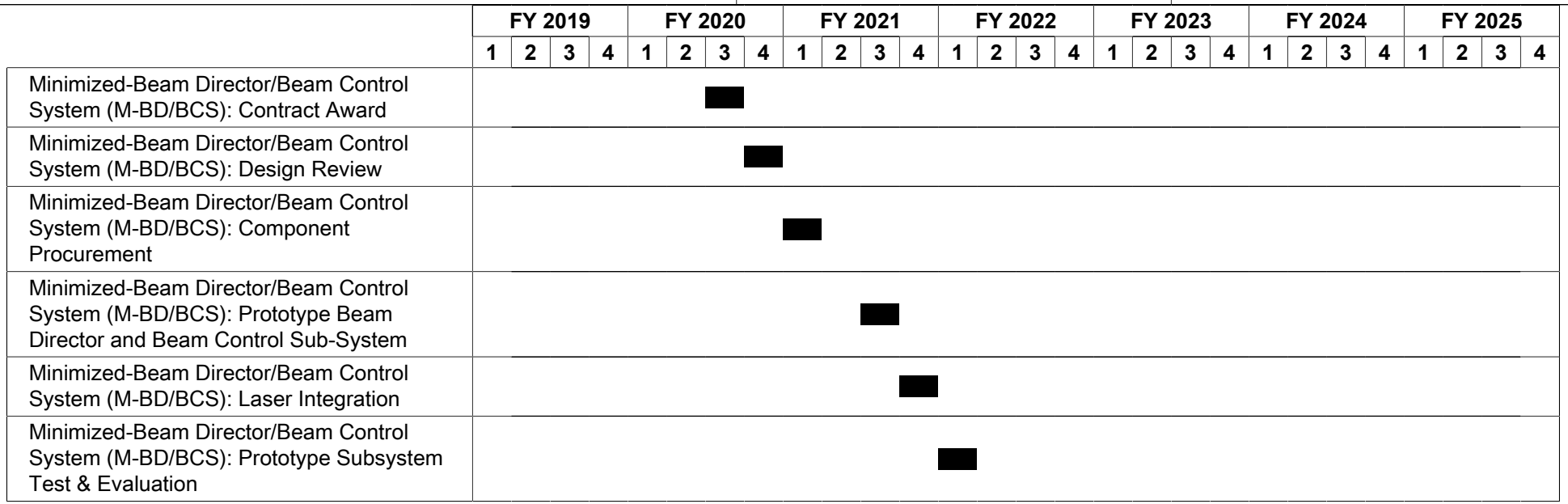

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9999 / *Congressional Adds*

Schedule Details

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Proj 9999				
Surface Navy Laser Weapon System (SNLWS): Procurement of Long Lead Material	1	2019	1	2019
Electromagnetic Railgun: PCT Dev/Testing	2	2019	4	2020
Electromagnetic Railgun: Mount Component Development	4	2019	1	2020
Electromagnetic Railgun: Mount/Platform Interface	4	2019	4	2020
Electromagnetic Railgun: Topside Integration/Platform Studies	4	2019	4	2020
Electromagnetic Railgun: System Trade Studies	2	2019	4	2020
Electromagnetic Railgun: Projectile/RGS Interface Development	2	2019	4	2020
Electromagnetic Railgun: Naval Post Graduate School Railgun Materials Testing	2	2019	4	2020
Railgun: Railgun Barrel and Mount System Rep-Rate Risk Reduction	2	2020	4	2021
Railgun: Controls Integration	2	2020	4	2021
Railgun: HVP Railgun Integration	2	2020	4	2021
Railgun: Pulsed Power Integration Studies	2	2020	4	2021
Railgun: System Trade Studies	2	2020	4	2021
Railgun: Pulse Current Transfer (PCT) maturation and risk reduction	2	2020	4	2021
Railgun: Naval Post Graduate School Railgun Materials Testing	2	2020	4	2021
Minimized-Beam Director/Beam Control System (M-BD/BCS): Contract Award	3	2020	3	2020
Minimized-Beam Director/Beam Control System (M-BD/BCS): Design Review	4	2020	4	2020
Minimized-Beam Director/Beam Control System (M-BD/BCS): Component Procurement	1	2021	1	2021
Minimized-Beam Director/Beam Control System (M-BD/BCS): Prototype Beam Director and Beam Control Sub-System	3	2021	3	2021
Minimized-Beam Director/Beam Control System (M-BD/BCS): Laser Integration	4	2021	4	2021

Exhibit R-4A, RDT&E Schedule Details: PB 2021 Navy		Date: February 2020
Appropriation/Budget Activity 1319 / 4	**R-1 Program Element (Number/Name)** PE 0603925N / *Directed Energy and Electric Weapon System*	**Project (Number/Name)** 9999 / *Congressional Adds*

	Start		End	
Events by Sub Project	**Quarter**	**Year**	**Quarter**	**Year**
Minimized-Beam Director/Beam Control System (M-BD/BCS): Prototype Subsystem Test & Evaluation	1	2022	1	2022