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| Exhibit R-2, RDT&E Budget Item Justification: PB 2020 Navy | | | | | | | | | | Date: March 2019 | | |
|--|-------------|---------|---------|--------------|--|---------------|---------|---------|---------|------------------|------------------|------------|
| Appropriation/Budget Activity 1319: Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD) | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | | | | |
| COST (\$ in Millions) | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| Total Program Element | 623.508 | 44.703 | 80.324 | 62.426 | - | 62.426 | 63.749 | 64.588 | 65.892 | 67.209 | Continuing | Continuing |
| 0236: SSN Comb Cont Sys Imprvmnt (ENG) | 623.508 | 44.703 | 60.824 | 62.426 | - | 62.426 | 63.749 | 64.588 | 65.892 | 67.209 | Continuing | Continuing |
| 9999: Congressional Adds | 0.000 | 0.000 | 19.500 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 19.500 |

A. Mission Description and Budget Item Justification

Project Unit 0236: This program develops Commercial-Off-The-Shelf (COTS) based software and hardware upgrades to integrate improved tactical and weapons control capabilities for multiple submarine Classes (SSN-688, SSGN, SEAWOLF, SSBN and VIRGINIA (Post Shakedown Availability)). The AN/BYG-1 is the combat control system common across submarine platforms which incorporates tactical control, payload control, and tactical Local Area Network (LAN) functions into a single development program. AN/BYG-1 allows the submarine to rapidly update the ship safety tactical picture, integrate the common tactical picture into the battlegroup, improve torpedo interfaces, and provide Tactical TOMAHAWK (TOMAHAWK Block IV) capability. The hardware upgrades, Technology Insertions (TI) are developed on a biennial basis to provide improved capability and address COTS obsolescence. Funding also accommodates the biennial integration of software Advanced Processing Builds (APB) for both tactical control (APB(T)) and payload control (APB(P)) subsystems. The tactical control integration effort incorporates the integration of other sensor (ESM, sonar, radar, etc.) inputs to provide a common operational picture and improved situational awareness in an information assurance (IA) compliant environment.

The Weapons Control development effort is winding down with pending completion of TI-16 APB15. The Payload Control System (PCS) upgrade provides a modernized PCS open architecture to support future payloads and integrate a common unmanned system controller and unmanned payloads. 21" Experimental Fuel Cell/ Unmanned Aerial System (XFC/UAS), 3" Submarine Launched Unmanned Aerial System (SLUAS) integration and transition to production.

Provides funding for the development of Payloads Launch System, Multi-tube Weapons System (MTWS), Information Assurance system, Onboard Team Trainer (OBTT), and Command, Control, Computer and Intelligence Maintenance Tool (C3IMT). FY18 added development of a Common Infrastructure Services (CIS) subsystem. This involves integration of Onboard Team Trainer - Master Controller (OBTT - MC) & Command, Control, Computer and Intelligence Maintenance Tool/ Inter-Subsystem Monitoring Tool (ISMT) efforts as well as other common services within Submarine Warfare Federated Tactical System (SWFTS). CIS will be an independent subsystem with its own software development and testing efforts, requiring additional funding to complete product delivery to platforms.

FY19 continues integration of Tactical Data Link (TDL) capabilities for Command & Control situational awareness, and additional R&D effort for payload integration to support MK48, APB 5+, APB 6 effort.

FY19 provides funding to commence development of APB 19 which will add two new software baselines in support of VA BLK IV Virginia Pay Module (VPM) and the COLUMBIA class (CLB). Cyber security efforts continue to grow due to increasing interconnection complexity, more IP based traffic in future baselines, and development of Cyber Safe Controls. Common Infrastructure Services development efforts begin under a new contract for APB19 and continue on APB17 under the

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| Appropriation/Budget Activity | | R-1 Program Element (Number/Name) | | | | |
| 1319: Research, Development, Test & Evaluation, Navy / BA 5: System Development & Demonstration (SDD) | | PE 0604562N / Submarine Tactical Warfare System | | | | |
| current Tactical Control System contract. As additional software applications are migrated to CIS, additional funding of this effort is required. Additional funding for early integration efforts for submarine payloads including Contender, Maritime Strike Tomahawk (MST), Next Generation Countermeasure, Anti-Torpedo Torpedo Compact Rapid Attack Weapons program (ATT CRAW) is also included in the FY 19 funding. | | | | | | |
| FY20 continues FY19 efforts on APB19 and commences TI-20 efforts. Additional funding in FY20 supports growing efforts in Information Assurance and CIS. APB effort grows to support two additional software baselines (VPM, CLB). | | | | | | |
| FY20 funding integrates Submarine Launched Harpoon BLK 1C into Payload Control System. Funds transfer from PMA 201 to NAVSEA. Submarine Launched Harpoon Platform Integration cost can't be executed by PMA 201 and will be performed by NAVSEA. | | | | | | |
| Platform integration and training costs cannot be executed by PMA201 and will be performed by NAVSEA. | | | | | | |
| B. Program Change Summary (\$ in Millions) | | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| Previous President's Budget | | 50.850 | 60.824 | 63.853 | - | 63.853 |
| Current President's Budget | | 44.703 | 80.324 | 62.426 | - | 62.426 |
| Total Adjustments | | -6.147 | 19.500 | -1.427 | - | -1.427 |
| • Congressional General Reductions | | - | - | | | |
| • Congressional Directed Reductions | | - | - | | | |
| • Congressional Rescissions | | - | - | | | |
| • Congressional Adds | | - | 19.500 | | | |
| • Congressional Directed Transfers | | - | - | | | |
| • Reprogrammings | | - | - | | | |
| • SBIR/STTR Transfer | | -1.600 | 0.000 | | | |
| • Program Adjustments | | 0.000 | 0.000 | -1.200 | - | -1.200 |
| • Rate/Misc Adjustments | | 0.000 | 0.000 | -0.227 | - | -0.227 |
| • Congressional Directed Reductions | | -4.547 | - | - | - | - |
| Adjustments | | | | | | |
| Congressional Add Details (\$ in Millions, and Includes General Reductions) | | | | | | |
| Project: 9999: Congressional Adds | | | | | | |
| Congressional Add: Submarine Launched Unmanned Aerial System | | | | | | |
| Congressional Add: SBIR Technology Insertion | | | | | | |
| Congressional Add: Submarine Tactical Warfare System | | | | | | |
| Congressional Add Subtotals for Project: 9999 | | | | | | |

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| <u>Congressional Add Details (\$ in Millions, and Includes General Reductions)</u> | | FY 2018 | FY 2019 |
| Congressional Add Totals for all Projects | | 0.000 | 19.500 |
| <u>Change Summary Explanation</u> <p>The overall FY20 funding was reduced by \$1.427M due to the following adjustments: -\$1.5M to realign cost savings from the Submarine Tactical Warfare Systems RDTEN Common Information Services contract, +\$0.5M to integrate Submarine Launched Harpoon into the Payload Control System, and -\$0.227M for miscellaneous rate adjustments.</p> <p>FY20 continues FY19 efforts on APB19 and commences TI-20 efforts. Additional funding in FY20 supports growing efforts in Information Assurance, CIS, and Submarine Launched Harpoon integration efforts. APB effort grows to support two additional software baselines (VPM, CLB).</p> | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy | | | | | | | | | | Date: March 2019 | | |
|---|-------------|---------|---------|--------------|--|---------------|---------|---------|--|------------------|------------------|------------|
| Appropriation/Budget Activity 1319 / 5 | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | Project (Number/Name) 0236 / SSN Comb Cont Sys Imprvmnt (ENG) | | | |
| COST (\$ in Millions) | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| 0236: SSN Comb Cont Sys Imprvmnt (ENG) | 623.508 | 44.703 | 60.824 | 62.426 | - | 62.426 | 63.749 | 64.588 | 65.892 | 67.209 | Continuing | Continuing |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |

A. Mission Description and Budget Item Justification

Project Unit 0236: This program develops Commercial-Off-The-Shelf (COTS) based software and hardware upgrades to integrate improved tactical and weapons control capabilities for multiple submarine Classes (SSN-688, SSGN, SEAWOLF, SSBN and VIRGINIA (Post Shakedown Availability)). The AN/BYG-1 is the combat control system common across submarine platforms which incorporates tactical control, payload control, and tactical Local Area Network (LAN) functions into a single development program. AN/BYG-1 allows the submarine to rapidly update the ship safety tactical picture, integrate the common tactical picture into the battlegroup, improve torpedo interfaces, and provide Tactical TOMAHAWK (TOMAHAWK Block IV) capability. The hardware upgrades, Technology Insertions (TI) are developed on a biennial basis to provide improved capability and address COTS obsolescence. Funding also accommodates the biennial integration of software Advanced Processing Builds (APB) for both tactical control (APB(T)) and payload control (APB(P)) subsystems. The tactical control integration effort incorporates the integration of other sensor (ESM, sonar, radar, etc.) inputs to provide a common operational picture and improved situational awareness in an information assurance (IA) compliant environment.

The Weapons Control development effort is winding down with pending completion of TI-16 APB15. The Payload Control System (PCS) upgrade provides a modernized PCS open architecture to support future payloads and integrate a common unmanned system controller and unmanned payloads. 21" Experimental Fuel Cell/ Unmanned Aerial System (XFC/UAS), 3" Submarine Launched Unmanned Aerial System (SLUAS) integration and transition to production.

Provides funding for the development of Payloads Launch System, Multi-tube Weapons System (MTWS), Information Assurance system, Onboard Team Trainer (OBTT), and Command, Control, Computer and Intelligence Maintenance Tool (C3IMT). FY18 added development of a Common Infrastructure Services (CIS) subsystem. This involves integration of Onboard Team Trainer - Master Controller (OBTT - MC) & Command, Control, Computer and Intelligence Maintenance Tool/ Inter-Subsystem Monitoring Tool (ISMT) efforts as well as other common services within Submarine Warfare Federated Tactical System (SWFTS). CIS will be an independent subsystem with its own software development and testing efforts, requiring additional funding to complete product delivery to platforms.

FY19 continues integration of Tactical Data Link (TDL) capabilities for Command & Control situational awareness, and additional R&D effort for payload integration to support MK48, APB 5+, APB 6 effort.

FY19 provides funding to commence development of APB 19 which will add two new software baselines in support of VA BLK IV Virginia Pay Module (VPM) and the COLUMBIA class (CLB). Cyber security efforts continue to grow due to increasing interconnection complexity, more IP based traffic in future baselines, and development of Cyber Safe Controls. Common Infrastructure Services development efforts begin under a new contract for APB19 and continue on APB17 under the current Tactical Control System contract. As additional software applications are migrated to CIS, additional funding of this effort is required. Additional funding for early

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy | | | Date: March 2019 | | | |
| Appropriation/Budget Activity 1319 / 5 | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | Project (Number/Name) 0236 / SSN Comb Cont Sys Imprvmnt (ENG) | | | | |
| integration efforts for submarine payloads including Contender, Maritime Strike Tomahawk (MST), Next Generation Countermeasure, Anti-Torpedo Torpedo Compact Rapid Attack Weapons program (ATT CRAW) is also included in the FY 19 funding. | | | | | | |
| FY20 continues FY19 efforts on APB19 and commences TI-20 efforts. Additional funding in FY20 supports growing efforts in Information Assurance and CIS. APB effort grows to support two additional software baselines (VPM, CLB). | | | | | | |
| FY20 funding provides for Submarine launched Harpoon. Platform integration and training costs cannot be executed by PMA201 and will be performed by NAVSEA. | | | | | | |
| B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each) | | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| Title: Advanced Processing Builds | | 16.196 | 20.282 | 23.590 | 0.000 | 23.590 |
| Articles: | | - | - | - | - | - |
| FY 2019 Plans: | | | | | | |
| Begin development of APB 17 into AN/BYG-1 (TI-18) baseline. Continue development of APB-19 into AN/BYG-1 (TI-18)baseline. Adds 2 new software baselines in APB19 (VPM & Columbia Class). | | | | | | |
| FY 2020 Base Plans: | | | | | | |
| Continue development of APB 19 into AN/BYG-1 (TI-18)baseline. Continue development of VPM & Columbia Class software baselines in APB19. Commence development of APB21 efforts. | | | | | | |
| FY 2020 OCO Plans: | | | | | | |
| N/A | | | | | | |
| FY 2019 to FY 2020 Increase/Decrease Statement: | | | | | | |
| Increase is due to ramping up of VPM & Columbia Class software baseline developmental efforts. | | | | | | |
| Title: AN/BYG-1 TI-18 | | 8.178 | 7.707 | 4.749 | 0.000 | 4.749 |
| Articles: | | - | - | - | - | - |
| FY 2019 Plans: | | | | | | |
| Continue development, integration and test of the next generation AN/BYG-1 (TI-18) for SSN 688/SSGN/SSBN Class submarines. | | | | | | |
| FY 2020 Base Plans: | | | | | | |
| Complete development, integration and test of the next generation AN/BYG-1 (TI-18) for SSN 688/SSGN/SSBN Class submarines | | | | | | |
| FY 2020 OCO Plans: | | | | | | |

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| B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each) | | | | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| N/A | | | | | | | | |
| FY 2019 to FY 2020 Increase/Decrease Statement: Decrease is due to the ramping down of development, integration and test of the next generation AN/BYG-1 (TI-18) for SSN 688/SSGN/SSBN Class submarines. Efforts set to complete in FY20. | | | | | | | | |
| Title: AN/BYG-1 TI-16 | | | | 3.996 | 0.000 | 0.000 | 0.000 | 0.000 |
| Articles: | | | | - | - | - | - | - |
| FY 2019 Plans: N/A | | | | | | | | |
| FY 2020 Base Plans: N/A | | | | | | | | |
| FY 2020 OCO Plans: N/A | | | | | | | | |
| Title: AN/BYG-1 TI-20 | | | | 0.000 | 5.737 | 8.379 | 0.000 | 8.379 |
| Articles: | | | | - | - | - | - | - |
| FY 2019 Plans: Begin development, integration and test of the next generation AN/BYG-1 (TI-20) for SSN VA Class and COLUMBIA SSBN submarines to include Common Weapons Launcher (CWL) modernization development. | | | | | | | | |
| FY 2020 Base Plans: Continue development, integration and test of the next generation AN/BYG-1 (TI-20) for SSN VA Class and COLUMBIA SSBN submarines to include Common Weapons Launcher modernization development. | | | | | | | | |
| FY 2020 OCO Plans: N/A | | | | | | | | |
| FY 2019 to FY 2020 Increase/Decrease Statement: Increase is due to ramp up of development, integration and test of the next generation AN/BYG-1 (TI-20) for SSN VA Class and COLUMBIA SSBN submarines to include Common Weapons Launcher modernization development. This is the 2nd year of funding this TI. | | | | | | | | |
| Title: Payload Integration | | | | 1.777 | 5.947 | 6.532 | 0.000 | 6.532 |
| Articles: | | | | - | - | - | - | - |

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| B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each) | | | | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| FY 2019 Plans: Continue software development efforts to support Mk 48 and APB5+ efforts. Additional funding for early integration efforts for submarine payloads including MK 48 APB6, Contender, Maritime Strike Tomahawk, Next Generation Countermeasure, and Anti-Torpedo Torpedo Compact Rapid Attack Weapons program. | | | | | | | | |
| FY 2020 Base Plans: Continue software development efforts to support submarine payload integration of Mk 48, APB5+, APB6, Contender, Maritime Strike Tomahawk, Next Generation Countermeasure, and Anti-Torpedo Torpedo Compact Rapid Attack Weapons program. | | | | | | | | |
| Begin integration of Harpoon BLK 1C into Payload Control System. | | | | | | | | |
| FY 2020 OCO Plans: N/A | | | | | | | | |
| FY 2019 to FY 2020 Increase/Decrease Statement: Increase is due to funds transfer from PMA 201 to NAVSEA for Submarine Launched Harpoon Platform Integration efforts. | | | | | | | | |
| Title: Payload Control System Upgrade | | | | 5.031 | 4.224 | 0.000 | 0.000 | 0.000 |
| Articles: | | | | - | - | - | - | - |
| FY 2019 Plans: Complete development to modernize the Payload Control System software code and architecture. Contains additional efforts to integrate a common UxV interface that will be delivered with APB 19. | | | | | | | | |
| FY 2020 Base Plans: N/A | | | | | | | | |
| FY 2020 OCO Plans: N/A | | | | | | | | |
| FY 2019 to FY 2020 Increase/Decrease Statement: Decrease due to completion of Payload Control System software and architecture modernization. PCS efforts in support of APB software development captured in APB subproject. | | | | | | | | |
| Title: Testing | | | | 3.113 | 3.176 | 3.165 | 0.000 | 3.165 |
| Articles: | | | | - | - | - | - | - |

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| B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each) | | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| FY 2019 Plans: Complete DT/OT for AN/BYG-1 APB 17 on SSN 688/SEAWOLF/SSBN/SSGN/VA Class submarines. | | | | | | |
| FY 2020 Base Plans: Begin DT/OT for AN/BYG-1 APB 19 on SSN 688/SEAWOLF/SSBN/SSGN/VA Class submarines. | | | | | | |
| FY 2020 OCO Plans: N/A | | | | | | |
| FY 2019 to FY 2020 Increase/Decrease Statement: \$11K difference from previous fiscal year. | | | | | | |
| Title: Information Assurance (IA) Articles: | | 3.590 - | 7.474 - | 8.117 - | 0.000 - | 8.117 - |
| FY 2019 Plans: Complete development integration of IA Toolkit and continue IA Certification Testing on BYG-1 TI-18. Develop IA Toolkit and commence IA certification Testing on BYG-1 TI-20. Continue RMF accreditations for various systems. Cyber security efforts continue to grow due increasing interconnection complexity, more IP based traffic in future baselines, and implementation of Cyber Safe Controls. | | | | | | |
| FY 2020 Base Plans: Continue development of IA Toolkit and IA certification Testing on BYG-1 TI-20. Continue RMF accreditations for various systems. Cyber security efforts continue to grow due increasing interconnection complexity, more IP based traffic in future baselines, and implementation of Cyber Safe Controls. | | | | | | |
| FY 2020 OCO Plans: N/A | | | | | | |
| FY 2019 to FY 2020 Increase/Decrease Statement: Increase due to increasing interconnection complexity, more IP based traffic in future baselines, and implementation of Cyber Safe Controls. | | | | | | |
| Title: Unmanned Aerial System (UAS) Articles: | | 1.122 - | 1.147 - | 2.193 - | 0.000 - | 2.193 - |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy | | | | Date: March 2019 | | |
| Appropriation/Budget Activity 1319 / 5 | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | Project (Number/Name) 0236 / SSN Comb Cont Sys Imprvmnt (ENG) | | |
| B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each) | | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| FY 2019 Plans: Continue Unmanned Aerial System development and integration efforts for 3 and 21 inch Submarine launched UAS. | | | | | | |
| FY 2020 Base Plans: Continue Unmanned Aerial System development and integration efforts for 3 and 21 inch Submarine launched UAS. | | | | | | |
| FY 2020 OCO Plans: N/A | | | | | | |
| FY 2019 to FY 2020 Increase/Decrease Statement: Ramping up of Unmanned Aerial System (UAS) development and integration efforts for 3 and 21 inch Submarine launched UAS (SLUAS)to transition to full-rate production. | | | | | | |
| Title: Common Infrastructure Services (CIS) | | 1.700 | 5.130 | 5.701 | 0.000 | 5.701 |
| Articles: | | - | - | - | - | - |
| FY 2019 Plans: Continue funding for Common Infrastructure Services integrates Onboard Team Trainer - Master Controller (OBTT - MC) & Command, Control, Computer and Intelligence Maintenance Tool/Inter-Subsystem Monitoring Tool (ISMT) efforts as well as other common services within SWFTS. CIS will be an independent subsystem with its own software development and testing efforts, requiring additional funding to complete product delivery to platforms. Common Information Subsystem development efforts begin under a new contract for APB 19 and continue on APB 17 under the current Tactical Control System contract. As additional software applications are migrated to CIS additional funding of this effort is required. | | | | | | |
| FY 2020 Base Plans: Continue funding for Common Infrastructure Services integrates Onboard Team Trainer - Master Controller & Command, Control, Computer and Intelligence Maintenance Tool/Inter-Subsystem Monitoring Tool (ISMT) efforts as well as other common services within SWFTS. CIS will be an independent subsystem with its own software development and testing efforts, requiring additional funding to complete product delivery to platforms. Common Information Subsystem (CIS) development efforts begin under a new contract for APB 19 and continue | | | | | | |

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| <u>B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)</u> on APB 17 under the current Tactical Control System contract. As additional software applications are migrated to CIS additional funding of this effort is required. <i>FY 2020 OCO Plans:</i> N/A <i>FY 2019 to FY 2020 Increase/Decrease Statement:</i> Slight ramp up in funding due to increase in common services within SWFTS. | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total |
| | | | | | |
| | | | | | |
| | | | | | |
| | Accomplishments/Planned Programs Subtotals | 44.703 | 60.824 | 62.426 | 0.000 |

| | | | | | | | | | | | |
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| <u>C. Other Program Funding Summary (\$ in Millions)</u> | | | | | | | | | | | |
| <u>Line Item</u> | <u>FY 2018</u> | <u>FY 2019</u> | <u>FY 2020 Base</u> | <u>FY 2020 OCO</u> | <u>FY 2020 Total</u> | <u>FY 2021</u> | <u>FY 2022</u> | <u>FY 2023</u> | <u>FY 2024</u> | <u>Cost To Complete</u> | <u>Total Cost</u> |
| • OPN/5420: SSN <i>Combat Control Systems</i> | 146.972 | 125.903 | 148.547 | - | 148.547 | 176.115 | 164.701 | 163.637 | 159.567 | Continuing | Continuing |
| <u>Remarks</u> OPN BA4 Ordinance Support & Equipment. BLI 5420 SSN Combat Control Systems | | | | | | | | | | | |
| <u>D. Acquisition Strategy</u> This budget integrates APBs developed by the advanced development community. This program has been tailored in accordance with the new DoD5000 directive to incorporate annual MDA production reviews. Advanced Processing Builds (APB) products associated with AN/BYG-1 Release-To-Fleet 3Q 2017, 3Q 2019 and 3Q 2021. | | | | | | | | | | | |
| <u>E. Performance Metrics</u> AN/BYG-1 Submarine Combat and Payload Control System performance metrics for each Advanced Processor Build (APB) and Technology Insertion (TI) cycle are contained in the classified Capability Production Document (CPD) annex to the overarching system requirements as laid out in the Capabilities Development Document (CDD). Each APB cycle receives an updated CPD based on fleet required capabilities. | | | | | | | | | | | |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy | | | | | | | | | | | | Date: March 2019 | | | |
| Appropriation/Budget Activity 1319 / 5 | | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | Project (Number/Name) 0236 / SSN Comb Cont Sys Imprvmnt (ENG) | | | | | |
| Product Development (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| AN/BYG-1 TECH INSERTION | C/CPIF | GENERAL DYNAMICS (GDAIS) : FAIR LAKES, VA | 100.481 | 4.628 | Oct 2017 | 9.623 | Oct 2018 | 9.628 | Oct 2019 | - | | 9.628 | Continuing | Continuing | Continuing |
| AN/BYG-1 TECH INSERTION | C/CPIF | GENERAL DYNAMICS (GDAIS) : PITTSFIELD, MA | 41.994 | 0.200 | Oct 2017 | 0.000 | Oct 2018 | 0.000 | Oct 2019 | - | | 0.000 | Continuing | Continuing | Continuing |
| AN/BYG-1 TECH INSERTION | C/CPIF | PROGENY (PCS) : MANASSAS, VA | 3.643 | 4.507 | Oct 2017 | 9.594 | Oct 2018 | 9.599 | Oct 2019 | - | | 9.599 | Continuing | Continuing | Continuing |
| GOVERNMENT ENGINEERING | WR | NUWC : NEWPORT, RI | 84.978 | 1.812 | Oct 2017 | 3.848 | Oct 2018 | 3.853 | Oct 2019 | - | | 3.853 | Continuing | Continuing | Continuing |
| INFORMATION ASSURANCE | C/CPAF | PROGENY : MANASSAS, VA | 39.337 | 3.590 | Oct 2017 | 7.474 | Oct 2018 | 7.479 | Oct 2019 | - | | 7.479 | Continuing | Continuing | Continuing |
| UNMANNED AERIAL SYSTEM | C/CPIF | GENERAL DYNAMICS : FAIR LAKES, VA | 1.087 | 0.214 | Oct 2017 | 0.000 | | 0.000 | | - | | 0.000 | Continuing | Continuing | Continuing |
| UNMANNED AERIAL SYSTEM | WR | NUWC : NEWPORT, RI | 1.061 | 0.445 | Oct 2017 | 0.675 | Oct 2018 | 1.699 | Oct 2019 | - | | 1.699 | Continuing | Continuing | Continuing |
| UNMANNED AERIAL SYSEM | C/CPIF | PROGENY (PCS) : MANASSAS, VA | 0.424 | 0.463 | Oct 2017 | 0.472 | Oct 2018 | 0.481 | Oct 2019 | - | | 0.481 | Continuing | Continuing | Continuing |
| Subtotal | | | 273.005 | 15.859 | | 31.686 | | 32.739 | | - | | 32.739 | Continuing | Continuing | N/A |
| Remarks | | | | | | | | | | | | | | | |
| UAS increases above inflation in FY19 & FY20 to support transition of 3" SLUAS to full-rate production | | | | | | | | | | | | | | | |
| Support (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| APB SOFTWARE INTEGRATION | C/CPIF | GENERAL DYNAMICS | 88.713 | 7.446 | Oct 2017 | 7.594 | Oct 2018 | 7.606 | Oct 2019 | - | | 7.606 | Continuing | Continuing | Continuing |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy | | | | | | | | | | | | Date: March 2019 | | | |
|---|------------------------|---|-------------|---------|------------|--|------------|--------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity 1319 / 5 | | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | Project (Number/Name) 0236 / SSN Comb Cont Sys Imprvmnt (ENG) | | | | | |
| Support (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| | | (GDAIS) : FAIRLAKES, VA | | | | | | | | | | | | | |
| APB SOFTWARE INTEGRATION | C/CPIF | GENERAL DYNAMICS : PITTSFIELD, MA | 27.850 | 0.272 | Oct 2017 | 0.000 | | 0.000 | Oct 2019 | - | | 0.000 | Continuing | Continuing | Continuing |
| APB SOFTWARE INTEGRATION | WR | NUWC : NEWPORT, RI | 58.834 | 4.765 | Oct 2017 | 4.860 | Oct 2018 | 4.862 | Oct 2019 | - | | 4.862 | Continuing | Continuing | Continuing |
| APB SOFTWARE INTEGRATION | C/CPAF | LOCKHEED MARTIN (LM-MSS) : MANASSAS, VA | 18.280 | 3.672 | Oct 2017 | 3.745 | Oct 2018 | 3.749 | Oct 2019 | - | | 3.749 | Continuing | Continuing | Continuing |
| APB SOFTWARE INTEGRATION | C/CPFF | PROGENY (PCS) : MANASSAS, VA | 5.078 | 4.705 | Oct 2017 | 4.799 | Oct 2018 | 4.803 | Oct 2019 | - | | 4.803 | Continuing | Continuing | Continuing |
| SOFTWARE DEVELOPMENT | Various | VARIOUS : VARIOUS:Not Specified | 54.158 | 2.329 | Oct 2017 | 2.375 | Oct 2018 | 2.380 | Oct 2019 | - | | 2.380 | Continuing | Continuing | Continuing |
| HARPOON PLATFORM INTEGRATION | C/CPFF | PROGENY : MANASSAS, VA | 0.000 | 0.000 | | 0.000 | | 0.500 | Oct 2019 | - | | 0.500 | 0.000 | 0.500 | - |
| Subtotal | | | 252.913 | 23.189 | | 23.373 | | 23.900 | | - | | 23.900 | Continuing | Continuing | N/A |
| Remarks PB20: HARPOON PLATFORM INTEGRATION ADD. -Funds transfer from PMA 201 to NAVSEA for Submarine Launched Harpoon Platform Integration efforts. | | | | | | | | | | | | | | | |
| Test and Evaluation (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| DEVELOPMENT TEST & EVALUATION | WR | NUWC : NEWPORT, RI | 38.062 | 0.968 | Oct 2017 | 0.987 | Oct 2018 | 0.993 | Oct 2019 | - | | 0.993 | Continuing | Continuing | Continuing |
| TEST & EVALUATION | C/CPIF | GENERAL DYNAMICS : FAIRLAKES, VA | 10.132 | 0.739 | Oct 2017 | 0.753 | Oct 2018 | 0.758 | Oct 2019 | - | | 0.758 | Continuing | Continuing | Continuing |

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|--|------------------------|-----------------------------------|-------------|---------|------------|--|------------|--------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy | | | | | | | | | | | | Date: March 2019 | | | |
| Appropriation/Budget Activity 1319 / 5 | | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | Project (Number/Name) 0236 / SSN Comb Cont Sys Imprvmnt (ENG) | | | | | |
| Test and Evaluation (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| TEST & EVALUATION | C/CPIF | GENERAL DYNAMICS : PITTSFIELD, MA | 4.236 | 0.739 | Oct 2017 | 0.753 | Oct 2018 | 0.756 | Oct 2019 | - | | 0.756 | Continuing | Continuing | Continuing |
| TEST & EVALUATION | C/CPAF | PROGENY : MANASSAS, VA | 2.313 | 0.483 | Oct 2017 | 0.492 | Oct 2018 | 0.495 | Oct 2019 | - | | 0.495 | Continuing | Continuing | Continuing |
| OPERATIONAL TEST & EVALUATION | WR | COMOPTEVFOR : NORFOLK, VA | 16.912 | 0.820 | Oct 2017 | 0.836 | Oct 2018 | 0.839 | Oct 2019 | - | | 0.839 | Continuing | Continuing | Continuing |
| Subtotal | | | 71.655 | 3.749 | | 3.821 | | 3.841 | | - | | 3.841 | Continuing | Continuing | N/A |
| Management Services (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| PROGRAM MANAGEMENT SUPPORT | C/CPFF | VARIOUS : VARIOUS:Not Specified | 25.935 | 1.906 | Oct 2017 | 1.944 | Oct 2018 | 1.946 | Oct 2019 | - | | 1.946 | Continuing | Continuing | Continuing |
| Subtotal | | | 25.935 | 1.906 | | 1.944 | | 1.946 | | - | | 1.946 | Continuing | Continuing | N/A |
| | | | Prior Years | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | Cost To Complete | Total Cost | Target Value of Contract |
| Project Cost Totals | | | 623.508 | 44.703 | | 60.824 | | 62.426 | | - | | 62.426 | Continuing | Continuing | N/A |
| Remarks | | | | | | | | | | | | | | | |

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Exhibit R-4, RDT&E Schedule Profile: PB 2020 Navy

Date: March 2019

Appropriation/Budget Activity

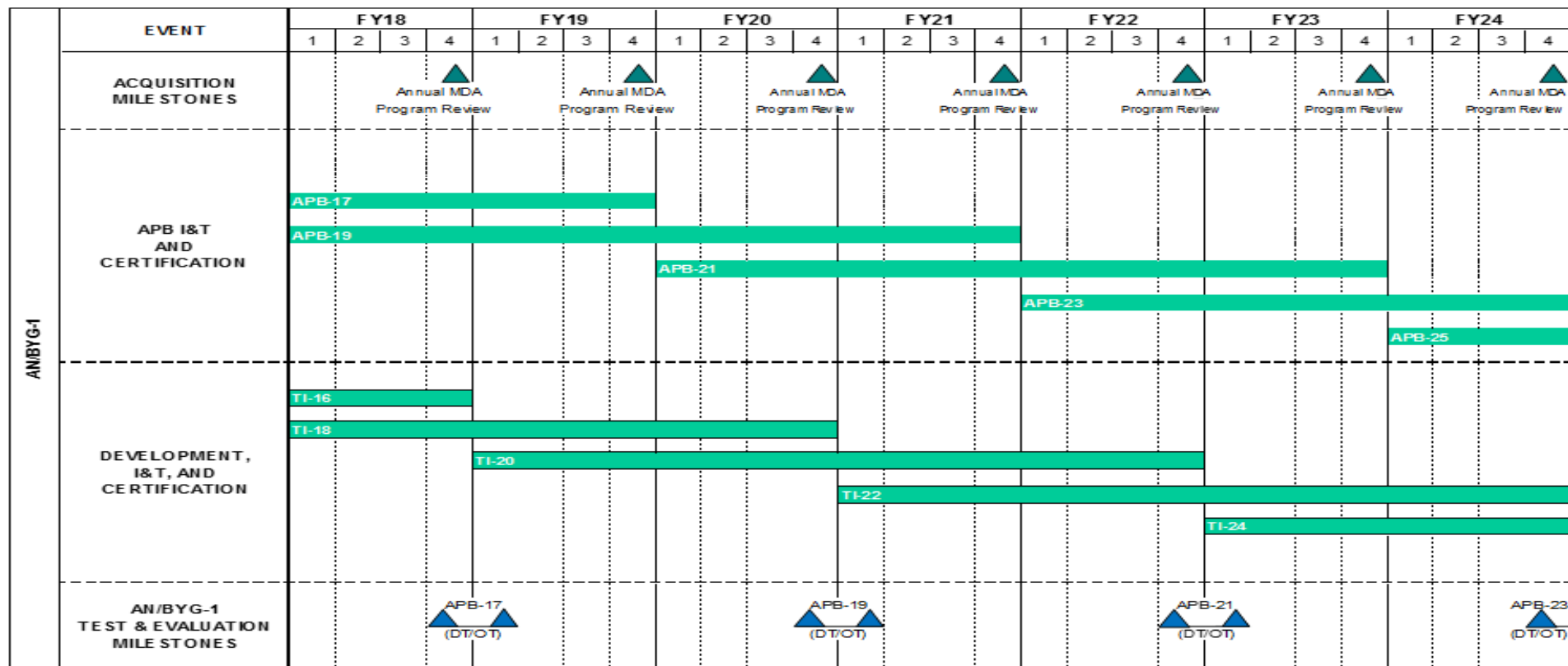
1319 / 5

R-1 Program Element (Number/Name)

PE 0604562N / Submarine Tactical Warfare System

Project (Number/Name)

0236 / SSN Comb Cont Sys Imprvmnt (ENG)



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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy | | | Date: March 2019 |
| Appropriation/Budget Activity 1319 / 5 | R-1 Program Element (Number/Name) PE 0604562N / <i>Submarine Tactical Warfare System</i> | Project (Number/Name) 0236 / <i>SSN Comb Cont Sys Imprvmnt (ENG)</i> | |

Schedule Details

| Events by Sub Project | Start | | End | |
|--|---------|------|---------|------|
| | Quarter | Year | Quarter | Year |
| Page 1 | | | | |
| Acq Milestones: Annual MDA Program Review - FY18 | 4 | 2018 | 4 | 2018 |
| Acq Milestones: Annual MDA Program Review - FY19 | 4 | 2019 | 4 | 2019 |
| Acq Milestones: Annual MDA Program Review - FY20 | 4 | 2020 | 4 | 2020 |
| Acq Milestones: Annual MDA Program Review - FY21 | 4 | 2021 | 4 | 2021 |
| APB I&T, Certification: APB-17: APB-17 | 1 | 2018 | 4 | 2019 |
| APB I&T, Certification: APB-19: APB-19 | 1 | 2018 | 4 | 2021 |
| APB I&T, Certification: APB-21: APB-21 | 1 | 2020 | 4 | 2023 |
| APB I&T, Certification: APB-23: APB-23 | 1 | 2022 | 4 | 2024 |
| APB I&T, Certification: APB-25: APB-25 | 1 | 2024 | 4 | 2024 |
| Development, I&T Certification: TI-16: TI-16 | 1 | 2018 | 4 | 2018 |
| Development, I&T Certification: TI-18: TI-18 | 1 | 2018 | 4 | 2020 |
| Development, I&T Certification: TI-20: TI-20 | 1 | 2019 | 4 | 2022 |
| Development, I&T Certification: T-22: TI-22 | 1 | 2021 | 4 | 2024 |
| Development, I&T Certification: TI-24: TI-24 | 1 | 2023 | 4 | 2024 |
| Test & Evaluation Milestones: AN/BYG-1: APB-17 DT/OT | 4 | 2018 | 1 | 2019 |
| Test & Evaluation Milestones: AN/BYG-1: APB-19 DT/OT | 4 | 2020 | 1 | 2021 |
| Test & Evaluation Milestones: AN/BYG-1: APB-21 DT/OT | 4 | 2022 | 1 | 2023 |
| Test & Evaluation Milestones: AN/BYG-1: APB-23 DT/OT | 4 | 2024 | 4 | 2024 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy | | | | | | | | | | Date: March 2019 | | |
| Appropriation/Budget Activity 1319 / 5 | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | Project (Number/Name) 9999 / Congressional Adds | | | |
| COST (\$ in Millions) | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total | FY 2021 | FY 2022 | FY 2023 | FY 2024 | Cost To Complete | Total Cost |
| 9999: Congressional Adds | 0.000 | 0.000 | 19.500 | 0.000 | - | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 19.500 |
| Quantity of RDT&E Articles | | - | - | - | - | - | - | - | - | - | | |
| A. Mission Description and Budget Item Justification | | | | | | | | | | | | |
| Project Unit 9999: | | | | | | | | | | | | |
| FY19 congressional adds provide funding to increase Submarine Launched Unmanned Aerial System (\$4.5M), SBIR Technology Insertion (\$10M) and Submarine Tactical Warfare System efforts (\$5M). | | | | | | | | | | | | |
| Provides funding to continue Submarine Launched Unmanned Aerial Systems (SLUAS) development, development and employment of TI16 APB17 BYG-1 software with virtualization, containerized on expandable micro-blade servers (BYG-1 Virtual Twin) and the development and employment of all baselines of Common Weapon Launcher (CWL) software with virtualization on standard COTS hardware. | | | | | | | | | | | | |
| Funding provided for Submarine Warfare Federated Tactical System (SWFTS) TI18 APB19 Cybersecurity Tool Kit (CSTK) rapid deployment of increased cyber resiliency tools and automation. Funding will allow for cybersecurity improvement to be developed and fielded to SSN and SSBN platforms sooner and improve overall cyber resilience through improved tools and automation improvements. | | | | | | | | | | | | |
| Funding provides for improvements and increase reliability within APB17 baseline, security improvements in BYG-1 data to support recent cyber changes and future payload interfaces. Also provides funding for increased capability within OBTT into APB17 baseline to allow additional operational training functionality and increase interface capability between user and machine. | | | | | | | | | | | | |
| Execute BYG-1 Virtual Twin: | | | | | | | | | | | | |
| -Selection of BYG-1 Virtual Twin Hardware, virtualization, and containerization technology | | | | | | | | | | | | |
| -Full virtualization of TI16 APB17 BYG-1 | | | | | | | | | | | | |
| -Containerization of TI16 APB17 BYG-1 subsystems into applications. | | | | | | | | | | | | |
| -Full test program on BYG-1 Virtual Twin using ATRT | | | | | | | | | | | | |
| Execute Common Weapon Launcher (CWL) Virtual Test Bed | | | | | | | | | | | | |
| -Full virtualization of TI16APB17 BYG-1 | | | | | | | | | | | | |
| -Full test program on CWL Test Bed | | | | | | | | | | | | |
| -Final Delivery to Government. | | | | | | | | | | | | |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy | | Date: March 2019 | |
| Appropriation/Budget Activity 1319 / 5 | R-1 Program Element (Number/Name) PE 0604562N / <i>Submarine Tactical Warfare System</i> | Project (Number/Name) 9999 / <i>Congressional Adds</i> | |
| B. Accomplishments/Planned Programs (\$ in Millions) | | FY 2018 | FY 2019 |
| Congressional Add: Submarine Launched Unmanned Aerial System FY 2018 Accomplishments: N/A FY 2019 Plans: Begin development and procurement of two shipsets (24 units) of Blackwing to support Initial Operating Capability in FY20. Begin development and procurement of five shipsets (60 units) of Hammerhead Spiral 1 Canisters to support Initial Operating Capability in FY20. Begin development of Interface Control Document (ICD), manufacturability improvements (to lower unit costs), and design of expansion of internal space to house larger UAV. Begin design and implementation of capability and interface requirements for submarine launch. | | 0.000 | 4.500 |
| Congressional Add: SBIR Technology Insertion FY 2018 Accomplishments: N/A FY 2019 Plans: Develop a containerized/virtualized BYG-1 Baseline on expandable micro-blade servers. Begin install configuration as tempalt to perform demonstration of reduced SWAP, configurable BYG-1. Develop a containerized/virtualized BYG-1 Baseline and SPEAR test tool. Begin building Test Bay as a service, associated security and demonstrate automated, remote testing capability via WAIF. Develop and employ all baselines of CWL software with virtualization on standard COTS hardware. Begin development and procurement of an SWFTS APB19 Cybersecurity Tool Kit (CSTK) Improvement to support Initial Operating Capability in FY20. | | 0.000 | 10.000 |
| Congressional Add: Submarine Tactical Warfare System FY 2018 Accomplishments: N/A FY 2019 Plans: Begin Phase 1 Command Applications and Platform (CAAP) implementation development and integration of Augmented Intelligence (AI) into BYG-1 to enhance ability to recognize and respond to changes in risk factors such as collision and counter detection. | | 0.000 | 5.000 |

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy | | Date: March 2019 |
| Appropriation/Budget Activity 1319 / 5 | R-1 Program Element (Number/Name) PE 0604562N / <i>Submarine Tactical Warfare System</i> | Project (Number/Name) 9999 / <i>Congressional Adds</i> |

| | | |
|--|----------------|----------------|
| B. Accomplishments/Planned Programs (\$ in Millions) | FY 2018 | FY 2019 |
| Begin and complete ISMT development and integration into APB-17 baseline. Begin ISMT development and integration of ISMT into APB-19 baseline. | | |
| Congressional Adds Subtotals | 0.000 | 19.500 |

C. Other Program Funding Summary (\$ in Millions)
N/A

Remarks

D. Acquisition Strategy

Once developed, these modernization upgrades will be part of the TI/APB software baselines, utilizing the same Acquisition Strategy as the Tactical Warfare System. The program budget integrates APBs developed by the advanced development community. This program has been tailored in accordance with the new DoD5000 directive to incorporate annual MDA production reviews. Advanced Processing Builds (APB) products associated with AN/BYG-1 Release-To-Fleet 3Q 2017, 3Q 2019 and 3Q 2021.

Near term: Continued refinement of the AWESUM AUR with improvements in reliability, maturity of design, IA compliance and compatibility with the Common Communications solution being developed with PMS 425 and SEA 073.

Far term: Within Five years, leveraging the discovery from near term efforts and achieving actual feedback from fleet operations, the Program expects to submit a RFP to best produce the next generation of AUR development and system employment.

SLUAS Controller modernization upgrades will be incorporated into the TI/APB software baselines, utilizing the same Acquisition Strategy as the Tactical Warfare System for BYG-1.

This program has been tailored in accordance with the new DoD 5000 directive to incorporate annual MDA production reviews.

E. Performance Metrics

AN/BYG-1 Submarine Combat and Payload Control System performance metrics for each Advanced Processor Build (APB) and Technology Insertion (TI) cycle are contained in the classified Capability Production Document (CPD) annex to the overarching system requirements as laid out in the Capabilities Development Document (CDD). Each APB cycle receives an updated CPD based on Fleet required capabilities.

In transition from the JCTD, initial Key Performance Parameters and Key Attributes are contained in the Functional Requirements Document, as established by COMSUBPAC and modified by OPNAV N97.

In establishing the Program of Record, a Performance Specification and a Capability Production Document (CPD) are being developed.

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| Exhibit R-2A, RDT&E Project Justification: PB 2020 Navy | | Date: March 2019 |
| Appropriation/Budget Activity 1319 / 5 | R-1 Program Element (Number/Name) PE 0604562N / <i>Submarine Tactical Warfare System</i> | Project (Number/Name) 9999 / <i>Congressional Adds</i> |
| <p>AN/BYG-1 Submarine Combat and Payload Control System performance metrics for each Advanced Processor Build (APB) and Technology Insertion (TI) cycle are contained in the classified CPD annex to the overarching system requirements as laid out in the Capabilities Development Document (CDD). Each APB cycle receives an updated CPD based on Fleet required capabilities.</p> | | |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy | | | | | | | | | | | | Date: March 2019 | | | |
|--|------------------------|---------------------------------|-------------|---------|------------|--|------------|--------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity 1319 / 5 | | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | Project (Number/Name) 9999 / Congressional Adds | | | | | |
| Product Development (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| BYG-1 Virtual Twin | Various | Various : Various | 0.000 | 0.000 | | 1.250 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 1.250 | - |
| CWL Virtual Test Bed | TBD | Progeny : Manassas, Va | 0.000 | 0.000 | | 0.500 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| SPEAR & Continuous Integration | Various | Various : Various | 0.000 | 0.000 | | 0.800 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.800 | - |
| Blackwing Shipset | C/CPFF | AeroVironment : Simi Valley, CA | 0.000 | 0.000 | | 1.500 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 1.500 | - |
| Hammerhead Shipset | C/CPFF | Sparton : DeLeon Springs, FL | 0.000 | 0.000 | | 1.000 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 1.000 | - |
| Hammerhead Cannister Improvements | C/CPFF | Sparton : DeLeon Springs, FL | 0.000 | 0.000 | | 0.500 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| TBD - DIU Award | C/CPFF | TBD : TBD | 0.000 | 0.000 | | 0.900 | May 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.900 | - |
| Integrated Systems Monitoring Tool (ISMT) | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.110 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.110 | - |
| On-Board Team Trainer (OBTT) | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.200 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| Phase 1 CAAP Implementation | C/CPFF | Assett : Manassas, Va | 0.000 | 0.000 | | 1.300 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 1.300 | - |
| SWFTS APB19 Cybersecurity Tool Kit | C/CPFF | Progeny : Manassas, Va | 0.000 | 0.000 | | 3.000 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 3.000 | - |
| Subtotal | | | 0.000 | 0.000 | | 11.060 | | 0.000 | | - | | 0.000 | 0.000 | 11.060 | N/A |
| Support (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| BYG-1 Virtual Twin | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.500 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| CWL Test Bed | TBD | Progeny : Manassas, VA | 0.000 | 0.000 | | 0.000 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.000 | - |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy | | | | | | | | | | | | Date: March 2019 | | | |
|--|------------------------|---------------------------------|-------------|---------|------------|--|------------|--------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity 1319 / 5 | | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | Project (Number/Name) 9999 / Congressional Adds | | | | | |
| Support (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| SPEAR & Continuous Integration | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.100 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Integrated Systems Monitoring Tool (ISMT) | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.374 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.374 | - |
| Security Classification Guide | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.090 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.090 | - |
| Phase 1 CAAP Implementation | C/CPFF | Assett : Manassas, VA | 0.000 | 0.000 | | 1.350 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 1.350 | - |
| SWFTS APB19 Cybersecurity Tool Kit | C/CPFF | Progeny : Manassas, VA | 0.000 | 0.000 | | 0.500 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| Subtotal | | | 0.000 | 0.000 | | 2.914 | | 0.000 | | - | | 0.000 | 0.000 | 2.914 | N/A |
| Test and Evaluation (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| BYG-1 Virtual Twin | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 1.000 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 1.000 | - |
| CWL Test Bed | TBD | Progeny : Manassas, VA | 0.000 | 0.000 | | 0.400 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.400 | - |
| SPEAR & Continuous Integration | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.250 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.250 | - |
| TBD - DIU Award | C/CPFF | Not Specified : Not Specified | 0.000 | 0.000 | | 0.100 | May 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Integrated Systems Monitoring Tool (ISMT) | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.143 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.143 | - |
| On-Board Team Trainer (OBTT) | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.205 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.205 | - |
| Phase 1 CAAP Implementation | C/CPFF | Assett : Manassas, VA | 0.000 | 0.000 | | 0.850 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.850 | - |
| SWFTS APB19 Cybersecurity Tool Kit | C/BA | Progeny : Manassas, VA | 0.000 | 0.000 | | 0.750 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.750 | - |

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| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy | | | | | | | | | | | | Date: March 2019 | | | |
|--|------------------------|---------------------------------|-------------|---------|------------|--|------------|--------------|------------|--|------------|------------------|------------------|------------|--------------------------|
| Appropriation/Budget Activity 1319 / 5 | | | | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | | Project (Number/Name) 9999 / Congressional Adds | | | | | |
| Test and Evaluation (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| Subtotal | | | 0.000 | 0.000 | | 3.698 | | 0.000 | | - | | 0.000 | 0.000 | 3.698 | N/A |
| Management Services (\$ in Millions) | | | | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | | | |
| Cost Category Item | Contract Method & Type | Performing Activity & Location | Prior Years | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Award Date | Cost | Cost To Complete | Total Cost | Target Value of Contract |
| BYG-1 Virtual Twin | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.250 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.250 | - |
| CWL Test Bed | TBD | Progeny : Manassas, VA | 0.000 | 0.000 | | 0.100 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| SPEAR & Continuous Integration | Various | Not Specified : Not Specified | 0.000 | 0.000 | | 0.100 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Blackwing Shipset | C/CPFF | AeroVironment : Simi Valley, CA | 0.000 | 0.000 | | 0.500 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.500 | - |
| Hammerhead Shipset | C/CPFF | Sparton : DeLeon Springs, FL | 0.000 | 0.000 | | 0.250 | Jan 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.250 | - |
| Integrated Systems Monitoring Tool (ISMT) | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.100 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.100 | - |
| Security Classification Guide | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.020 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.020 | - |
| On-Board Team Trainer (OBTT) | C/CPFF | Rite Solutions : Middletown, RI | 0.000 | 0.000 | | 0.050 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.050 | - |
| Phase 1 CAAP Implementation | C/CPFF | Assett : Manassas, VA | 0.000 | 0.000 | | 0.200 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.200 | - |
| SWFTS APB19 Cybersecurity Tool Kit | C/CPFF | Progeny : Manassas, VA | 0.000 | 0.000 | | 0.258 | Feb 2019 | 0.000 | | - | | 0.000 | 0.000 | 0.258 | - |
| Subtotal | | | 0.000 | 0.000 | | 1.828 | | 0.000 | | - | | 0.000 | 0.000 | 1.828 | N/A |
| | | | Prior Years | FY 2018 | | FY 2019 | | FY 2020 Base | | FY 2020 OCO | | FY 2020 Total | Cost To Complete | Total Cost | Target Value of Contract |
| Project Cost Totals | | | 0.000 | 0.000 | | 19.500 | | 0.000 | | - | | 0.000 | 0.000 | 19.500 | N/A |

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|--|-------------|---------|--|--------------|-------------|--|------------------|------------|--------------------------|--|
| Exhibit R-3, RDT&E Project Cost Analysis: PB 2020 Navy | | | | | | | Date: March 2019 | | | |
| Appropriation/Budget Activity 1319 / 5 | | | R-1 Program Element (Number/Name) PE 0604562N / Submarine Tactical Warfare System | | | Project (Number/Name) 9999 / Congressional Adds | | | | |
| | Prior Years | FY 2018 | FY 2019 | FY 2020 Base | FY 2020 OCO | FY 2020 Total | Cost To Complete | Total Cost | Target Value of Contract | |
| Remarks | | | | | | | | | | |

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PE 0604562N: *Submarine Tactical Warfare System*
Navy

R-1 Line #133

| |
|--|
| R-1 Program Element (Number/Name) PE 0604562N / <i>Submarine Tactical Warfare System</i> |
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| | |
|------------------------------|---------------------------|
| Project (Number/Name) | 9999 / Congressional Adds |
|------------------------------|---------------------------|

| Proj 9999 | FY 2018 | | | | FY 2019 | | | | FY 2020 | | | | FY 2021 | | | | FY 2022 | | | | FY 2023 | | | | FY 2024 | | | | | | | | | | | |
|---|---------|----|----|----|---------|---|----|----|---------|----|----|----|---------|----|----|----|---------|----|----|----|---------|----|----|----|---------|----|----|----|--|--|--|--|--|--|--|--|
| | 1Q | 2Q | 3Q | 4Q | 1Q | 2Q | 3Q | 4Q | 1Q | 2Q | 3Q | 4Q | 1Q | 2Q | 3Q | 4Q | 1Q | 2Q | 3Q | 4Q | 1Q | 2Q | 3Q | 4Q | 1Q | 2Q | 3Q | 4Q | | | | | | | | |
| SBIR Technology | | | | | | CSTK I&T, Certification: CSTK APB19 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | CSTK I&T, Certification: CSTK APB21 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Commons Weapons Launcher (CWL) Virtual Test Bed | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | BYG-1 Virtual Twin | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | SPEAR Continuous Integration | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Submarine Tactical Warfare System | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | Command Applications And Platform (CAAP) Phase 1 - Start & Delivery | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Submarine Launched Unmanned Aerial System | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | SLUAS Blackwing Shipset Procurement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | SLUAS Hammerhead Shipset Procurement | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | SLUAS Hammerhead Canister Improvements | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | SLUAS Evolutionary Development | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

2020PB - 0604562N - 9999

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| Exhibit R-4A, RDT&E Schedule Details: PB 2020 Navy | | | Date: March 2019 |
| Appropriation/Budget Activity 1319 / 5 | R-1 Program Element (Number/Name) PE 0604562N / <i>Submarine Tactical Warfare System</i> | Project (Number/Name) 9999 / <i>Congressional Adds</i> | |

Schedule Details

| Events by Sub Project | Start | | End | |
|--|----------------|-------------|----------------|-------------|
| | Quarter | Year | Quarter | Year |
| <i>Proj 9999</i> | | | | |
| SBIR Technology: CSTK I&T, Certification: CSTK APB19 | 2 | 2019 | 1 | 2021 |
| SBIR Technology: CSTK I&T, Certification: CSTK APB21 | 1 | 2020 | 1 | 2023 |
| SBIR Technology: Commons Weapons Launcher (CWL) Virtual Test Bed | 3 | 2019 | 4 | 2021 |
| SBIR Technology: BYG-1 Virtual Twin | 3 | 2019 | 4 | 2022 |
| SBIR Technology: IDT SPEAR Continuous Integration | 3 | 2019 | 4 | 2020 |
| Submarine Tactical Warfare System: Command Applications And Platform (CAAP) Phase 1 - Start & Delivery | 2 | 2019 | 4 | 2020 |
| Submarine Launched Unmanned Aerial System: SLUAS Blackwing Shipset Procurement | 3 | 2019 | 3 | 2021 |
| Submarine Launched Unmanned Aerial System: SLUAS Hammerhead Shipset Procurement | 3 | 2019 | 3 | 2021 |
| Submarine Launched Unmanned Aerial System: SLUAS Hammerhead Canister Improvements | 3 | 2019 | 1 | 2022 |
| Submarine Launched Unmanned Aerial System: SLUAS Defense Innovation (DIU) Evolutionary Development | 3 | 2019 | 1 | 2022 |