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

Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603892C / <i>AEGIS BMD</i>
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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	3,783.490	724.731	737.269	814.936	-	814.936	674.825	553.402	478.000	449.145	Continuing	Continuing
MD09: <i>Aegis BMD</i>	2,804.582	229.791	274.932	405.041	-	405.041	366.322	327.247	258.300	248.567	Continuing	Continuing
MG09: <i>Aegis BMD SM-3 Development Articles</i>	194.018	79.686	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	273.704
MM09: <i>Aegis BMD SM-3 Development</i>	114.507	187.879	253.244	201.970	-	201.970	102.453	28.969	14.285	7.954	0.000	911.261
MC09: <i>Cyber Operations</i>	7.944	13.005	19.617	29.392	-	29.392	38.348	48.632	46.252	28.946	Continuing	Continuing
MX09: <i>Aegis BMD Development Support</i>	347.831	179.320	163.628	148.030	-	148.030	140.923	126.302	134.702	139.178	Continuing	Continuing
MD40: <i>Program-Wide Support</i>	314.608	35.050	25.848	30.503	-	30.503	26.779	22.252	24.461	24.500	Continuing	Continuing

Program MDAP/MAIS Code: 362

Note

Increase from FY 2020 to FY 2021 provides the following:

- Increased cybersecurity requirements to initiate Radio Frequency (RF) Link Improvements Initiation between Aegis BMD Weapon Systems and missiles to enable missile hardware enhancements in alignment with the U.S. Navy
- Increased concepts, system-level requirements and preliminary design for methods to achieve deployment in support of Layered Homeland Defense
- Increased development efforts of Aegis Ballistic Missile Defense (BMD) 4.2 required to maintain joint U.S. Navy schedule alignment with an accelerated certification date to deliver capability to the warfighter in time to support the need
- Expanded BMD 5.x Weapon System capabilities to include integration with SM-3 Block IIA Software Updates 8.2 and 8.3 to address evolving threats
- Increased development for Aegis BMD 6.0 baseline necessary to address the complexities of integrating BMD Capability with the Advance Capability Build (ACB) 20 combat system to include new SPY-6 requirements
- Incorporation of Maritime Tactical Command and Control (MTC2) into Aegis BMD Mission Planner Prototype (Cerberus) to provide multi-mission planning and de-confliction

The FY 2021 funding request was reduced by \$3.024 million during DWR to reduce Civilian Labor.

The FY 2021 funding request was reduced by \$4.443 during DWR to reduce contractor support.

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Appropriation/Budget Activity 0400: <i>Research, Development, Test & Evaluation, Defense-Wide / BA 4: Advanced Component Development & Prototypes (ACD&P)</i>	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD
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A. Mission Description and Budget Item Justification

The Aegis BMD mission is to deliver an enduring, operationally effective and supportable BMD capability to defend the nation, deployed forces, friends and allies, and to increase this capability by delivering evolutionary improvements as part of Ballistic Missile Defense System (BMDS) upgrades. The Aegis BMD element of the BMDS capitalizes upon and evolves from the existing United States Navy Aegis Weapons System (AWS) and Standard Missile (SM) infrastructures. Aegis BMD provides a forward-deployable, mobile capability to detect and track Ballistic Missiles of all ranges, and the ability to destroy Short-Range Ballistic Missiles (SRBMs), Medium-Range Ballistic Missiles (MRBMs), and Intermediate-Range Ballistic Missiles (IRBMs) in the midcourse phase of flight, and shorter range missiles in the terminal phase of flight. Aegis BMD also provides a Long Range Surveillance and Track (LRS&T) capability to the BMDS. Upgrades to both the Aegis BMD Weapon System and the Standard Missile-3 (SM-3) configuration enable Aegis BMD to provide effective, supportable defensive capability against longer range, more sophisticated threats and an enduring Aegis Ashore defensive capability.

This Program Element includes BMDS threat discrimination improvements, which will enhance BMDS effectiveness against the evolving adversary threat. The result will be a BMDS architecture more capable of discriminating and destroying reentry vehicles with a higher degree of confidence, improving Warfighter shot doctrine, and more efficiently using interceptor inventory. BMDS threat discrimination improvements are funded from the Enabling (0603890C), Midcourse (0603882C), BMD Sensors (0603884C), C2BMC (0603896C), and Aegis BMD (0603892C) PEs.

B. Program Change Summary (\$ in Millions)	FY 2019	FY 2020	FY 2021 Base	FY 2021 OCO	FY 2021 Total
Previous President's Budget	741.076	727.479	718.949	-	718.949
Current President's Budget	724.731	737.269	814.936	-	814.936
Total Adjustments	-16.345	9.790	95.987	-	95.987
• Congressional General Reductions	0.000	0.000			
• Congressional Directed Reductions	0.000	-28.000			
• Congressional Rescissions	0.000	0.000			
• Congressional Adds	0.000	37.790			
• Congressional Directed Transfers	0.000	0.000			
• Reprogrammings	0.000	0.000			
• SBIR/STTR Transfer	-12.324	0.000			
• Missile Defeat and Defense Enhancement	0.000	0.000	0.000	-	0.000
• Other Adjustment	-4.021	0.000	95.987	-	95.987

Change Summary Explanation

Net Increase in FY 2020 reflects the enacted congressional decrease of \$28M for Unjustified Growth and provides congressional adds for SM-3 Block IIA test planning and acquisition of test articles for environmental testing and increased cybersecurity requirements.

Increase in FY 2021 provides the following:

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<ul style="list-style-type: none">- Increased cybersecurity requirements to initiate Radio Frequency (RF) Link Improvements Initiation between Aegis BMD Weapon Systems and missiles to enable missile hardware enhancements in alignment with the U.S. Navy- Re-baseline BMD 6.x program to condense BMD software development schedule to continue in alignment with U.S. Navy's Flight III DDG deployment- Upgrades to Aegis Baseline (BL) 9 (BMD 5.x) to provide additional threats to the Aegis weapon system aligning with SM-3 Block IIA Build 8.2/8.3 software updates and threat set- Aegis BL 5.4.1 (BMD 4.2) program schedule acceleration reducing total Future Year Defense Program (FYDP) cost while delivering capability to the warfighter in time to support the need in joint coordination with the U.S. Navy		

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency										Date: February 2020		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD				Project (Number/Name) MD09 / Aegis BMD			
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
MD09: <i>Aegis BMD</i>	2,804.582	229.791	274.932	405.041	-	405.041	366.322	327.247	258.300	248.567	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Increase from FY 2020 to FY 2021 provides the following:

- Regional Sensor Advanced Discrimination solutions and modeling and simulation updates for multiple Aegis BMD architectures
- Concepts, system-level requirements and preliminary design for methods to achieve persistent deployment in support of Layered Homeland Defense
- Increased development efforts of Aegis BMD 4.2 required to maintain joint U.S. Navy schedule alignment with an accelerated certification date to deliver capability to the warfighter in time to support the need
- Expanded BMD 5.x Weapon System capabilities to include integration with SM-3 Block IIA Software Updates 8.2 and 8.3 to address evolving threats
- Increased development for Aegis BMD 6.0 baseline necessary to address the complexities of integrating BMD Capability with the ACB 20 combat system to include new SPY-6 requirements

A. Mission Description and Budget Item Justification

Aegis BMD continues development of a Sea-Based BMD capability in support of the MDA's mission to protect the homeland, deployed forces, friends and allies from ballistic missile threats of all ranges and in all stages of flight.

Systems Engineering & Integration performs requirements development, engineering analysis, capability integration, and performance verification for Aegis BMD development and BMDS integration.

Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion enables cross-baseline specification management and capability assessments to ensure consistent application of technical standards, processes, and procedures across the Aegis BMD program. Aegis BMD specific efforts include: systems engineering and architecture (process and execution); modeling and simulation (M&S); Verification and Validation (V&V) test and evaluation support; ship integration; quality; safety and mission assurance M&S. V&V efforts in this accomplishment are performed at the Aegis BMD element level, which feed into the overall BMDS system level.

Aegis Baseline (BL) 5.4.0 (BMD 4.1.2) is a joint effort with the U.S. Navy developing a single Aegis Weapon System that merges BMD 4.1 and Aegis BL 5.3 computer programs within the current BMD 4.x weapon system architecture. Additional capabilities provide Anti-Air Warfare (AAW) improvements, SM-6 Dual I Extended Range AAW/Anti-Surface Warfare (ASUW), interoperability improvements, and updated BMD threat adaptation data.

Aegis BL 5.4.1 (BMD 4.2) is a joint effort with the U.S. Navy that refurbishes existing ship AN/SPY-1 radar arrays with the installation of antenna Low Noise Amplifiers (LNAs). This baseline will provide update to 21 Flight I/II Destroyers (DDG) with increased capability to maintain relevance through End of Service Life. Capabilities delivered include discrimination improvements, expanded threat set, increased stand-off range, expanded ship operating area, and war fighter requested improvements.

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Aegis BL 9 (BMD 5.x) aligns with U.S. Navy Aegis Baseline 9 Capability Packages (2020, 2021, 2022, and 2024) to provide expanded detection, track, and defeat capabilities of additional intermediate range threats and threats with increasingly complex engagement scenes, increased raid sizes, and enables the Weapon System to operate in challenging operational environments. Through a series of unique Capability Insertion Packages, BMD 5.x provides software updates to the original BMD 5.1 to incorporate emergent BMDS capabilities, War fighter improvements, and improved Weapon System performance.

Aegis BL 10 (BMD 6.0) incorporates the solid state Air and Missile Defense Radar (AMDR), now designated SPY-6, for introduction on the first Flight III DDG. BMD 6.0 will provide deployed assets enhanced Integrated Air and Missile Defense (IAMD) capability, while enabling BMDS element utilization of SPY-6 data for remote engagement. Enhancements include significant improvements in IAMD planning, search, track, discrimination and force level (multi-asset) raid defense. BMD 6.0 will enable U.S. Navy ships to maintain greater stand-off range while increasing performance against complex threats.

Aegis Underlay includes Aegis Weapon System and SM-3 Block IIA software modifications to existing systems to support a phased delivery of operational capability against expanded threat/mission space.

Modeling & Simulation (M&S) Objective Simulation Framework (OSF) effort develops, maintains and deploys the framework hardware and software for use at element laboratories and Combatant Command (CCMD) locations to support IMTP events, BMDS capability delivery assessments, War fighter training, exercises, and wargames.

M&S BMDS Simulations & Tools effort provides development and sustainment of digital products and the architecture framework, and delivery/maintenance of infrastructure for BMDS performance assessments.

BMD System Assessment and Verification, Validation & Assessment (VV&A) includes activities to support BMDS Operational Capacity Baseline (OCB) delivery decisions and Technical Capability Declarations (TCDs), and anchor System modeling and simulation.

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<p>Title: Systems Engineering & Integration</p> <p align="right">Articles:</p> <p>Description: Perform requirements development, engineering analysis, capability integration, and performance verification for Aegis BMD development and BMDS integration, including Aegis BMD compliance with the BMDS Specification and BMDS Description Document.</p> <p>Recurring Accomplishments:</p> <ul style="list-style-type: none"> - Conduct system level performance analyses to support ongoing BMDS Architecture and Systems Engineering efforts - Perform top-down system level engineering analysis, capability integration, and performance verification for Aegis BMD development and BMDS integration, including Aegis BMD compliance with the BMD System Specification and BMD System Description Document - Identify architecture alternatives that improve the BMD System's performance and are complementary to and interoperable with NATO systems and theaters around the world 	17.930	20.780	18.999
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Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Define BMDS technical content expectations and develop system requirements, to include integration of new capabilities, such as the U.S. Navy's Air and Missile Defense Radar (AMDR) - Develop functional performance, interface, and design suitability requirements in collaboration with Aegis BMD engineers to ensure correct flow-down and allocation of BMD System-level requirements to Aegis BMD - Respond to Warfighter, Combatant Command and other requests for analyses and requests for information; provide analytical support for real-world events - Conduct non-advocate assessments of BMDS capabilities and limitations prior to capability delivery decisions to determine fielding readiness (including Theater/Regional BMD) - Conduct extensive analysis of data collected in BMD test events to evaluate BMD System operations and performance <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans: - SEE ABOVE.</p> <p>FY 2021 Plans: - SEE ABOVE.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: N/A</p>				
Title: Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion		57.427	46.170	60.497
Description: Aegis BMD Core System Engineering enables cross-baseline specification management and capability assessments to ensure consistent application of technical standards, processes, and procedures across the Aegis BMD program. Aegis BMD specific efforts include: systems engineering and architecture (process and execution), M&S, V&V, test and evaluation support, and ship integration. M&S V&V efforts in this accomplishment are performed at the Aegis BMD element level, which feed into the overall BMDS system level. Recurring Accomplishments: <ul style="list-style-type: none"> - Conduct U.S. Navy and Joint Link certifications required for BMD Baseline certifications for operational deployment - Support Ground Test Campaign for BMDS to achieve Operational Capability Baseline (OCB) declaration - Execute V&V activities and provide results to MDA System Verification Team and the OTA in support of BMD system level accreditation for BMDS events - Provide M&S Requirements Management and Development - Conduct further development of Aegis BMD System Architecture and overarching system concepts - Conduct BMDS system level requirements allocation and Aegis BMD system requirements development, trace, validation and verification, and configuration management for coordination with all participating external agencies and organizations 		Articles: -	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Perform Command, Control, Computer, Communications and Intelligence (C4I) systems engineering to further develop Aegis BMD requirements, and to identify and resolve BMDS interoperability issues - Define and coordinate development and implementation of C4I capabilities in U.S. Navy C4I programs of record to meet Aegis BMD requirements - Conduct Threat Engineering analysis and Requirements Assessment - Conduct Systems Engineering for Aegis BMD system-level M&S development and interfaces to the BMDS architecture - Provide verified, validated, accredited models in support of U.S. Navy certification, MDA characterization of system-level performance, Operational Test Agency (OTA) assessment of operational capabilities, and representation of Aegis BMD capabilities in BMD test and exercise venues - Provide target engineering, test planning activities, and IMTP process/inputs for Aegis BMD - Conduct Performance Assessment and Verification (PAV) processes which assess the sufficiency of Objective Quality Evidence (OQE) to provide a traceable evidence to verify Element Specification (ES) requirements traced to BMDS requirements - Provide oversight of all Aegis BMD analysis in support of systems assessment and verification supporting test and analysis requirements and test planning inputs to align with MDA and U.S. Navy test programs - Provide consolidated analysis and reporting for firing events <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Provide model development and V&V in support of COMOPTEVFOR BL 9.C2 M&S accreditation - Provide support and oversight of development, integration and sustainment of M&S in support of BMD 6 - Provide Electronic Protection analysis and development of Electronic Attack mitigation concepts - Develop or modify Aegis BMD models and supporting M&S components to meet system-level and enterprise M&S infrastructure requirements for both the Ground Test re-architecture and all-Digital BMDS M&S architecture. - Develop and mature Regional Sensor Advanced Discrimination solutions and modeling and simulation updates for multiple Aegis BMD architectures <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Provide Electronic Protection analysis - Develop and mature Regional Sensor Advanced Discrimination solutions and modeling and simulation updates for multiple Aegis BMD architectures - Provide Software Development of End-to-end Digital Integrated System-level Simulation (EDISS) Full Digital Product (FDP), Increments 1 and 2 - Complete systems engineering for FDP Inc 1, initiate systems engineering for FDP Inc 2, including System Requirements Review and System Functional Review - Provide software development for FDP Inc 1, including Spiral In-Progress Reviews 			

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Conduct integration and testing for FDP Inc 1 - Deploy Phase 1 of Ground Test Integrated System-level Simulation (GTISS) improvements to the MDA Ground Test Architecture to address BMDS Operational Test Agency (OTA) identified issues - Provide software development of GTISS Phase 2, including in-progress technical reviews - Integrate and test GTISS Phase 2 M&S - Conduct requirements and functional analysis for GTISS Phase 3 - Conduct Systems Engineering Technical Reviews and develop GTISS Phase 3 system design <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase from FY 2020 to FY 2021 provides Regional Sensor Advanced Discrimination solutions, Link 16 Improvements Engineering, requirements and architecture definition for Aegis BMD Element Specifications and modeling and simulation updates for multiple Aegis BMD architectures.</p> <p>Title: Aegis BMD 4.x Development</p> <p align="right">Articles:</p> <p>Description: Aegis Baseline 5.4.0 (BMD 4.1.2) incorporates the BMD 5.0 Capability Upgrade (CU) of EPAA Phase II ENDO/EXO requirements including EPAA Phase II Exo-atmospheric threats, integration of the SM-3 Block IB Threat Upgrade (TU), and reintroduction of other Aegis capabilities integrated with the SM-6 Dual I (Endo only). It provides Aegis Modernization capabilities comparable to the BMD 4.0 ships with legacy computer processing architecture. Aegis Baseline 5.4.1 (BMD 4.2) baseline development takes advantage of refurbished and upgraded AN/SPY-1 radar arrays with LNAs by increasing BMD capabilities with improved radar sensitivity, discrimination, threat upgrades, and more efficient radar resource utilization.</p> <p>Recurring Accomplishments:</p> <ul style="list-style-type: none"> - Update Critical Item Development (CIDS), Interface Description Specifications (IDS) and all supporting engineering documents and plans - Conduct design studies and concepts supporting development and integration - Conduct Aegis BMD performance analysis supporting In-Process Reviews (IPR) - Participate in program leadership and technical forums including Program Management Team, System Engineering Team, and Cross Product Teams for Integration and Test, Modeling & Simulation, Test, Evaluation & Certification, and Fleet Integration and Design - Provide Weapon System updates to include MIL-SPEC UYK-43, Commercial Off-The-Shelf (COTS) BMD Signal Processor, and COTS adjunct processor updates - MDA/Navy co-funded effort to provide BMD capability on Flight I/II DDGs <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans:</p>	28.681	45.047	74.195
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2019	FY 2020	FY 2021
<p>Support of computer program delivery and to provide Objective Quality Evidence (OQE) for Certification:</p> <ul style="list-style-type: none"> - Conduct Aegis Baseline 5.4 (BMD 4.1) Ship Installation and Test on first ship to support U.S. Navy At-Sea Testing - Certify Aegis Baseline 5.4 (BMD 4.1) in FY 2020 - Provide Aegis Baseline 5.4 (BMD 4.1) support to BMDS ground test events, collect Objective Qualitative Evidence (OQE) to support MDA Operational Capacity Baseline (OCB) reviews <p>For Aegis Baseline 5.4 (BMD 4.2):</p> <ul style="list-style-type: none"> - Update Critical Item Development (CIDS), Interface Description Specifications (IDS) and all supporting engineering document and plans - Conduct Aegis BMD low-level performance analysis supporting In-Process Reviews (IPR) - Conduct computer program integration efforts, capability development and coding; unit test and element computer program integration and test; Engineering Test and Evaluation (ET&E), Multi-Element Integration and Test (MEIT) with regression testing. <p>FY 2021 Plans:</p> <p>For Aegis Baseline 5.4.1 (BMD 4.2):</p> <ul style="list-style-type: none"> - Perform computer program integration efforts, capability development and coding; unit test and element computer program integration and test; Engineering Test and Evaluation (ET&E), Multi-Element Integration and Test (MEIT) with regression testing - Conduct two IPRs in FY 2021 - Conduct increased threat sensitivity runs in MEDUSA to account for new additional threats - Incorporate new baseline requirements as a result of an FY 2020 System Requirements Review (SRR) - Develop ship change documents supporting the Radar Array Face replacement <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p> <p>Increase from FY 2020 to FY 2021 provides alignment to the joint Navy/MDA Aegis BL 5.4.1 (BMD 4.2) re-phased baseline plan. Schedule accelerated certification six months earlier, which reduces overall Future Year Defense Program (FYDP) cost while delivering capability to the warfighter; to include Hypersonic tracking and reporting. Major portion of complex development occurs in FY 2021. Aegis BL 5.4.1 (BMD 4.2) continues computer program integration efforts, capability development and coding; unit test and element computer program integration and test; Engineering Test and Evaluation (ET&E), Multi-Element Integration and Test (MEIT) with regression testing. Provides further update to Aegis BL 5.4.1 (BMD 4.2) Critical Item Development (CIDS), Interface Description Specifications (IDS) and all supporting engineering document and plans. Provides performance analysis in support of requirements certification to support two Aegis BL 5.4.1 (BMD 4.2) IPR events to review progress and status of the baseline.</p>				
Title: Aegis BMD 5.x Development		9.881	23.721	51.682
Articles:		-	-	-

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<p>Description: In alignment with U.S. Navy Aegis Baseline 9 Capability Packages (2020, 2021, 2022, and 2024), Aegis BMD 5.x will develop a series of unique Capability Insertion Packages (CIP) that expand detection, track, and defeat capabilities of additional intermediate range threat and threats with increasingly complex engagement scenes, increased raid sizes, and enables the Weapon System to operate in challenging operational environments. Aegis BMD capability packages are focused towards Aegis Baseline 9 Destroyers (DDGs) and Aegis Ashore Missile Defense Systems. Annual capability upgrades are necessary to pace the evolving threat, improve system reliability, and incorporate technological growth. Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans: Deliver Aegis BMD 5.1.2 (Aligned with Navy AEGIS Baseline 9 2020): CIP includes: - Sea Based Terminal Increment 2 Capability Upgrade: Provides capability improvements against emerging/evolving endo-atmospheric threats - Mid-Term Discrimination Improvements for Homeland Defense: Provides Long Range Search and Track (LRS&T) queuing with improved discrimination for use with other BMDS Sensors - Integration of Boost Phase Communication (9-State): Provides additional position, velocity, and acceleration track covariance over the Tactical Datalink (TDL) for boosting track in support of the GMD mission Schedule: Design, Code, Test, Integration - Q1 FY 2020 Ground Test (BMDS OCB Testing) - Q2 FY 2020 Combat Systems Test (integrated with Aegis BL 9 2020) - Q3 FY 2020 Combat System Certification Panel (integrated with Aegis BL 9 2020) - Q3 FY 2020 BMDS OCB Approval - Q4 FY 2020</p> <p>Continue Aegis BMD 5.1.3 (Aligned with Navy AEGIS Baseline 9 2021): CIP includes: - Missile Power Application Non-Launch (MPAN) Increment 1: Provides SM-3 Block IIA missile reprogramming capability in operational environment (Aligned with SM-3 Software Build 8.0/8.1) - Active Sensor Bias: Provides updates to improve radar tracking performance and report tracking bias across BMDS sensors for improved track quality Schedule: Design, Code, Test, Integration - 2Q FY 2020 Ground Test (BMDS OCB Testing) - 3Q FY2020 Combat Systems Test (integrated with Aegis BL 9 2021) - 3Q FY 2020</p>			

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
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<p>Combat System Certification Panel (integrated with Aegis BL 9 2021) - 1Q FY 2021</p> <p>Commence Aegis BMD 5.1.4 (Aligned with Navy Aegis Baseline 9 2022): CIP Includes:</p> <ul style="list-style-type: none"> - Expanded Aegis BMD Threat Space: Provides integration of additional threats to the Aegis weapon system (aligns with SM-3 Block IIA Build 8.0/8.1 software updates and threat set) - Hypersonic TDL Upgrades: Incorporates two (2) TDL Interface Change Proposals (ICP) in support of BMDS Hypersonic track and reporting requirements - Electronic Attack/Electronic Protection (EA/EP) Increment 1: Provides initial weapon system improvements for operations in complex EA environments - Force Engagement and Sensor Coordination - Raid (FENSR): Provides improved weapon system track and defeat of threats (in raid) by improving radar resource allocation, improved tracking performance, and platform-to-platform weapons coordination - MPAN Increment 2: Builds upon Increment 1 (BMD 5.1.3) by providing parallel processing, which decreases software update cycle times - Aegis Ashore TI-12 Hybrid (TI-12H) Integration: Provides weapon system updates and integration of TI-12H architecture in Aegis Ashore Missile Defense Systems <p>Schedule:</p> <ul style="list-style-type: none"> - System Design and Specifications - 3Q FY 2020 - Software Coding - 4Q FY 2020 <p>FY 2021 Plans:</p> <p>Deliver Aegis BMD 5.1.3 (Aligned with Navy AEGIS Baseline 9 2021): CIP includes:</p> <ul style="list-style-type: none"> - Missile Power Application Non-Launch (MPAN) Increment 1: Provides SM-3 Block IIA missile reprogramming capability in operational environment (Aligned with SM-3 Software Build 8.0/8.1) - Active Sensor Bias: Provides updates to improve radar tracking performance and report tracking bias across BMDS sensors for improved track quality <p>Schedule:</p> <p>BMDS OCB Approval - 2Q FY 2021</p> <p>Continue Aegis BMD 5.1.4 (Aligned with Navy Aegis Baseline 9 2022): CIP Includes:</p> <ul style="list-style-type: none"> - Expanded Aegis BMD Threat Space: Provides integration of additional threats to the Aegis weapon system (aligns with SM-3 Block IIA Build 8.0/8.1 software updates and threat set) 			
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Appropriation/Budget Activity 0400 / 4		R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD		Project (Number/Name) MD09 / Aegis BMD
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Hypersonic TDL Upgrades: Incorporates two (2) TDL Interface Change Proposals (ICP) in support of BMDS Hypersonic track and reporting requirements - Electronic Attack/Electronic Protection (EA/EP) Increment 1: Provides initial weapon system improvements for operations in complex EA environments - Force Engagement and Sensor Coordination - Raid (FENSRR): Provides improved weapon system track and defeat of threats (in raid) by improving radar resource allocation, improved tracking performance, and platform-to-platform weapons coordination - MPAN Increment 2: Builds upon Increment 1 (BMD 5.1.3) by providing parallel processing, which decreases software update cycle times - Aegis Ashore TI-12 Hybrid (TI-12H) Integration: Provides weapon system updates and integration of TI-12H architecture in Aegis Ashore Missile Defense Systems <p>Schedule:</p> <ul style="list-style-type: none"> - Design, Code, Test, Integration - 3Q FY 2021 - Ground Test - 4Q FY 2021 - Combat System Test (integrated with Aegis BL 9 2022) - 4Q FY 2021/1Q FY 2022 <p>Commence Aegis BMD 5.2.0 (Aligned with Navy Aegis Baseline 9 2024):</p> <p>CIP Includes:</p> <ul style="list-style-type: none"> - Expanded Active Sensor Bias (Increment 2): Provides updates to improve radar tracking performance and report tracking bias across BMDS sensors for improved track quality - Expanded Hypersonic Track and Report (Increment 2): Continues development and delivery of Hypersonic tracking and reporting - Increased Boost Phase Communications (9-State Plus): Provides additional position, velocity, and acceleration track covariance over the TDL for boosting track in support of the GMD mission - Expanded Aegis BMD Threat Space: Provides integration of additional threats to the Aegis weapon system (aligns with SM-3 Block IIA Build 8.2/8.3 software updates and threat set) - EA/EP (Increment 2): Continues weapon system improvements for operations in complex EA environments - Aegis BMD Warfighter Improvements: Incorporates/Integrates Warfighter feedback enhancements to existing functionality <p>Schedule:</p> <ul style="list-style-type: none"> Critical Design Review - 2Q FY 2021 Commence Design Code Test and Integration - 2Q FY 2021 <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase from FY 2020 to FY 2021 provides the initiation of Aegis BMD 5.2.0 efforts for Weapon System integration with SM-3 Block IIA Software Updates 8.2 and 8.3 to address evolving threats.</p>				
Title: Aegis BMD 6.x Development		56.881	66.798	101.548

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<p align="right"><i>Articles:</i></p> <p>Description: The U.S. Navy is developing the Advance Capability Build (ACB) 20 Combat System (CS) and the Air and Missile Defense Radar (AMDR), now designated SPY-6, for introduction on the first DDG Flight III. Aegis BMD 6.0 will integrate Aegis BMD 5.1 capability with the ACB 20 Combat System, to include new SPY-6 requirements. Aegis BMD 6.0 exploits SPY-6 radar improvement to enhance Engagement and Search and Track capabilities to include discrimination, raid defense and expanded threat space. This will enable BMDS element utilization of SPY-6 data for remote engagements and will supplement deployed assets with simultaneous multi-mission capabilities (e.g. IAMD). SPY-6 will support a force-level (multi-asset) approach to raid defense and will enable U.S. Navy ships to have a greater stand-off range from threat environments.</p> <p>Recurring Accomplishments:</p> <ul style="list-style-type: none"> - Develop Critical Item Development (CIDS), Interface Description Specifications (IDS) and all supporting engineering documents and plans - Conduct design studies and concepts supporting development and integration - Conduct Aegis BMD performance analysis supporting In-Process Reviews(IPR) - Participate in program leadership and technical forums including Program Management Team, System Engineering Team, and Cross Product Teams for Integration and Test, Modeling & Simulation, Test, Evaluation & Certification, and Fleet Integration and Design - Develop computer program for Aegis BMD 6.0 supporting Software Increment Reviews (SWIR) - MDA/Navy co-funded effort to provide BMD capability on Flight III DDGs <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans:</p> <p>Aegis BMD 6.0 computer program development activities to support the Flight III DDG schedule:</p> <ul style="list-style-type: none"> - Conduct Aegis BMD 6.0 concurrent engineering across BMD Surveillance and Track, Exo-organic, Endo-organic, and Mission Planner areas - Conduct SPY-6 integration efforts, capability development, and performance analysis - Conduct Aegis BMD 6.0 design and code across the BMD Mission area - Conduct Aegis BMD 6.0 unit test and element computer integration and test <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Conduct Aegis BMD 6.0 concurrent engineering across Mission Planner (Polygon Defended Area/Launch Area/Weapons Doctrine & Real-Time Plan Response), IAMD/BMD Search & Track, Engagement Scheduling, Engagement Capacity, Raid and Dual Tier/Remote Engagement areas - Continue SPY-6 integration efforts, capability development, and performance analysis 	-	-	-

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
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- Continue Aegis BMD 6.0 design, code, test and performance analysis across the BMD Mission area

FY 2020 to FY 2021 Increase/Decrease Statement:

Increase from FY 2020 to FY 2021 provides the most significant portion of the BMD 6.0 development efforts to include increased engineering across Mission Planner, IAMD/BMD Search & Track, Engagement Scheduling, Engagement Capacity, Raid, Engagement Scheduling and Dual Tier/Remote Engagement areas. Provides SPY-6 integration efforts, capability development, and performance analysis, as well as design, code, test and performance analysis across the BMD Mission area. Activities increase as Aegis BMD 6.0 prepares for a first quarter FY 2022 Engineering Assessment to deliver software ready for testing.

Title: Aegis Layered Homeland Defense Development	0.000	12.000	39.229
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Articles:	-	-	-
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Description: Aegis Weapon System (AWS) and SM-3 Block IIA software modifications to existing systems to support a phased delivery of operational capability against expanded threat/mission space. Aegis Underlay efforts will initially operationalize residual defense capability aligned with FTM-44 and, in the second phase, will add capability for Aegis BMD to provide an initial under layer capability to GMD in support of Homeland Defense.

FY 2020 Plans:

- Conduct requirement definition for Aegis Homeland Defense Underlay
- Conduct BMDS system level requirements allocation and Aegis BMD system requirements development, trace, validation and verification, and configuration management for coordination with all participating external agencies and organizations

FY 2021 Plans:

- Begin design phase to decompose Aegis BMD Element Specifications into the Weapon System and Standard Missile specifications
- Deliver an AWS Mission Planning TAD update to existing Aegis BL 9 (BMD 5.x) Certified Computer Program to operationalize residual defense capability of the AWS and SM-3
- Execute an analysis of alternatives to evaluate concepts for alternate SM-3 deployment methods to achieve persistent deployment in support of Layered Homeland Defense
- Define concept and establish system-level requirements, utilizing Aegis Weapon System fire control as point of departure, to complement existing BMDS elements
- Commence preliminary design of concept
- Identify and resolve integration challenges

FY 2020 to FY 2021 Increase/Decrease Statement:

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Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2019	FY 2020	FY 2021
Increase from FY 2020 to FY 2021 provides an AWS Mission Planning TAD update to operationalize residual defense capability of the AWS and SM-3 deployed Aegis BL 9 (BMD 5.x) ships. Increase also provides concepts, system-level requirements and preliminary design for methods to achieve persistent deployment in support of Layered Homeland Defense.				
Title: Modeling & Simulation Objective Simulation Framework		34.387	36.337	32.829
		Articles:	-	-
<p>Description: This effort develops, maintains and deploys the framework hardware and software for use at element laboratories and Combatant Command (CCMD) locations to support IMTP events, BMDS capability delivery assessments, Warfighter training, exercises, and wargames.</p> <p>Recurring Accomplishments:</p> <ul style="list-style-type: none"> - Develop and implement Objective Simulation Framework (OSF) upgrades to incorporate advanced tracking, discrimination, engagement and associated upper tier debris mitigation capabilities, as well as other requirements and capabilities to meet MDA's evolving M&S Enterprise needs - Sustain and enhance framework products to maintain capabilities to support stakeholders - Develop plans, procedures and documentation for scheduled events including Wargames and Combatant Command Exercises and the Distributed, Focused and Integrated hardware in the loop (HWIL) Events as presented in the IMTP. Provide event architecture integration and checkout of Wargames for these same IMTP scheduled events - Provide the ground test architecture integration expertise to meet the testing requirements of the IMTP. Support delivery of integrated architectures for test across all test venues using the BMDS test framework to integrate distributed architectures in support of BMDS - Develop, maintain, test, field, and operate model representations for use in events and other MDA M&S stakeholder application areas. Deploy hardware and software updates to distributed sites. Perform regular maintenance and critical repairs of hardware and software. - Control and maintain the M&S Integration and Development Laboratories for Element M&S. Maintain venue for stakeholders to conduct early integration efforts and identification of issues prior to event architecture integration to support system development. - Continue maintenance of the Single Stimulation Framework in the required venues until the transition of the Objective Simulation Framework into the venues completes. <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - SEE ABOVE. <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - SEE ABOVE. <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>				

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2019	FY 2020	FY 2021
Decrease from FY 2020 to FY 2021 reflects completion of transition from the M&S Single Stimulation Framework (SSF) to the Objective Simulation Framework (OSF).				
Title: M&S BMDS Simulations & Tools		5.098	4.647	4.543
Articles:		-	-	-
Description: This effort includes: development and sustainment of digital products and the architecture framework, and delivery/maintenance of infrastructure for BMDS performance assessments. Recurring Accomplishments: - Integrate, test, and verify the M&S enterprise supporting BMDS testing, assessment, exercises, and wargaming, including testing infrastructure. Guide and facilitate integration testing of MDA's M&S frameworks and core truth models, and all M&S components into virtual representations of the BMDS that are credible, affordable, and provide decision makers with the data needed - Integrate, test, functionally qualify, and deliver M&S tools and complex test architectures to provide system test capabilities to support MDA IMTP based test events, wargames, and exercises - Continue the transition of real-time digital simulation capability to the OSF to support Intended Uses - Provide HWIL/M&S Benchmarking/Integration documentation and coordination - Conduct M&S system integration and verification to support M&S system architecture development. Provide developmental integration testing to support M&S system architecture integration Specific and/or unique accomplishments to each FY are as follows: FY 2020 Plans: - SEE ABOVE. FY 2021 Plans: - SEE ABOVE. FY 2020 to FY 2021 Increase/Decrease Statement: N/A				
Title: BMDS Verification, Validation & Assessment (VV&A)		19.506	19.432	21.519
Articles:		-	-	-
Description: This activity includes BMD System Assessment and VV&A activities to support BMDS Operational Capacity Baseline (OCB) delivery decisions and Technical Capability Declarations (TCDs), and anchor System modeling and simulation. Recurring Accomplishments: - Verify BMDS performance, and produce BMDS verification status reports - Conduct extensive analysis of data collected in BMDS ground and flight test events, instrumental to understanding BMD System operations and performance and anchoring models and simulations				

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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<ul style="list-style-type: none"> - Identify mitigation approaches for BMDS performance issues uncovered during system level analysis and assessment - Maintain M&S VV&A database, and verification data for BMD System Specification Change Notices - Develop, maintain, and update the M&S VV&A tool kit - Provide recommendations for improving assessment confidence, including M&S and testing issue resolutions - Conduct V&V in support of MDA BMD System level accreditation process in support of BMDS Ground Test and performance assessment events - Conduct specified BMD System post-flight reconstructions, element post-flight reconstructions, and pre-mission testing events so as to optimize the body of evidence and analysis supporting system-level BMDS accreditation. <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans: - SEE ABOVE.</p> <p>FY 2021 Plans: - Conduct V&V of Aegis BMD digital models in support of accreditation process for BMDS Ground Test and performance assessment events</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase from FY 2020 to FY 2021 provides for VV&A of digital models.</p>			
Accomplishments/Planned Programs Subtotals	229.791	274.932	405.041

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0208866C MD09: <i>Aegis BMD O&M</i>	77.765	75.237	85.830	-	85.830	77.612	81.977	84.899	85.610	Continuing	Continuing
• 0208866C MD09: <i>Aegis BMD Procurement</i>	706.366	697.768	620.096	-	620.096	498.016	541.099	890.056	815.708	Continuing	Continuing
• 0208866C MD73: <i>Aegis Ashore Procurement</i>	15.000	25.659	12.000	-	12.000	1.520	3.896	2.403	0.981	Continuing	Continuing
• 0208866C MD90: <i>Aegis Hardware and Software Procurement</i>	91.181	124.986	104.372	-	104.372	109.374	103.328	126.109	124.604	Continuing	Continuing
• 0604878C: <i>Aegis BMD Test</i>	92.160	169.822	170.880	-	170.880	191.744	163.103	179.877	217.735	Continuing	Continuing
• 0604880C: <i>Land Based SM-3 (LBSM3)</i>	25.200	38.352	56.628	-	56.628	43.742	29.073	31.507	27.908	Continuing	Continuing

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
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Remarks

D. Acquisition Strategy

The Aegis BMD element acquisition approach supports evolutionary development, continuously building upon demonstrated capabilities to advance overall BMDS capability. After considering all the technical and management aspects of the program and to meet the requirements presented by an evolving ballistic missile threat, the Aegis BMD program awarded sole source contracts to Raytheon and Lockheed Martin to continue development of the SM-3 and the Aegis BMD Weapon System, respectively.

The M&S acquisition strategy utilizes full and open competition to develop, acquire and deliver the integrated architectures/frameworks, as well as develop and deliver models of Aegis systems. The Digital and HWIL product centers integrate the suite of M&S into a composite simulation capability, all based on an open architecture. M&S achieves this end-state via close collaboration between its integrating contractor teams (Digital and HWIL) and those of the Aegis BMD prime contractors, with additional technical standards and engineering oversight provided by Federally Funded Research and Development Centers (FFRDCs) and University Affiliated Research Centers (UARCs).

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

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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Systems Engineering & Integration - Systems Engineering	Various	MDA Various : VA, AL	65.979	1.191	Nov 2018	1.813	Nov 2019	1.330	Nov 2020	-		1.330	Continuing	Continuing	Continuing
Systems Engineering & Integration - Systems Engineering - CSS	C/CPFF	TEAMS : VA	17.408	4.144	Nov 2018	5.312	Nov 2019	4.262	Nov 2020	-		4.262	Continuing	Continuing	Continuing
Systems Engineering & Integration - Systems Engineering - Industry	C/CPAF	Boeing : VA	62.990	12.595	Nov 2018	13.655	Nov 2019	13.407	Nov 2020	-		13.407	Continuing	Continuing	Continuing
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - MD09 - TD APL	SS/CPAF	JHU/APL : Columbia, MD	26.983	10.866	Nov 2018	8.785	Nov 2019	12.260	Nov 2020	-		12.260	Continuing	Continuing	Continuing
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - MD09 - TD LM	C/CPFF	Lockheed Martin : Moorestown, NJ	23.346	12.199	Nov 2018	2.277	Nov 2019	5.030	Nov 2020	-		5.030	Continuing	Continuing	Continuing
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - MD09 - TD MIT	MIPR	Hanscom AFB - MIT/LL : Lexington, MA	15.281	5.305	Nov 2018	3.775	Nov 2019	5.677	Nov 2020	-		5.677	Continuing	Continuing	Continuing
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - MD09 - TD MITRE	MIPR	CECOM - MITRE : Dahlgren, VA	2.512	1.053	Nov 2018	1.608	Nov 2019	1.966	Nov 2020	-		1.966	Continuing	Continuing	Continuing
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - MD09 - TD NSWCCD	MIPR	NSWC DD : Dahlgren, VA	27.399	8.137	Nov 2018	10.620	Nov 2019	12.148	Nov 2020	-		12.148	Continuing	Continuing	Continuing
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - NIWC Pacific	MIPR	NIWC PAC : San Diego, CA	5.516	4.669	Nov 2018	4.482	Nov 2019	7.059	Nov 2020	-		7.059	Continuing	Continuing	Continuing

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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - Technology Design and Insertion - Discrimination	MIPR	Various - MDA : AL,VA	15.895	0.000		1.745	Nov 2019	2.193	Nov 2020	-		2.193	Continuing	Continuing	Continuing
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - Technology Design and Insertion - M&S improvements	MIPR	Various - MDA : AL, VA	0.000	0.000		8.812	Nov 2019	13.858	Nov 2020	-		13.858	Continuing	Continuing	Continuing
Aegis Ballistic Missile Defense (BMD) Technology Design and Insertion - Various - MDA	MIPR	Various - MDA : AL,VA,CA	13.313	15.198	Nov 2018	4.066	Nov 2019	0.306	Nov 2020	-		0.306	Continuing	Continuing	Continuing
Aegis BMD 4.x Development - BMD 4.0 Dev -MD09- Aegis Techrep	MIPR	AEGIS Techrep : Moorestown, NJ	3.205	0.377	Nov 2018	2.844	Nov 2019	4.684	Nov 2020	-		4.684	Continuing	Continuing	Continuing
Aegis BMD 4.x Development - BMD 4.0 Dev. - MD09 - D	MIPR	MDA : VA	31.834	0.000		5.216	Nov 2019	8.591	Nov 2020	-		8.591	Continuing	Continuing	Continuing
Aegis BMD 4.x Development - BMD 4.0 Dev. - MD09 - Dahlgren	MIPR	NSWC/DD : DAHLGREN, VA	149.519	6.156	Nov 2018	3.912	Nov 2019	6.443	Nov 2020	-		6.443	Continuing	Continuing	Continuing
Aegis BMD 4.x Development - BMD 4.0 Dev. - MD09 - Lockheed Martin	SS/CPIF	LOCKHEED MARTIN : MOORESTOWN, NJ	814.412	20.640	Nov 2018	30.059	Nov 2019	49.509	Nov 2020	-		49.509	Continuing	Continuing	Continuing
Aegis BMD 4.x Development - BMD 4.0 Dev. -MD09- BMD 4.0 Dev-	Various	Various : Various	43.102	1.508	Nov 2018	3.016	Nov 2019	4.968	Nov 2020	-		4.968	Continuing	Continuing	Continuing

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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Aegis BMD 5.x Development - MD09 - 5.x	SS/CPAF	LOCKHEED MARTIN : MOORESTOWN, NJ	714.844	6.373	Nov 2018	13.254	Nov 2019	35.117	Nov 2020	-		35.117	Continuing	Continuing	Continuing
Aegis BMD 5.x Development - MD09 - 5.x APL	SS/CPFF	JHU/APL/MD : COLUMBIA, MD	54.203	0.460	Nov 2018	1.787	Nov 2019	2.828	Nov 2020	-		2.828	Continuing	Continuing	Continuing
Aegis BMD 5.x Development - MD09 - 5.x DD	MIPR	NSWC/DD : DAHLGREN, VA	75.811	1.400	Nov 2018	5.896	Nov 2019	9.331	Nov 2020	-		9.331	Continuing	Continuing	Continuing
Aegis BMD 5.x Development - MD09 - 5.x PHD	MIPR	NSWC/PHD : PT HUENEME, CA	11.463	0.000		0.591	Nov 2019	0.935	Nov 2020	-		0.935	Continuing	Continuing	Continuing
Aegis BMD 5.x Development - MD09 - AW	MIPR	Aegis Tech Rep : Moorestown, NJ	4.509	0.000		0.750	Nov 2019	1.187	Nov 2020	-		1.187	Continuing	Continuing	Continuing
Aegis BMD 5.x Development - MD09 - Various	MIPR	Various : MA, MD, VA, NJ	207.411	1.648	Nov 2018	1.443	Nov 2019	2.284	Nov 2020	-		2.284	Continuing	Continuing	Continuing
Aegis BMD 6.x Development - JHU/APL	SS/CPFF	JHU/APL : MD	9.925	3.902	Nov 2018	3.932	Nov 2019	5.978	Nov 2020	-		5.978	Continuing	Continuing	Continuing
Aegis BMD 6.x Development - Lockheed Martin	C/CPFF	Lockheed Martin : NJ	31.203	45.175	Nov 2018	55.062	Nov 2019	83.707	Nov 2020	-		83.707	Continuing	Continuing	Continuing
Aegis BMD 6.x Development - MD09 - DD	MIPR	NSWC/DD : Dahlgren, VA	7.757	3.902	Nov 2018	3.902	Nov 2019	5.932	Nov 2020	-		5.932	Continuing	Continuing	Continuing
Aegis BMD 6.x Development - Various	MIPR	Various : MA, MD, VA, NJ, CA	23.202	3.902	Nov 2018	3.902	Nov 2019	5.931	Nov 2020	-		5.931	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Aegis Engineering - APL	SS/CPFF	JHU/APL : MD	0.000	0.000		0.000		4.000	Nov 2020	-		4.000	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Aegis Engineering - DD	MIPR	NSWC DD : Dahlgren VA	0.000	0.000		0.000		4.000	Nov 2020	-		4.000	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Aegis Engineering - LM	SS/CPFF	Lockheed Martin : Moorestown NJ	0.000	0.000		0.000		8.000	Nov 2020	-		8.000	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency												Date: February 2020			
Appropriation/Budget Activity						R-1 Program Element (Number/Name)				Project (Number/Name)					
0400 / 4						PE 0603892C / AEGIS BMD				MD09 / Aegis BMD					
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Aegis Layered Homeland Defense Development - Aegis Engineering - MIT/LL	MIPR	MIT/LL : Lexington MA	0.000	0.000		0.000		3.000	Nov 2020	-		3.000	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Aegis Engineering - RMS	SS/CPIF	Raytheon : AZ	0.000	0.000		0.000		6.000	Nov 2020	-		6.000	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Aegis Weapon System - MD09 - APL	SS/CPFF	JHU/APL : MD	0.000	0.000		0.756	Nov 2019	0.897	Nov 2020	-		0.897	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Aegis Weapon System - MD09 - Aegis Techrep	MIPR	Aegis Techrep : Moorestown NJ	0.000	0.000		0.324	Nov 2019	0.384	Nov 2020	-		0.384	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Aegis Weapon System - MD09 - DD	MIPR	NSWC DD : Dahlgren VA	0.000	0.000		0.540	Nov 2019	0.640	Nov 2020	-		0.640	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Aegis Weapon System - MD09 - LM	SS/CPFF	Lockheed Martin : Moorestown NJ	0.000	0.000		9.180	Nov 2019	10.608	Nov 2020	-		10.608	Continuing	Continuing	Continuing
Aegis Layered Homeland Defense Development - Standard Missile - 3 (SM-3) Block IIA Development - MD09 - Raytheon	SS/CPIF	Raytheon : AZ	0.000	0.000		1.200	Nov 2019	1.700	Nov 2020	-		1.700	Continuing	Continuing	Continuing
Modeling & Simulation Objective Simulation Framework - M&S OSF Engineering	Various	MDA : AL, VA	13.351	3.576	Nov 2018	3.256	Nov 2019	5.453	Nov 2020	-		5.453	Continuing	Continuing	Continuing
Modeling & Simulation Objective Simulation	C/CPFF	TEAMS : AL, CO	18.644	5.896	Nov 2018	7.344	Nov 2019	6.375	Nov 2020	-		6.375	Continuing	Continuing	Continuing

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Framework - M&S OSF Engineering - CSS Support															
Modeling & Simulation Objective Simulation Framework - M&S OSF Engineering - Engineering Support	C/CPAF	Northrop Grumman : CO	32.479	9.181	Nov 2018	0.000		0.000		-		0.000	0.000	41.660	0.000
Modeling & Simulation Objective Simulation Framework - M&S OSF Engineering - Integration	MIPR	AMRDEC : AL	24.123	2.810	Nov 2018	3.090	Nov 2019	4.067	Nov 2020	-		4.067	Continuing	Continuing	Continuing
Modeling & Simulation Objective Simulation Framework - M&S OSF Engineering - Prime	C/CPFF	Teledyne Brown Engineering / TBD : AL, CO	138.312	12.924	Nov 2018	22.647	Nov 2019	0.000		-		0.000	0.000	173.883	0.000
Modeling & Simulation Objective Simulation Framework - M&S OSF Engineering - Prime 2	C/CPFF	Lockheed Martin : AL	0.000	0.000		0.000		16.934	Nov 2020	-		16.934	Continuing	Continuing	Continuing
M&S BMDS Simulations & Tools - Sims & Tools	C/CPFF	Teledyne Brown Engineering : AL, CO	2.373	1.185	Nov 2018	0.000		0.000		-		0.000	0.000	3.558	0.000
M&S BMDS Simulations & Tools - Sims & Tools - Industry	C/CPAF	Northrop Grumman : CO	37.054	3.254	Nov 2018	0.000		0.000		-		0.000	0.000	40.308	0.000
M&S BMDS Simulations & Tools - Sims & Tools - Industry (2)	C/CPAF	SWDC : CO	0.000	0.000		3.887	Nov 2019	4.069	Nov 2020	-		4.069	Continuing	Continuing	Continuing
M&S BMDS Simulations & Tools - Sims & Tools - Various	Various	Various : AL, CO	0.000	0.659	Dec 2018	0.760	Nov 2019	0.474	Nov 2020	-		0.474	Continuing	Continuing	Continuing
BMDS Verification, Validation & Assessment (VV&A) - Verification & Assessment	Various	MDA Various : AL, VA	6.329	1.066	Nov 2018	0.000		0.000		-		0.000	0.000	7.395	0.000
BMDS Verification, Validation & Assessment	C/CPFF	TEAMS : AL	14.742	1.316	Nov 2018	0.806	Nov 2019	1.531	Nov 2020	-		1.531	Continuing	Continuing	Continuing

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
(VV&A) - Verification & Assessment - CSS Support															
BMDS Verification, Validation & Assessment (VV&A) - Verification & Assessment - Industry	C/CPAF	Boeing : AL	21.081	6.300	Nov 2018	7.559	Nov 2019	9.365	Nov 2020	-		9.365	Continuing	Continuing	Continuing
BMDS Verification, Validation & Assessment (VV&A) - Verification & Assessment - Labs	MIPR	MITRE : VA	7.821	1.796	Nov 2018	2.236	Nov 2019	1.368	Nov 2020	-		1.368	Continuing	Continuing	Continuing
BMDS Verification, Validation & Assessment (VV&A) - Verification & Assessment - OGA	MIPR	AMRDEC : AL	27.822	6.336	Nov 2018	6.974	Nov 2019	7.038	Nov 2020	-		7.038	Continuing	Continuing	Continuing
BMDS Verification, Validation & Assessment (VV&A) - Verification & Assessment - UARC2	MIPR	JHU/APL : AL, VA	1.429	2.692	Nov 2018	1.857	Nov 2019	2.217	Nov 2020	-		2.217	Continuing	Continuing	Continuing
Subtotal			2,804.582	229.791		274.932		405.041		-		405.041	Continuing	Continuing	N/A

Remarks
N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	-		-		-		-		-	-	-	N/A

Remarks
N/A

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD
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Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	-		-		-		-		-	-	-	N/A

Remarks
N/A

Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	-		-		-		-		-	-	-	N/A

Remarks
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	2,804.582	229.791	274.932	405.041	-	405.041	Continuing	Continuing	N/A

Remarks
Funding in the All Prior Years column represents a summary of Prior Years Total Costs for active contracts, MIPRs, and civilian salaries on the R-3. Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD
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	Significant Event Complete ▲		Milestone Decision Complete ★		Element Test Complete ◆		System Level Test Complete ●		Complete Activity ◆	
	Significant Event Planned △		Milestone Decision Planned ☆		Element Test Planned ◇		System Level Test Planned ○		Planned Activity ◇	
	FY 2019	FY 2020	FY 2021	FY 2022	FY 2023	FY 2024	FY 2025			
BMD 6.0 IPR #3	◆									
BL 5.4.0 (BMD 4.1.2) EA		◆								
BMD 6.0 IPR #4		◆								
BL 5.4.1 (BMD 4.2) SRR		◇								
BMD 5.1.3 Design, Code, Test, Integration		△								
BL 5.4.1 (BMD 4.2) IPR #1			△							
BL 5.4.0 (BMD 4.1) Certification			☆							
BMD 5.1.2 Certification			☆							
BMD 5.1.3 BMDS OCB Testing			△							
BMD 6.0 IPR #5				△						
Aegis Underlay SRR				△						
BL 5.4.1 (BMD 4.2) IPR #2					△					
BMD 5.1.3 Certification					☆					
BMD 5.1.3 BMDS OCB Approval						△				
BMD 5.2.0 CDR							△			
BMD 5.2.0 Design, Code, Test, Integration							△			
BL 5.4.1 (BMD 4.2) IPR #3								△		
BMD 6.0 IPR #6									△	
BMD 5.1.4 Design, Code, Test, Integration										△
Aegis Underlay PDR										△
BMD 5.1.4 BMDS OCB Testing										△
BMD 6.0 EA										△
BL 5.4.1 (BMD 4.2) IPR #4										△
BMD 5.1.4 Certification										☆

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
BMD 6.0 IPR #3	2	2019	2	2019
BL 5.4.0 (BMD 4.1.2) EA	1	2020	1	2020
BMD 6.0 IPR #4	1	2020	1	2020
BL 5.4.1 (BMD 4.2) SRR	2	2020	2	2020
BMD 5.1.3 Design, Code, Test, Integration	2	2020	2	2020
BL 5.4.1 (BMD 4.2) IPR #1	3	2020	3	2020
BL 5.4.0 (BMD 4.1) Certification	3	2020	3	2020
BMD 5.1.2 Certification	3	2020	3	2020
BMD 5.1.3 BMDS OCB Testing	3	2020	3	2020
BMD 6.0 IPR #5	4	2020	4	2020
Aegis Underlay SRR	4	2020	4	2020
BL 5.4.1 (BMD 4.2) IPR #2	1	2021	1	2021
BMD 5.1.3 Certification	1	2021	1	2021
BMD 5.1.3 BMDS OCB Approval	2	2021	2	2021
BMD 5.2.0 CDR	2	2021	2	2021
BMD 5.2.0 Design, Code, Test, Integration	2	2021	2	2021
BL 5.4.1 (BMD 4.2) IPR #3	3	2021	3	2021
BMD 6.0 IPR #6	3	2021	3	2021
BMD 5.1.4 Design, Code, Test, Integration	3	2021	3	2021
Aegis Underlay PDR	4	2021	4	2021
BMD 5.1.4 BMDS OCB Testing	4	2021	4	2021
BMD 6.0 EA	1	2022	1	2022
BL 5.4.1 (BMD 4.2) IPR #4	1	2022	1	2022

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD09 / Aegis BMD
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Events	Start		End	
	Quarter	Year	Quarter	Year
BMD 5.1.4 Certification	2	2022	2	2022
BL 5.4.1 (BMD 4.2) EA	4	2022	4	2022
Aegis Underlay CDR	4	2022	4	2022
BL 5.4.1 (BMD 4.2) Certification	4	2023	4	2023
BMD 5.x Incremental Capability Upgrade 2024 Certification	3	2024	3	2024
Aegis Underlay Certification	4	2024	4	2024

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency										Date: February 2020		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD				Project (Number/Name) MG09 / Aegis BMD SM-3 Development Articles			
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
MG09: Aegis BMD SM-3 Development Articles	194.018	79.686	0.000	0.000	-	0.000	0.000	0.000	0.000	0.000	0.000	273.704
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-	-	-

Note

No funding is requested in FY 2021 and the outyears.

A. Mission Description and Budget Item Justification

This project supported Aegis BMD purchase of Development Articles to use as test articles, and initial deployment in support of EPAA Phase III. Project included manufacturing of SM-3 Block IIA All Up Round (AUR) for the purposes of flight testing and delivery to the fleet as operational assets, and to ensure the maturation of SM-3 Block IIA manufacturing process.

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

	FY 2019	FY 2020	FY 2021
Title: FY16 SM-3 Block IIA RDT&E All Up Rounds	79.686	0.000	0.000
Articles:	-	-	-
Description: Manufacture seventeen (17) SM-3 Block IIA All Up Rounds (AURs) (delivered FY 2018 through FY 2020) for the purposes of flight testing as reflected in the IMTP and, if not consumed in testing, delivery to the fleet as operational assets prior to an initial production decision in support of EPAA Phase III. SM-3 Block IIA AURs validated the Engineering Manufacturing Readiness Level 3 criteria for an Initial Production Decision received 1Q FY 2020. Recurring Accomplishment: Deliver SM-3 Block IIA AURs Specific and/or unique accomplishments to each FY are as follows:			
FY 2020 Plans: Complete manufacturing and deliver of FY16 SM-3 Block IIA RDT&E All Up Rounds deliveries			
FY 2021 Plans: N/A			
FY 2020 to FY 2021 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals	79.686	0.000	0.000

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MG09 / Aegis BMD SM-3 Development Articles

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

N/A

Remarks

D. Acquisition Strategy

The Aegis BMD element acquisition approach supports evolutionary development, continuously building upon demonstrated capabilities to advance overall BMDS capability. After considering all the technical and management aspects of the program and to meet the requirements presented by an evolving ballistic missile threat, the Aegis BMD program awarded sole source contracts to Raytheon and Lockheed Martin to continue development of the SM-3 and the Aegis BMD Weapon System, respectively.

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MG09 / Aegis BMD SM-3 Development Articles
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
FY16 SM-3 Block IIA RDT&E All Up Rounds - FY16 SM-3 Block IIA RDT&E All Up Rounds - NSWC/DD	MIPR	NSWC/DD : Dahlgren, VA	0.145	0.000		0.000		0.000		-		0.000	0.000	0.145	0.000
FY16 SM-3 Block IIA RDT&E All Up Rounds - FY16 SM-3 Block IIA RDT&E All Up Rounds - SM-3 MANUFACTURING - MG09	SS/CPAF	Raytheon : Tucson, AZ	193.873	79.607	Nov 2018	0.000		0.000		-		0.000	0.000	273.480	0.000
FY16 SM-3 Block IIA RDT&E All Up Rounds - FY16 SM-3 Block IIA RDT&E All Up Rounds-Various	MIPR	Various : Various, CA, VA, MD	0.000	0.079	Apr 2019	0.000		0.000		-		0.000	0.000	0.079	0.000
Subtotal			194.018	79.686		0.000		0.000		-		0.000	0.000	273.704	N/A

Remarks
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	194.018	79.686	0.000	0.000	-	0.000	0.000	273.704	N/A

Remarks
Award Dates reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MG09 / Aegis BMD SM-3 Development Articles
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	Significant Event Complete ▲		Milestone Decision Complete ★		Element Test Complete ◆		System Level Test Complete ●		Complete Activity ◆					
	Significant Event Planned △		Milestone Decision Planned ☆		Element Test Planned ◇		System Level Test Planned ○		Planned Activity ◇					
	FY 2019		FY 2020		FY 2021		FY 2022		FY 2023		FY 2024		FY 2025	
FY16 SM-3 Block IIA AUR-first round delivery						◆								
FY16 SM-3 Block IIA AUR EPAA Phase III Declaration								◇						

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MG09 / Aegis BMD SM-3 Development Articles

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
FY16 SM-3 Block IIA AUR-first round delivery	4	2019	4	2019
FY16 SM-3 Block IIA AUR EPAA Phase III Declaration	3	2020	3	2020

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MM09 / Aegis BMD SM-3 Development
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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
MM09: Aegis BMD SM-3 Development	114.507	187.879	253.244	201.970	-	201.970	102.453	28.969	14.285	7.954	0.000	911.261
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Decrease from FY 2020 to FY 2021 reflects the completion of development activities including the Guidance Electronics Unit (GEU) Engineering Change Proposal (ECP) and Software UP grades (SWUP) builds 8.1/8.2 and incorporation into the production line. Additionally reflects the efforts to complete Missile Power Application Non-Launch (MPAN) approval and integration into the fleet.

A. Mission Description and Budget Item Justification

Provides development of SM-3 Missiles, Upgrade Modifications, and Integration into the Aegis Weapon System.

The SM-3 Block IB improves Aegis BMD's ability to expand the BMD battlespace, engage longer range, more sophisticated ballistic missiles that may deploy countermeasures and launch in larger raid sizes. The SM-3 Block IB Kinetic Warhead's (KW) two color infra-red (IR) seeker and advanced signal processor provides a real-time discrimination and characterization capability while improving sensitivity for longer range targets and performance against more sophisticated threats. Additionally, the new Throttleable Divert and Attitude Control System (TDACS) KW divert engine has been upgraded over the SM-3 Block IA to provide a more flexible divert in order to maneuver the KW to intercept.

The SM-3 Block IIA consists of an upgrade to a 21-inch diameter SM-3 missile and expands beyond the SM-3 Block IB battlespace to counter Intermediate Range Ballistic Missile (IRBM). SM-3 Block IIA provides an increased kinematic envelope through improved infa-red (IR) discrimination and divert capability that provide performance against the EPAA phase III expanded threat set. When combined with Aegis BMD 5.1 weapon system modifications, the SM-3 Block IIA will provide Engage on Remote (EoR) capability, which allows the use of remote off board sensor information to launch and guide the SM-3 Block IIA to final intercept. Aegis BMD 5.1 EoR capability with SM-3 Block IIA also frees up radar resources and increases the number and type of threats to be engaged simultaneously over previous baselines.

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

	FY 2019	FY 2020	FY 2021
Title: Standard Missile-3 (SM-3) Block IB Development	45.050	34.611	47.133
Articles:	-	-	-
Description: This effort modernizes the SM-3 Block IB missile, which improves on the SM-3 Block IA performance and enables engagement of more sophisticated ballistic missiles and larger raid sizes			
SM-3 Block IB Threat Upgrade (TU) Technology Refresh (previously IB Modernization) will provide the following:			
- Refreshed SM-3 KW Common Avionics Package will provide improved producibility and utilization of common components between the SM-3 Block IIA. SM-3 Block IB common components will be extendable to support different form/fit in circuit card			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020		
Appropriation/Budget Activity 0400 / 4		R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD		Project (Number/Name) MM09 / Aegis BMD SM-3 Development
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2019	FY 2020	FY 2021
<p>assemblies across SM-3 Block IB and SM-3 Block IIA and will mitigate SM-3 Block IB hardware availability issues. Includes Back-fit of IIA GEU ECP into IB</p> <ul style="list-style-type: none"> - Refreshed SM-3 Block IB Guidance Section (GS) with the integration of Digital Data Link (DDL) replacement of Plate 3A will resolve Plate 3A hardware availability issues <p>Recurring Accomplishments:</p> <ul style="list-style-type: none"> - Assess performance with weapons systems upgrades/modifications and against emerging threats <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Continue development of common KW Circuit Card Assembly - Development of SM-3 Block IB Circuit Card Assemblies (CCAs) to be common with SM-3 Block IIA (IB Common Components will be extendable to support different form/fit in CCAs across SM-3 Block IB, and SM-3 Block IIA) <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - SM-3 KW Common Avionics - Development of SM-3 Block IB Circuit Card Assemblies (CCAs) to be common with SM-3 Block IIA (IB Common Components will be extendable to support different form/fit in CCAs across SM-3 Block IB, and SM-3 Block IIA) - Back-fit of SM-3 Block IIA GEU ECP into SM-3 Block IB; integration and test to ensure Legacy SM-3 Block IB performance is met; and Digital Integrated Circuit technology - Continue integration of DDL replacement of Plate 3A <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase from FY 2020 to FY 2021 provides increased funding for back-fit of GEU ECP and integration into the SM-3 Block IB.</p>				
Title: Standard Missile-3 (SM-3) Block IIA Development		142.829	218.633	154.837
		Articles:	-	-
<p>Description: The SM-3 Block IIA is required to meet EPAA Phase III. It will increase the area that can be defended by Aegis BMD, increase the probability of kill against a larger threat set, and leverage enhanced capability provided by BMDS sensor upgrades</p> <p>Recurring Accomplishments:</p> <ul style="list-style-type: none"> - Conduct SM-3 Block IIA software update to support engagements against additional complex threats identified during Aegis BMD 5.1 design process conducted after missile Critical Design Review (CDR) - Conduct End to End Distributed Development System (ETEDDS) integration testing; and flight test support - Continue implementation of SM-3 Block IIA cost reduction initiatives to support meeting cost goals to reduce the current estimated Average Unit Production Price (AUPP) 				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MM09 / Aegis BMD SM-3 Development

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<p>- Continue transition of KW hardware commonality effort (from design to material purchases) to system integration testing in order to demonstrate Technology Readiness Level (TRL) 7</p> <p>- Continue Engineering Manufacture Readiness Level (EMRL) 3 compliance to support life cycle progression</p> <p>Specific and unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Complete NRE services for manufacturing maturity (EMRL 4) inclusive of rate capability and production test equipment - Guidance Electronics Unit (GEU) Engineering Change Proposal (ECP) planned activities: - Conduct manufacturing readiness review for custom electronic part and verify unit is production ready - Complete upgraded GEU re-qualification activities and ensure readiness for production - Complete Computer in the Loop (CIL) and Hardware in the Loop (HIL) upgrades; upgrade Technical Design Agent's GEU equipment for flight test simulations - Complete the Engineering Change Proposal, including the technical data package and supporting documentation, for cut-in to missile production - Execute activities to transition GEU upgrades into current production line - Commence Test planning and acquisition of test articles for environmental testing - Begin evaluation of the effects of space environments on the SM-3 Block IIA missile during flight <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Complete Software Update builds 8.1 - adds enhanced performance requirements for 6 new threats; and 8.2 - adds Missile Power Application Non-Launch (MPAN) capability, bringing Missile Reprogramming (MRP) to the missile and fleet allowing the Vertical Launch System to conduct Missile Built in Tests (MBIT) onboard the ship while underway and incorporates 3 additional threats. Additionally, allows the capability to update software of the SM-3 IIA Round while aboard the ship, thereby enhancing the ability to conduct updates, which historically only occurred during Recertification. - Complete MPAN Safety approval via Weapons Systems Explosive Safety Review Board (WSESRB) process and fleet introduction - GEU ECP planned activities: - Complete manufacturing readiness review at GEU ECP supplier and manufacturer to verify maturity and production readiness - Complete transition to production of GEU ECP into AURs - Continue Test planning and acquisition of test articles for environmental testing - Continue evaluation of the effects of space environments on the SM-3 Block IIA missile during flight <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MM09 / Aegis BMD SM-3 Development

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
Decrease from FY 2020 to FY 2021 reflects the completion of development activities including the GEU ECP and SWUP builds 8.1/8.2 and incorporation into the production line. Additionally reflects the completion of MPAN approval and integration into the fleet in 1Q FY 2021.			
Accomplishments/Planned Programs Subtotals	187.879	253.244	201.970

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
• 0208866C MD09: Aegis BMD O&M	77.765	75.237	85.830	-	85.830	77.612	81.977	84.899	85.610	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Aegis BMD element acquisition approach supports evolutionary development, continuously building upon demonstrated capabilities to advance overall BMDS capability. After considering all the technical and management aspects of the program and to meet the requirements presented by an evolving ballistic missile threat, the Aegis BMD program awarded sole source contracts to Raytheon and Lockheed Martin to continue development of the SM-3 and the Aegis BMD Weapon System, respectively.

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MM09 / Aegis BMD SM-3 Development
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Standard Missile-3 (SM-3) Block IB Development - Standard Missile-3 (SM-3) Block IB Development - MM09 Carderock	MIPR	NSWC Carderock : Bethesda, MD	0.000	0.436	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IB Development - Standard Missile-3 (SM-3) Block IB Development - MM09	SS/CPAF	Raytheon : Tuscon, AZ	13.832	41.599	Dec 2018	28.959	Dec 2019	39.436	Dec 2020	-		39.436	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IB Development - Standard Missile-3 (SM-3) Block IB Development - MM09 - 20117142332259	MIPR	NSWC/PHD : Port Hueneme, CA	0.085	0.060	Nov 2018	0.660	Nov 2019	0.899	Nov 2020	-		0.899	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IB Development - Standard Missile-3 (SM-3) Block IB Development - MM09 - Various	MIPR	NSWC Corona : Corona, CA	0.029	0.395	Nov 2018	0.790	Nov 2019	1.076	Nov 2020	-		1.076	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IB Development - Standard Missile-3 (SM-3) Block IB Development - MM09 MIT	MIPR	Hanscom AFB - MIT/LL : Lexington, MA	0.000	1.105	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IB Development - Standard Missile-3 (SM-3) Block IB Development - MM09 DD	MIPR	NSWC Dahlgren : Dahlgren, VA	0.341	0.860	Nov 2018	1.612	Nov 2019	2.195	Nov 2020	-		2.195	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IB Development - Standard Missile-3 (SM-3) Block IB Development - MM09 JHU/APL	SS/CPAF	JHUAPL : Laurel, MD	0.595	0.595	Nov 2018	0.420	Nov 2019	0.572	Nov 2020	-		0.572	Continuing	Continuing	Continuing

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency												Date: February 2020			
Appropriation/Budget Activity					R-1 Program Element (Number/Name)					Project (Number/Name)					
0400 / 4					PE 0603892C / AEGIS BMD					MM09 / Aegis BMD SM-3 Development					
Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Standard Missile-3 (SM-3) Block IB Development - Standard Missile-3 (SM-3) Block IB Development - MM09-NAVSEA	MIPR	NAVSEA BAE Systems : Baltimore, MD	0.000	0.000		2.170	Nov 2019	2.955	Nov 2020	-		2.955	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3) Block IIA Development - CA,VA, MD	MIPR	Various : CA, VA, MD	3.338	9.568	Nov 2018	6.281	Nov 2019	3.742	Nov 2020	-		3.742	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3) Block IIA Development - MM09 - SM-3 BLK IIA INTEGRATION	SS/CPIF	Raytheon : Tucson, AZ	76.521	110.080	Apr 2019	175.377	Nov 2019	132.033	Mar 2021	-		132.033	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3) Block IIA Development - MM09 - SM-3 BLK IIA INTEGRATION - APL	MIPR	JHU/APL : Laurel, MD	5.378	15.157	Dec 2018	15.890	Dec 2019	9.467	Dec 2020	-		9.467	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3) Block IIA Development - MM09 - SM-3 BLK IIA INTEGRATION - DD	MIPR	NSWC DD : Dahlgren, VA	6.466	3.717	Nov 2018	9.485	Nov 2019	5.651	Nov 2020	-		5.651	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3) Block IIA Development - NSWC Corona	MIPR	NSWC Corona : Corona, CA	2.794	1.816	Nov 2018	4.698	Nov 2019	2.799	Nov 2020	-		2.799	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3)	MIPR	NWSC/Crane : IN	0.907	0.589	Nov 2018	1.922	Nov 2019	1.145	Nov 2020	-		1.145	Continuing	Continuing	Continuing

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MM09 / Aegis BMD SM-3 Development
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Block IIA Development - NSW/Crane															
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3) Block IIA Development - MM09 - SM-3 BLK IIA	MIPR	Brookhaven Lab - DOE : Uptown NY	0.000	0.000		3.830	Oct 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3) Block IIA Development - MM09 - SM-3 BLK IIA Draper	SS/CPIF	Draper Laboratory : Cambridge MA	0.000	0.000		1.150	Oct 2019	0.000		-		0.000	Continuing	Continuing	Continuing
Standard Missile-3 (SM-3) Block IIA Development - Standard Missile-3 (SM-3) Block IIA Development - NJ	C/CPFF	Lockheed Martin : Moorestown NJ	4.221	1.902	Nov 2018	0.000		0.000		-		0.000	0.000	6.123	0.000
Subtotal			114.507	187.879		253.244		201.970		-		201.970	Continuing	Continuing	N/A

Remarks
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	114.507	187.879	253.244	201.970	-	201.970	Continuing	Continuing	N/A

Remarks
Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

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Exhibit R-4, RDT&E Schedule Profile: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MM09 / Aegis BMD SM-3 Development
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	FY 2019			FY 2020			FY 2021			FY 2022			FY 2023			FY 2024			FY 2025		
	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3	Q1	Q2	Q3
GEU ECP Host GEU delta-CDR			◆																		
GEU ECP Qualification						◇															
Baseline 8.1 Operational Capacity Baseline (OCB)									△												
Baseline 8.1 MPAN WSERB									△												
Baseline 8.3 SRR									△												
IBTU Tech Refresh Missile PDR									△												
IBTU Guidance Section (GS) SRR												△									
Baseline 8.2 Formal Qualification Testing (FQT)												△									
Baseline 8.2 OCB															△						
IBTU GS PDR															△						
Baseline 8.3 Technical Interchange Meetings (TIM)																		△			
IBTU Guidance Unit (GU) Qual																					△
Baseline 8.3 OCB																					△
IBTU GS CDR																					△
Baseline 8.3 FQT																					△

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MM09 / Aegis BMD SM-3 Development
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
GEU ECP Host GEU delta-CDR	3	2019	3	2019
GEU ECP Qualification	4	2020	4	2020
Baseline 8.1 Operational Capacity Baseline (OCB)	1	2021	1	2021
Baseline 8.1 MPAN WSERB	1	2021	1	2021
Baseline 8.3 SRR	1	2021	1	2021
IBTU Tech Refresh Missile PDR	1	2021	1	2021
IBTU Guidance Section (GS) SRR	2	2021	2	2021
Baseline 8.2 Formal Qualification Testing (FQT)	3	2021	3	2021
Baseline 8.2 OCB	1	2022	1	2022
IBTU GS PDR	2	2022	2	2022
Baseline 8.3 Technical Interchange Meetings (TIM)	4	2022	4	2022
IBTU Guidance Unit (GU) Qual	4	2022	4	2022
Baseline 8.3 OCB	1	2023	1	2023
IBTU GS CDR	2	2023	2	2023
Baseline 8.3 FQT	3	2023	3	2023

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency										Date: February 2020		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD				Project (Number/Name) MC09 / Cyber Operations			
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
MC09: <i>Cyber Operations</i>	7.944	13.005	19.617	29.392	-	29.392	38.348	48.632	46.252	28.946	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Increase from FY 2020 to FY 2021 initiates software development efforts, solution prototyping, and integration testing.

A. Mission Description and Budget Item Justification

Sustain the DoD Risk Management Framework (RMF) Certification and Accreditation process and Controls Validation Testing (CVT) activities, analysis of validation results, risk assessments and reviews of proposed Program Manager/Information Systems Security Manager (PM/ISSM).

This project supports the monitoring and tracking of Cybersecurity mitigation detailed in Information Technology Security POA&Ms. Activities include preparation of C&A documentation and accreditation recommendations to the MDA Authorizing Official (AO). Independent Verification and Validation (IV&V) team actions ensure the availability, integrity, authentication, confidentiality and non-repudiation of the AB mission and non-mission systems, which includes test and remote site administrative systems. Activities in the Project are necessary to comply with the Federal Information Security Management Act (FISMA).

The SM-3 Block IB and IIA missiles and corresponding Aegis BMD weapon systems communication requires hardware and software development and integration testing to enable new cyber security capabilities. Activities include Encoder/Decoder, Plate 3 Circuit Card Assemblies (CCAs) and Mission Computer CCA updates. After missile and baseline specific efforts are complete, significant integration testing is required.

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

	FY 2019	FY 2020	FY 2021
Title: Network / System Certification and Accreditation (C&A)	13.005	10.827	11.337
Articles:	-	-	-
Description: Network/System Certification and Accreditation (C&A) includes recurring efforts such as cybersecurity engineering and architecture requirements planning for Aegis BMD systems, plan and test the Risk Management Framework (RMF) controls for the BMDS in regards to Aegis BMD systems to comply with the new directive, RMF for DoD Information Technology (DoDi 8510.01) to replace the DoD Information Assurance Certification and Accreditation process (DIACAP) and conduct Controls Validation Testing (CVT). Recurring Accomplishments: - Continue coordination and development of new and existing accreditation packages that comply with new directive, RMF for DoD Information Technology (DoDi 8510.01) process - Conduct regular Controls Validation Testing (CVT) and cooperative risk assessments to mitigate cybersecurity deficiencies - Develop and deploy Hardware and Software HW/SW implementation strategies for Continuous Monitoring activities at remote sites and Aegis BMD assets			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MC09 / Cyber Operations
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
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<p>Monthly reviews of systems through the eMass System</p> <ul style="list-style-type: none"> - Daily management of eMass System Plan of Action and Milestones (POAMs) <p>Specific and/or unique accomplishments to each FY are as follows:</p> <ul style="list-style-type: none"> - Daily management of eMass System Plan of Action and Milestones (POAMs) <p>FY 2020 Plans: -SEE ABOVE.</p> <p>FY 2021 Plans: -SEE ABOVE.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: -N/A</p>			
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<p>Title: RF Link Improvements</p> <p align="right">Articles:</p> <p>Description: The U.S. Navy is pursuing improvements identified by Engineering Topic 17 (ET-17) within Aegis Baseline 10 development and specific missile type. Radio Frequency (RF) Link Security Improvements will advance communications between Aegis BMD Weapon System and SM-3 Block IB and IIA missile variants. Product development and implementation will enable missile hardware enhancements in order to achieve the full requisite Missile RF Link Security Improvements.</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Provide MDA CNet upgrades for increased cybersecurity requirements - Begin replacement of Aegis Data Link (ADL) to enhance cybersecurity protections - Conduct hardware and software design solution efforts and down-select <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Begin software development and hardware prototype efforts to include initial integration testing - Conduct analysis and design trades to define encryption scheme for the weapon system, including backwards compatibility with missiles without RF Link Security upgrades - Update Aegis BMD Weapon System requirements and interface specifications to incorporate changes between the weapon system and missile message link <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase from FY 2020 to FY 2021 initiates software development efforts, solution prototyping, and integration testing.</p>	0.000 -	8.790 -	18.055 -
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Accomplishments/Planned Programs Subtotals	13.005	19.617	29.392
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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency **Date:** February 2020

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MC09 / Cyber Operations
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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
• 0603882C: <i>Ballistic Missile Defense Midcourse Defense Segment</i>	790.316	1,303.716	1,004.305	-	1,004.305	776.125	726.566	767.592	1,068.536	Continuing	Continuing
• 0603884C: <i>Ballistic Missile Defense Sensors</i>	382.759	352.288	281.957	-	281.957	576.699	656.539	574.703	593.592	Continuing	Continuing
• 0603896C: <i>Ballistic Missile Defense Command and Control, Battle Management & Communication</i>	500.965	549.756	593.353	-	593.353	593.330	546.471	581.376	543.971	Continuing	Continuing
• 0603898C: <i>Ballistic Missile Defense Joint Warfighter Support</i>	48.401	51.532	49.560	-	49.560	51.735	51.059	53.133	54.023	Continuing	Continuing
• 0603904C: <i>Missile Defense Integration and Operations Center (MDIOC)</i>	51.689	56.161	55.356	-	55.356	55.721	57.457	59.798	61.334	Continuing	Continuing
• 0604878C: <i>Aegis BMD Test</i>	92.160	169.822	170.880	-	170.880	191.744	163.103	179.877	217.735	Continuing	Continuing
• 0604880C: <i>Land Based SM-3 (LBSM3)</i>	25.200	38.352	56.628	-	56.628	43.742	29.073	31.507	27.908	Continuing	Continuing
• 0901598C: <i>Management HQ - MDA</i>	28.626	27.065	26.902	-	26.902	26.708	26.364	26.495	27.036	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Aegis BMD element acquisition approach supports evolutionary development, continuously building upon demonstrated capabilities to advance overall BMDS capability. After considering all the technical and management aspects of the program and to meet the requirements presented by an evolving ballistic missile threat, the Aegis BMD program awarded sole source contracts to Raytheon and Lockheed Martin to continue development of the SM-3 and the Aegis BMD Weapon System, respectively.

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Exhibit R-3, RDT&E Project Cost Analysis: PB 2021 Missile Defense Agency												Date: February 2020			
Appropriation/Budget Activity						R-1 Program Element (Number/Name)				Project (Number/Name)					
0400 / 4						PE 0603892C / AEGIS BMD				MC09 / Cyber Operations					
Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Network / System Certification and Accreditation (C&A) - Booz Allen and Hamilton	C/CPIF	MDA : McLean, VA	4.935	2.193	Nov 2018	4.000	Nov 2019	3.410	Nov 2020	-		3.410	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C&A) - CND/IA Advisory and Assistance Services	C/CPIF	Torch Technologies : Huntsville, AL	2.166	0.581	Nov 2018	0.000		0.000		-		0.000	0.000	2.747	0.000
Network / System Certification and Accreditation (C&A) - Jacobs Technology	C/CPFF	Tullahoma : TN	0.000	0.682	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C&A) - Network / System Certification and Accreditation (C&A) - Network System Certification and Accreditation - RMS	SS/CPAF	Raytheon : Tucson, AZ	0.000	0.000		0.000		1.486	Nov 2020	-		1.486	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C&A) - Network System Certification and Accreditation	SS/CPAF	Lockheed Martin : Moorestown NJ	0.843	7.305	Nov 2018	6.827	Nov 2019	6.441	Nov 2020	-		6.441	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C&A) - Network System Certification and Accreditation - DISA	TBD	DISA : Falls Church, VA	0.000	0.100	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Network / System Certification and Accreditation (C&A)	MIPR	NSWC/PHD : Port Hueneme CA	0.000	0.501	Nov 2018	0.000		0.000		-		0.000	0.000	0.501	0.000

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MC09 / Cyber Operations
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
- Network System Certification and Accreditation - PHD															
Network / System Certification and Accreditation (C&A) - Network/System Certification and Accreditation - DD	MIPR	NSWC - DD : Dahlgren VA	0.000	1.300	Nov 2018	0.000		0.000		-		0.000	0.000	1.300	0.000
Network / System Certification and Accreditation (C&A) - Program Operations - MC09 - CivSal	Allot	MDA : VA	0.000	0.343	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
RF Link Improvements - RF Link Improvements - SM-3	C/CPFF	Raytheon : Tucson, AZ	0.000	0.000		8.390	Mar 2020	17.313	Nov 2020	-		17.313	Continuing	Continuing	Continuing
RF Link Improvements - RF Link Improvements - WS	SS/CPIF	Lockheed Martin : Moorestown, NJ	0.000	0.000		0.400	Mar 2020	0.742	Nov 2020	-		0.742	Continuing	Continuing	Continuing
Subtotal			7.944	13.005		19.617		29.392		-		29.392	Continuing	Continuing	N/A

Remarks
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	7.944	13.005	19.617	29.392	-	29.392	Continuing	Continuing	N/A

Remarks
Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MC09 / Cyber Operations
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MC09 Cyber Operations	1	2019	4	2025
MC09 RF Link Improvements	1	2021	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency										Date: February 2020		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD				Project (Number/Name) MX09 / Aegis BMD Development Support			
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
MX09: <i>Aegis BMD Development Support</i>	347.831	179.320	163.628	148.030	-	148.030	140.923	126.302	134.702	139.178	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

N/A

A. Mission Description and Budget Item Justification

This includes the Government, contractor, and Federally Funded Research and Development Center (FFRDC) workforce that manage the overall Aegis Ballistic Missile Defense (BMD) program and enables the program to develop, build, and test standard missiles and associated Aegis Weapons Systems. Aegis Ballistic Missile Defense (BMD), in accordance with negotiated agreements between the U.S. Navy and the Missile Defense Agency (MDA) has identified and segregated funding for Developmental Support of Aegis BMD specific elements resident aboard Aegis capable U.S. Navy ships. Computer Program Support consists of, but is not limited to, reviews of Technical Observation Reports (TORs) that are generated by ship crews during exercises or deployments, determination of root causes and preparation of Computer Program Change Request (CPCR) to correct TORs, updates to the in-service computer program to apply, test and certify multiple CPCRs, and tests installation of Aegis Weapon System (AN/SPY-radar/Fire Control System (FCS)) alignment updates as required. Aegis BMD provides support to Annual Integration Events (AIEs) to ensure any updated Aegis Combat System (ACS) computer programs do not degrade BMD equipped ships and provides distance and technical support for BMD equipped ships. Provides Fleet operations and mission support to enable the conduct of sustained BMD operation.

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

	FY 2019	FY 2020	FY 2021
Title: Program Operations	104.586	99.678	82.685
Articles:	-	-	-
<p>Description: This activity includes the Government, contractor, and Federally Funded Research and Development Center (FFRDC) workforce that manage the overall Aegis Ballistic Missile Defense (BMD) program and enables the program to develop, build, and test standard missiles and the associated Aegis Weapon Systems. This project includes all operations support for the Aegis program office in Engineering, Testing, Logistics, Acquisition, Safety, Quality Assurance, Finance, Budget Formulation and Execution, Cost Estimation, and Earned Value Management in support of development activities. Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans: - SEE ABOVE.</p> <p>FY 2021 Plans: - SEE ABOVE.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020		
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2019	FY 2020	FY 2021
The decrease from FY 2020 to FY 2021 reflects a reduction in program operations.				
Title: Aegis Ballistic Weapon System Support		28.025	22.747	24.594
		Articles:	-	-
<p>Description: Provides system engineering for fielded Aegis BMD Weapon Systems from warfighter feedback, investigation of BMDS Discrepancy Reports, and BMDS ground test observation analysis. It includes computer program defect corrections and supports assessment of flight test readiness.</p> <p>Recurring Accomplishments:</p> <ul style="list-style-type: none"> - Update threat adaptation data to keep pace with emergent threats - Provide operation and sustainment of land based test sites used for the development of Aegis BMD baselines. Operation and sustainment includes Engineering, Logistics, Quality Assurance, Configuration Management and other support activities to both baseline development and the sites. - Provide support for contingency operations of national interest - Support upgrades to fielded Aegis BMD computer programs baselines approved as an Operational Capacity Baseline - Provide engineering support to Operationally Capable Baseline ships that participate in BMD test events - Provide test site usage for maintenance and support of baselines under development - Sustain the classified computing infrastructure needed for development efforts <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - SEE ABOVE. <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - SEE ABOVE. <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p> <p>Increase from FY 2020 to FY 2021 provides additional test site maintenance hours supporting multiple baselines under development.</p>				
Title: Fleet Integration		17.340	16.871	24.702
		Articles:	-	-
<p>Description: Provide Fleet operations and mission support to enable the conduct of sustained BMD operations; advocate war fighter requirements and fleet feedback in baseline development and capability upgrades to Aegis BMD weapon system; provide analysis and Mission Planning support for Geographic Combatant Commanders for operational application of Maritime BMD capabilities; and provide BMD Capabilities Analysis and Exercise Support for Aegis BMD baselines under development or currently deployed in the Operational Fleet.</p>				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<p>Recurring Accomplishments:</p> <ul style="list-style-type: none"> - Define, develop and review Joint and Fleet Doctrine for incorporation of Aegis BMD capability transition to warfighter and baseline acceptance into MDA Operational Capacity Baseline (OCB) - Research and define certification and warfighter acceptance requirements for Aegis BMD baselines to ensure successful capability delivery - Develop Aegis BMD training simulations and scenarios to support shipboard training including BMD Qualification (BMDQ) and higher level exercises - Execute warfighter feedback process to enhance Aegis BMD functional capability development and influence future Aegis BMD requirements and support MDA Test Community and Combatant Commanders in BMD Exercises and Wargames - Provide analysis for Anti-Ship Ballistic Missile Defense - Provide analysis on parametric organic sensor sensitivity - Provide analysis on up-range ship/sensor support for Launch on Remote (LoR), Engage on Remote (EoR), and Cued engagements - Provide analysis on impacts of countermeasures - Provide analysis on developing threats <p>Specific and/or unique accomplishments to each FY are as follows:</p> <p>FY 2020 Plans:</p> <ul style="list-style-type: none"> - Optimization of multi-baseline/ship defense designs - Limited anti-air warfare depth of fire calculations - Deliver Aegis BMD Mission Planner Prototype <p>FY 2021 Plans:</p> <ul style="list-style-type: none"> - Provide optimization of multi-baseline/ship defense designs in order to accomplish force defense design planning. - Provide limited Anti-Air Warfare (AAW) depth of fire calculations. Navy BMD assets need to account for air threats that impact their ship operating area integrated BMD/AAW mission. - Deploy Maritime Tactical Command and Control (MTC2) cloud device for local storage and mission planning computing in order to support collaboration across ship networks (afloat-to-ashore) and future mission planning software and data library updates - Incorporate MTC2 into Aegis BMD Mission Planner Prototype (Cerberus) to provide multi-mission planning and de-confliction (BMD, air, surface, etc) - Develop Capability Insertion and Requirements to resolve warfighter feedback design issues. Build warfighter requirement into current baseline on a more frequent schedule. - Mission Planner Integrated Product Team (IPT) Lead. Synchronizes mission planning efforts across the program. <p>FY 2020 to FY 2021 Increase/Decrease Statement:</p>			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020		
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support		
B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)		FY 2019	FY 2020	FY 2021
Increase from FY 2020 to FY 2021 provides Maritime Tactical Command and Control (MTC2) capability for collaborative planning across ship, strike group, and higher ashore headquarters. MTC2 deployment allows iterative and faster fielding of BMD Planner (Cerberus) to warfighters.				
Title: Infrastructure Upgrades		26.669	24.332	16.049
Articles:		-	-	-
Description: Provides management of C4I aspects of the BMDS Test Site (BTS) San Diego upgrade plan to maintain Fleet representative C4I configurations to support testing, troubleshooting, and Fleet operations. Includes IT services in support of the Aegis RDT&E mission to include: IT help-desk services; portal and data services; records management; business automation services; and desktop and Special Purpose Processing Nodes (SPPNs) maintenance and licenses. In addition, replaces critical IT infrastructure at end-of-life and to implement DoD mandated projects in support of the Joint Information environment (JIE) initiative. Recurring accomplishments: - Conduct Aegis IT services such as IT help-desk; portal and data services; records management; business automation services; and desktop and SPPN maintenance and licenses - Replacement of critical end-of-life equipment - Upgrades to IT infrastructure planning and implementation efforts to accomplish DoD mandated IT Projects (JIE and DoD CIO Information Resources Management (IRM) initiatives. FY 2020 Plans: - SEE ABOVE. FY 2021 Plans: - SEE ABOVE FY 2020 to FY 2021 Increase/Decrease Statement: Decrease from FY 2020 to FY 2021 reflects realignment of Special Access Program facility upgrade efforts from Program Element 0603892C to Program Element 0603891C.				
Title: USINDOPACOM Joint Emerging Operational Needs Statement (JEONS)		2.700	0.000	0.000
Articles:		-	-	-
Description: Integrated upper tier Ballistic Missile Defense System that expands engagement options and increases coverage area. Provides updated Threat Adaptation Data necessary for successful mission planning and threat detection on Aegis BMD ships. JEON funding also supports initial development efforts for regional peer-to-peer engagement coordination with Terminal High-Altitude Area Defense (THAAD). FY 2020 Plans:				

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support

B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
N/A			
FY 2021 Plans: N/A			
FY 2020 to FY 2021 Increase/Decrease Statement: N/A			
Accomplishments/Planned Programs Subtotals	179.320	163.628	148.030

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

<u>Line Item</u>	<u>FY 2019</u>	<u>FY 2020</u>	<u>FY 2021</u> <u>Base</u>	<u>FY 2021</u> <u>OCO</u>	<u>FY 2021</u> <u>Total</u>	<u>FY 2022</u>	<u>FY 2023</u>	<u>FY 2024</u>	<u>FY 2025</u>	<u>Cost To</u> <u>Complete</u>	<u>Total Cost</u>
• 0208866C MD09: <i>MD09 Aegis BMD O&M</i>	77.766	75.237	85.830	-	85.830	77.612	81.977	84.899	85.610	Continuing	Continuing
• 0604878C: <i>Aegis BMD Test</i>	92.160	169.822	170.880	-	170.880	191.744	163.103	179.877	217.735	Continuing	Continuing
• 0604880C: <i>Land</i> <i>Based SM-3 (LBSM3)</i>	25.200	38.352	56.628	-	56.628	43.742	29.073	31.507	27.908	Continuing	Continuing

Remarks

D. Acquisition Strategy

The Aegis Ballistic Missile Defense (BMD) element acquisition approach supports evolutionary development, continuously building upon demonstrated capabilities to advance overall BMDS capability. After considering all the technical and management aspects of the program and to meet the requirements presented by an evolving ballistic missile threat, the Aegis BMD program awarded sole source contracts to Raytheon and Lockheed Martin to continue development of the Standard Missile-3 (SM-3) and the Aegis BMD Weapon System, respectively.

Competition will be maximized for purchase of any products or services as appropriate.

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support
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Product Development (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	-		-		-		-		-	-	-	N/A

Remarks
N/A

Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Operations - Program Operations - MX09 - Civ Sal	Allot	MDA : VA	33.575	28.512	Nov 2018	36.417	Nov 2019	34.933	Nov 2020	-		34.933	Continuing	Continuing	Continuing
Program Operations - Program Operations - MX09 - DD PM	MIPR	NSWC/DD : Dahlgren, VA	4.932	1.941	Nov 2018	3.186	Nov 2019	2.057	Nov 2020	-		2.057	Continuing	Continuing	Continuing
Program Operations - Program Operations - MX09 - IT	Various	MDA : VA, AL	1.402	1.787	Nov 2018	1.752	Nov 2019	1.517	Nov 2020	-		1.517	Continuing	Continuing	Continuing
Program Operations - Program Operations - MX09 - MDA Travel	Allot	MDA : VA	2.165	2.352	Nov 2018	3.483	Nov 2019	2.500	Nov 2020	-		2.500	Continuing	Continuing	Continuing
Program Operations - Program Operations - MX09 - NAVSEA Civ Sal	MIPR	NAVSEA : Washington, DC	13.691	13.603	Nov 2018	14.785	Nov 2019	13.348	Nov 2020	-		13.348	Continuing	Continuing	Continuing
Program Operations - Program Operations - MX09 - NAVSEA RB Sal	MIPR	NAVSEA : Washington, DC	2.429	2.429	Nov 2018	2.499	Nov 2019	2.391	Nov 2020	-		2.391	Continuing	Continuing	Continuing
Program Operations - Program Operations - MX09 - NAVSEA Training, Various	MIPR	NAVSEA : Washington, DC	1.526	0.060	Nov 2018	0.297	Nov 2019	0.060	Nov 2020	-		0.060	Continuing	Continuing	Continuing
Program Operations - Program Operations - MX09 - NAVSEA Travel	MIPR	NAVSEA : Washington, DC	1.056	1.130	Nov 2018	0.659	Nov 2019	0.000		-		0.000	0.000	2.845	0.000

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Operations - Program Operations - MX09 - Security	MIPR	Various : VA	1.651	0.127	Nov 2018	2.722	Nov 2019	0.285	Nov 2020	-		0.285	Continuing	Continuing	Continuing
Program Operations - Program Operations - MX09 - TEAMS	C/CPFF	Various : VA, AL	40.197	52.645	Nov 2018	33.878	Nov 2019	25.594	Nov 2020	-		25.594	Continuing	Continuing	Continuing
Aegis Ballistic Weapon System Support - MX09 - AW APL	SS/CPFF	JHU/APL : Columbia, MD	5.127	1.182	Nov 2018	0.853	Nov 2019	0.929	Nov 2020	-		0.929	Continuing	Continuing	Continuing
Aegis Ballistic Weapon System Support - MX09 - AW DD	MIPR	NSWC DD : Dahlgren, VA	18.128	3.946	Nov 2018	3.618	Nov 2019	3.768	Nov 2020	-		3.768	Continuing	Continuing	Continuing
Aegis Ballistic Weapon System Support - MX09 - AW LM	C/CPFF	Lockheed Martin : Moorestown, NJ	41.405	6.373	Nov 2018	2.098	Nov 2019	2.284	Nov 2020	-		2.284	Continuing	Continuing	Continuing
Aegis Ballistic Weapon System Support - MX09 - AW NAVSEA	MIPR	NAVSEA : Washington, DC	41.461	15.332	Nov 2018	15.372	Nov 2019	16.736	Nov 2020	-		16.736	Continuing	Continuing	Continuing
Aegis Ballistic Weapon System Support - MX09 - AW TECH REP	MIPR	Aegis Tech Rep : Moorestown, NJ	0.940	0.432	Nov 2018	0.432	Nov 2019	0.470	Nov 2020	-		0.470	Continuing	Continuing	Continuing
Aegis Ballistic Weapon System Support - MX09 - AW Wallops	MIPR	SCSC : Wallops Island, VA	3.243	0.304	Nov 2018	0.374	Nov 2019	0.407	Nov 2020	-		0.407	Continuing	Continuing	Continuing
Aegis Ballistic Weapon System Support - MX09 - TD Various	MIPR	Various : San Diego, CA	32.663	0.000		0.000		0.000		-		0.000	0.000	32.663	0.000
Aegis Ballistic Weapon System Support - MX09 - AW PHD	MIPR	NSWC PHD : Port Hueneme, CA	0.500	0.456	Nov 2018	0.000		0.000		-		0.000	0.000	0.956	0.000
Fleet Integration - MX09 - Fleet APL	SS/CPFF	JHU/APL/MD : Columbia, MD	17.496	10.955	Nov 2018	11.130	Nov 2019	12.009	Nov 2020	-		12.009	Continuing	Continuing	Continuing
Fleet Integration - MX09 - Fleet DD	MIPR	NSWC DD : Dahlgren, VA	7.765	2.725	Nov 2018	5.081	Nov 2019	3.630	Nov 2020	-		3.630	Continuing	Continuing	Continuing

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total			
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Cost To Complete	Total Cost	Target Value of Contract
Fleet Integration - MX09 - Fleet NIWC	MIPR	NIWC : San Diego, CA	0.000	2.002	Nov 2018	0.000		7.713	Nov 2020	-		7.713	Continuing	Continuing	Continuing
Fleet Integration - MX09 - Fleet SMDC	MIPR	SMDC/ARSTRST : Huntsville, AL	1.305	0.604	Nov 2018	0.660	Nov 2019	0.250	Nov 2020	-		0.250	Continuing	Continuing	Continuing
Fleet Integration - MX09 - Fleet CSCS	MIPR	CSCS : Dahlgren, VA	3.160	1.054	Nov 2018	0.000		1.100	Nov 2020	-		1.100	Continuing	Continuing	Continuing
Infrastructure Upgrades - Infrastructure Upgrades - MX-09 S Jacobs	C/CPAF	Jacobs Engineering : AL, CA, CO, NM, VA, HI	0.000	0.096	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Infrastructure Upgrades - Infrastructure Upgrades MX-09 S Network	C/CPFF	Network Management Resources : Chantilly, VA	0.000	0.171	Nov 2018	0.000		0.000		-		0.000	Continuing	Continuing	Continuing
Infrastructure Upgrades - MX09 - ICT Funding	C/CPAF	Jacobs Engineering : AL,CA,CO,NM,VA,HI	34.885	12.717	Nov 2018	11.569	Nov 2019	11.662	Nov 2020	-		11.662	Continuing	Continuing	Continuing
Infrastructure Upgrades - MX09 - S	MIPR	SPAWAR : CA	0.191	0.255	Nov 2018	0.000		0.000		-		0.000	0.000	0.446	0.000
Infrastructure Upgrades - MX09 - S APL	SS/CPAF	JHU/APL : Laurel, MD	1.497	0.300	Nov 2018	5.160	Nov 2019	0.000		-		0.000	0.000	6.957	0.000
Infrastructure Upgrades - MX09 - S Corona	MIPR	NSWC Corona : Corona, CA	2.788	1.697	Nov 2018	0.847	Nov 2019	0.000		-		0.000	0.000	5.332	0.000
Infrastructure Upgrades - MX09 - S LM	C/CPAF	Lockheed Martin : Moorestown, NJ	14.908	5.827	Nov 2018	0.894	Nov 2019	0.000		-		0.000	0.000	21.629	0.000
Infrastructure Upgrades - MX09 - S MIT	C/CPAF	MIT : Lexington, MA	0.658	0.300	Nov 2018	0.348	Nov 2019	0.000		-		0.000	0.000	1.306	0.000
Infrastructure Upgrades - MX09 - S RMS	C/CPAF	Raytheon : Tucson, AZ	5.820	0.000		1.100	Nov 2019	0.000		-		0.000	0.000	6.920	0.000
Infrastructure Upgrades - MX09- D/TD	MIPR	SPAWAR : CA	5.095	5.076	Nov 2018	3.294	Nov 2019	4.387	Nov 2020	-		4.387	0.000	17.852	0.000
Infrastructure Upgrades - MX09- S DD	MIPR	NSWC DD : Dahlgren, VA	3.313	0.230	Nov 2018	0.300	Nov 2019	0.000		-		0.000	0.000	3.843	0.000
Infrastructure Upgrades - MX09-Variou	MIPR	Various : Various	0.759	0.000		0.820	Nov 2019	0.000		-		0.000	0.000	1.579	0.000

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
USINDOPACOM Joint Emerging Operational Needs Statement (JEONS) - USINDOPACOM Joint Emerging Operational Needs Statement (JEON) - MX09 AW JHU/APL	SS/CPFF	JHU/APL : Columbia, MD	0.480	0.000		0.000		0.000		-		0.000	0.000	0.480	0.000
USINDOPACOM Joint Emerging Operational Needs Statement (JEONS) - USINDOPACOM Joint Emerging Operational Needs Statement (JEON) - MX09 AW Lockheed Martin	C/CPFF	Lockheed Martin : Moorestown, NJ	0.935	2.700	Nov 2018	0.000		0.000		-		0.000	0.000	3.635	0.000
USINDOPACOM Joint Emerging Operational Needs Statement (JEONS) - USINDOPACOM Joint Emerging Operational Needs Statement (JEON) - MX09 AW NSWC	MIPR	NSWC DD : Dahlgren, VA	0.685	0.000		0.000		0.000		-		0.000	0.000	0.685	0.000
Subtotal			347.831	179.320		163.628		148.030		-		148.030	Continuing	Continuing	N/A

Remarks
N/A

Test and Evaluation (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	-		-		-		-		-	-	-	N/A

Remarks
N/A

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support
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Management Services (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Subtotal			-	-		-		-		-		-	-	-	N/A

Remarks
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	347.831	179.320		163.628		148.030		-		148.030	Continuing	Continuing	N/A

Remarks
Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

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Exhibit R-4A, RDT&E Schedule Details: PB 2021 Missile Defense Agency		Date: February 2020
Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MX09 / Aegis BMD Development Support

Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MX09 Aegis BMD Development Support	1	2019	4	2025

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency										Date: February 2020		
Appropriation/Budget Activity 0400 / 4					R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD				Project (Number/Name) MD40 / Program-Wide Support			
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
MD40: <i>Program-Wide Support</i>	314.608	35.050	25.848	30.503	-	30.503	26.779	22.252	24.461	24.500	Continuing	Continuing
Quantity of RDT&E Articles	-	-	-	-	-	-	-	-	-	-		

Note

Program Wide Support (PWS) is allocated on a pro-rata basis across multiple Agency PE's each fiscal year based on the total Agency budget, and therefore fluctuates per PE by fiscal year.

A. Mission Description and Budget Item Justification

PWS contains non-headquarters management costs in support of MDA functions and activities across the entire MDS. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the MDS as well as supports MDA in the development and evaluation of technologies that will respond to the changing threat. Additionally, PWS includes personnel to support global deployments performing deployment site preparation and activation, and provides facility capabilities for MDA Executing Agent locations worldwide. Other MDA wide costs include: physical and technical security; civilian drug testing; audit readiness; the Science, Technology, Engineering, and Mathematics (STEM) program; legal services and settlements; travel and agency training; office, equipment, vehicle, and warehouse leases; utilities and base operations across multiple geographic locations; commercial and ancillary facility services; management of all facility aspects regardless of lifecycle stage; supplies and maintenance; compliance with statutory environmental requirements; data and unified communications support; materiel and readiness and central property management of equipment; Facilities Sustainment, Restoration and Modernization (FSRM) program, (formerly Real Property Maintenance) to keep the Department's inventory of facilities in good working order; and similar operating expenses. PWS is allocated on a pro-rata basis across most Agency PEs and therefore fluctuates per PE by fiscal year based on the total Agency budget in that fiscal year.

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

	FY 2019	FY 2020	FY 2021
Title: Program Wide Support	35.050	25.848	30.503
Articles:	-	-	-
Description: PWS contains non-headquarters management costs in support of MDA functions and activities across the entire MDS. These functions include Government Civilians and Contract Support Services. This effort provides integrity and oversight of the MDS as well as supports MDA in the development and evaluation of technologies that will respond to the changing threat. Additionally, PWS includes personnel to support global deployments performing deployment site preparation and activation, and provides facility capabilities for MDA Executing Agent locations worldwide. Other MDA wide costs include: physical and technical security; civilian drug testing; audit readiness; the Science, Technology, Engineering, and Mathematics (STEM) program; legal services and settlements; travel and agency training; office, equipment, vehicle, and warehouse leases; utilities and base operations across multiple geographic locations; commercial and ancillary facility services; management of all facility aspects regardless of lifecycle stage; supplies and maintenance; compliance with statutory environmental requirements; data and unified communications support; materiel and readiness and central property management of equipment; Facilities Sustainment, Restoration and Modernization (FSRM) program, (formerly Real Property Maintenance) to keep the Department's inventory of			

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Exhibit R-2A, RDT&E Project Justification: PB 2021 Missile Defense Agency	Date: February 2020
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Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD40 / Program-Wide Support
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B. Accomplishments/Planned Programs (\$ in Millions, Article Quantities in Each)	FY 2019	FY 2020	FY 2021
<p>facilities in good working order; and similar operating expenses. PWS is allocated on a pro-rata basis across most Agency PEs and therefore fluctuates per PE by fiscal year based on the total Agency budget in that fiscal year.</p> <p>FY 2020 Plans: - SEE ABOVE.</p> <p>FY 2021 Plans: - SEE ABOVE.</p> <p>FY 2020 to FY 2021 Increase/Decrease Statement: Increase from FY 2020 to FY 2021 reflects the PWS allocation on a pro-rata basis across multiple Agency PE's each fiscal year based on the total Agency budget, and therefore fluctuates per PE by fiscal year.</p>			
Accomplishments/Planned Programs Subtotals	35.050	25.848	30.503

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

N/A

Remarks

D. Acquisition Strategy

N/A

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD40 / Program-Wide Support
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Support (\$ in Millions)				FY 2019		FY 2020		FY 2021 Base		FY 2021 OCO		FY 2021 Total	Cost To Complete	Total Cost	Target Value of Contract
Cost Category Item	Contract Method & Type	Performing Activity & Location	Prior Years	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost	Award Date	Cost			
Program Wide Support - Agency Operations Management	C/CPAF	Various : Multi: AL, CA, CO, VA	2.702	0.537	Jul 2019	0.423	Jul 2020	0.000		-		0.000	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Civilian Salaries	Various	MDA : Multi: AK, AL, CO, CA, VA	236.981	34.513	Oct 2018	23.547	Oct 2019	24.791	Oct 2020	-		24.791	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Other Agency Services	MIPR	Various : Multi: AK/AL/CA/CO/HI/MD/VA/NJ/NY/OCONUS	30.979	0.000		0.152	Jan 2020	0.235	Oct 2020	-		0.235	Continuing	Continuing	Continuing
Program Wide Support - Agency Operations and Support Services	C/CPFF	Various : Multi: AL, CA, CO, VA	39.256	0.000		1.726	Jul 2020	5.477	Jul 2021	-		5.477	Continuing	Continuing	Continuing
Program Wide Support - Prior year no longer funded in the FYDP	Various	Various : Various	4.690	0.000		0.000		0.000		-		0.000	0.000	4.690	0.000
Subtotal			314.608	35.050		25.848		30.503		-		30.503	Continuing	Continuing	N/A

Remarks
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	314.608	35.050	25.848	30.503	-	30.503	Continuing	Continuing	N/A

Remarks
Award Date reflects date of first obligation. Additional obligations may incrementally occur throughout the year.

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

Appropriation/Budget Activity 0400 / 4	R-1 Program Element (Number/Name) PE 0603892C / AEGIS BMD	Project (Number/Name) MD40 / Program-Wide Support
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Schedule Details

Events	Start		End	
	Quarter	Year	Quarter	Year
MD40 Program-Wide Support	1	2019	4	2025