DDG 1000 ZUMWALT CLASS DESTROYER (DDG 1000)

December 2021 Selected Acquisition Report (SAR)

DECEMBER 31, 2021
DEPARTMENT OF THE NAVY

Contents

Common Acronyms and Abbreviations for MDAP Programs
Acq O&M - Acquisition-Related Operations and Maintenance
ACAT - Acquisition Category
ADM - Acquisition Decision Memorandum
APB - Acquisition Program Baseline
APPN - Appropriation
APUC - Average Procurement Unit Cost
$B - Billions of Dollars
BA - Budget Authority/Budget Activity
Blk - Block
BY - Base Year
CAPE - Cost Assessment and Program Evaluation
CARD - Cost Analysis Requirements Description
CDD - Capability Development Document
CLIN - Contract Line Item Number
CPD - Capability Production Document
CY - Calendar Year
DAB - Defense Acquisition Board
DAE - Defense Acquisition Executive
DAMIR - Defense Acquisition Management Information Retrieval
DoD - Department of Defense
DSN - Defense Switched Network
EMD - Engineering and Manufacturing Development
EVM - Earned Value Management
FOC - Full Operational Capability
FMS - Foreign Military Sales
FRP - Full Rate Production
FY - Fiscal Year
FYDP - Future Years Defense Program
ICE - Independent Cost Estimate
IOC - Initial Operational Capability
Inc - Increment
JROC - Joint Requirements Oversight Council
$K - Thousands of Dollars
KPP - Key Performance Parameter
LRIP - Low Rate Initial Production
$M - Millions of Dollars
MDA - Milestone Decision Authority
MDAP - Major Defense Acquisition Program
MILCON - Military Construction
N/A - Not Applicable
O&M - Operations and Maintenance
ORD - Operational Requirements Document
OSD - Office of the Secretary of Defense
O&S - Operating and Support
PAUC - Program Acquisition Unit Cost
PB - President's Budget
PE - Program Element
PEO - Program Executive Officer
PM - Program Manager
POE - Program Office Estimate
RDT&E - Research, Development, Test, and Evaluation
SAR - Selected Acquisition Report
SCP - Service Cost Position
TBD - To Be Determined
TY - Then Year
UCR - Unit Cost Reporting
U.S. - United States
USD(AT&L) - Under Secretary of Defense (Acquisition, Technology and Logistics)
USD(A&S) - Under Secretary of Defense (Acquisition and Sustainment)

Program Manager

Name: Capt. Matthew Schroeder

Date Assigned: October 16, 2020

Address: 1333 Isaac Hull Ave. S.E., Washington D.C. 20376-2202

Phone: 202-781-5402

Email: matthew.k.schroeder.mil@us.navy.mil

Mission and Description

After a comprehensive review of Zumwalt class requirements, the Navy decided in November 2017 to refocus the primary mission of the Zumwalt Class Destroyers from Land Attack to Offensive Surface Strike. Zumwalt class guided missile destroyers are warships that provide multi-mission offensive and defensive capabilities, including Anti-Air Warfare (AAW), Anti-Submarine Warfare (ASW), and Anti-Surface Warfare (ASuW). This advanced warship will provide credible forward naval presence while operating independently or as an integral part of Naval, Joint, or Combined Expeditionary Strike Forces. Armed with an array of weapons, DDG 1000 will provide offensive, distributed, and precision firepower at long ranges. The ships' stealth and ability creates a new level of battlespace complexity for potential adversaries. The Zumwalt class will also operate as a key enabler in the acceleration of new warfighting capabilities and rapid development and validation of operational tactics, techniques, and procedures.

Executive Summary

Significant Accomplishments:

The Navy accepted final delivery of DDG 1000 on April 24, 2020, completing dual delivery process and marking the transition to the next phase of developmental and integrated at-sea testing. USS Zumwalt joined the U.S. Pacific Fleet battle force and is assigned to Surface Development Squadron One. DDG 1000 will also operate as a key enabler in the acceleration of new war-fighting capabilities and rapid development and validation of operational tactics, techniques, and procedures.

DDG 1000 conducted the MK 46 Structural Test Fire in May 2020 marking first-in-class large caliber firing of ammunition from a Zumwalt Class shipboard weapons system and the first live fire test of the MK 57 Vertical Launching System with a Standard Missile (SM-2) in October 2020. DDG 1000 completed Post Shakedown Availability in July 2021, MK 46 Gun Weapon System events in September and December 2021, and the Magnetic Silencing Quick Look in December 2021. PEO Ships transferred USS Zumwalt In-Service sustainment and lifecycle management to SEA 21 at Obligation Work Limiting Date (OWLD) on December 31, 2021. DDG 1000 will continue first-of-class developmental and integrated at-sea testing, as well as participate in fleet employment opportunities through Calendar Year (CY) 2022. The Navy is reevaluating the timeline for Zumwalt Class IOC.

USS Michael Monsoor (DDG 1001) completed Combat System Availability in March 2020 and is activating weapons, sensors and communication systems. DDG 1001 participated in underway test events and fleet exercises including the Integrated Battle Problem in April 2021, conducted the first-in-class Aviation Dynamic Interface Test in August 2021 and performed 35 launches and recoveries of aircraft, and completed a 33-day underway in October 2021 to participate in San Francisco Fleet Week and execute Torpedo Defense testing. DDG 1001 will continue to participate in underway test events, fleet exercises and regular at-sea periods to maintain crew proficiency and provide the fleet an early opportunity to engage the ship in operational scenarios.

Construction of Lyndon B. Johnson (DDG 1002), the final ship of the class, is complete. DDG 1002 completed Builders Trials September 1, 2021. The Navy accepted completion of production and test activity from General Dynamics Bath Iron Works (BIW) November 2021. DDG 1002 departed BIW January 2022 and arrived at Huntington Ingalls Industries' shipyard in Pascagoula, MS for Combat Systems installation and activation. The Navy executed a contract with HII for ship support services (e.g. shore power, care and protection, fire watch, etc.). A contract for the full availability work scope is expected to award March 2022. The Navy approved a plan to deliver DDG 1002 using a single delivery approach following the completion of Combat Systems installation, test and activation. Delivery is planned for late CY 2024 upon completion of a successful acceptance trial. The Navy will not crew DDG 1002 until final delivery to align with a more traditional shipbuilding delivery schedule.

The Navy is on track to field Conventional Prompt Strike (CPS) on Zumwalt-class destroyers in FY 2025. In support of the Zumwalt Class being the first platform to deliver CPS capability, the Navy commenced engineering design planning that will allow for integration of CPS during a planned FY 2024 Dry-Docking Selected Restricted Availability.

There are no significant software related issues with this program at this time.

History of Significant Developments Since Program Initiation

History of Significant Developments Since Program Initiation	
Date	**Significant Development Description**
January 1995	The program achieved Milestone 0 and started the Cost and Operational Effectiveness Analysis for the surface combatant for the twenty-first century (SC 21), comprised of destroyers (DD 21) and cruisers (CG 21). The DD 21 was intended to replace the DDG 51 by providing advanced land attack and multi-mission capabilities.
January 1998	The program achieved Milestone I for DD 21 and proceeded into the Program Definition and Risk Reduction phase. Primary Milestone I risks identified were a ship with a new hull form, several new combat system elements, significantly reduced manning level, very low signatures, and at lower costs than DDG 51. In order to maintain competitive cost pressure and to maintain technical competition, the Navy awarded Phase I and II concept development contracts to two industry teams
November 2001	The DD 21 program was restructured into the DD(X) program.
April 2002	Phase II concept development concluded, and the Navy competitively selected and awarded a Design and Development contract to Northrop Grumman (NG) Ship systems (now Huntington Ingalls Shipbuilding – HII). The NG team was subsequently expanded to a DD(X) "national" team that also included Bath Iron Works (BIW), Lockheed Martin, and Boeing. The NG concept required Research, Development, Test, and Evaluation, Navy (RDT&EN) increases for many of the new technologies including integrated electric drive, radars, software development, optimized manning, the advanced gun, and munitions. To reduce risk, the Navy contracted for Engineering Development Models (EDMs) for 10 subsystems.
January 2005	The 10 EDMs completed testing and reached sufficient technical maturity to support a Critical Design Review. At that point, DD(X) was programmed to consist of 10 highly automated, reduced signature, reduced manning electric drive ships. DD(X)'s major new systems included Dual Band Radar (DBR), and Advanced Gun System (AGS) with a Long Range Land Attack Projectile (LRLAP).
November 2005	The program achieved Milestone B. Major outstanding risks at Milestone B were related to the schedule and cost of software development and the integration and test of Mission Systems, as well as the costs of shipbuilder construction, DBR and AGS.
April 2006	The DD(X) program was renamed DDG 1000 and detail design contracts for the dual lead ships were awarded to BIW and Northrop Grumman Shipbuilding (NGSB) (formerly ISI).
December 2007	The ADM was issued authorizing the Navy to enter Production Phase for DDG 1000.
February 2008	The DoD approved Low Rate Initial Production for seven ships, and lead ship construction contracts were awarded to BIW and NGSB.
July 2008	The Navy provided testimony to the House Armed Services Committee Seapower and Expeditionary Forces Subcommittee requesting Congressional support to truncate the DDG 1000 program and restart the DDG 51 program.
February 2010	The PB FY2011 budget submission confirmed the reduction of the DDG 1000 Program to three ships as a result of the Future Surface Combatant Radar Hull Study in which the Navy concluded a modified DDG 51 with an Advanced Missile Defense Radar was the most cost-effective solution to fleet air and missile defense requirements.
June 2010	The USD (AT&L) certified a restructured three-ship program that included removal of

	the Volume Search Radar from the ship design, changed the IOC from FY 2015 to FY 2016, and revised test and evaluation requirements.
October 2010	Milestone B prime was achieved for the restructured program following the Nunn-McCurdy certification.
March 2011	The APB for the restructured DDG 1000 Program was approved.
March 2013	Due to the FY 2013 sequestration impacts commencing during the execution year, the program experienced budget reductions of approximately $70.2M of Shipbuilding and Conversion, Navy (SCN) and $10.3M of RDT&EN. The approximate $70.2M FY 2013 SCN sequester prevented the award of a $145M FY 2013 option to Raytheon for remaining Mission Systems Equipment (MSE) efforts for DDG 1000, 1001, and 1002, necessitating restructuring of the FY 2013, FY 2014, and FY 2015 options. A Below Threshold Reprograming for $9.999M of RDT&EN was approved to continue LRLAP guided flight tests and combat systems development.
August 2013	The Navy awarded a contract modification for the design and construction of a steel deckhouse, hangar, and Aft Peripheral Vertical Launch System (PVLS) for DDG 1002 to BIW. The award occurred after the DDG 1002 sole source negotiation with HII for the procurement of the DDG 1002 composite deckhouse, composite hangar, and Aft PVLS did not reach an affordable solution and deliveries of these components for DDG 1002 were becoming time critical. The Navy concurrently pursued a steel deckhouse, hangar, and Aft PVLS using limited competition.
April 2014	DDG 1000 was christened at BIW in Bath, ME.
December 2015	Raytheon was awarded a contract for remaining DDG 1002 MSE.
April 2016	DDG 1000 completed acceptance trials off the coast of Bath, ME.
May 2016	DDG 1000 delivered to the Navy (Hull, Mechanical & Electrical (HM&E) delivery).
June 2016	DDG 1001 was christened at BIW in Bath, ME. DDG 1001 floated off in Bath, ME.
September 2016	DDG 1000 sailed away from BIW en route to its homeport of San Diego, CA.
October 2016	DDG 1000 was commissioned in Baltimore, MD.
November 2016	BAE was awarded the $192 million contract for post-delivery execution yard efforts to install combat systems, as well as to complete PSAs on DDG 1000 and DDG 1001. The work will be executed at British Aerospace's (BAE) San Diego, CA facility near the ships' homeport at Naval Station San Diego and will be overseen by Naval Sea Systems Command.
December 2016	DDG 1000 arrived at its homeport of San Diego.
January 2017	DDG 1002 keel laid at the BIW facility in Bath, ME.
March 2017	DDG 1000 entered Combat Availability at the BAE shipyard in San Diego, CA.
November 2017	Navy redefined the primary mission of the Zumwalt Class Destroyers from Land Attack to Offensive Surface Strike.
January 2018	DDG 1001 completed builder's trials and acceptance trials off the coast of Bath, ME.
April 2018	DDG 1001 Hull Mechanical and Electrical Delivery.
September 2018	DDG 1000 completed Combat Availability and entered Combat Testing.
November 2018	DDG 1001 Sail-away.
December 2018	DDG 1000 Class Planning Yard Services contract was awarded to BIW.

December 2018	DDG 1001 arrived at its homeport of San Diego, CA.
December 2018	DDG 1002 was launched at BIW.
January 2019	DDG 1001 commissioned in San Diego, CA.
April 2019	DDG 1002 was christened at BIW in Bath, ME.
March 2020	DDG 1001 completed Combat System Availability in March 2020 and commenced activation of weapons, sensors and communication systems.
April 2020	Navy accepted final delivery of DDG 1000 on April 24, 2020
September 2021	DDG 1002 completed builder's trials off the coast of Bath, ME.
November 2021	Navy formally accepted completion of production and test activity from BIW of DDG 1002 on November 17, 2021.
December 2021	DDG 1000 SCN Obligation Work Limiting Date (OWLD) on December 31, 2021.
December 2021	PEO Ships transferred USS Zumwalt In-Service sustainment and lifecycle management to SEA 21 at OWLD.
January 2022	DDG 1002 sailed away Jan 12, 2022 from BIW.
January 2022	DDG 1002 arrived at HII in Pascagoula, MS for completion of Combat Systems installation and activation on January 17, 2022.
January 2022	Awarded undefinitized contract January 13, 2022 to HII for DDG 1002 scope associated with support services for the ship (ex. shore power, care and protection, fire watch, etc.).

Schedule

Schedule Events

Schedule Events					
Events	**Development APB Objective**	**Current APB Development Objective/Threshold**		**Current Estimate/Actual**	**Deviation**
Milestone B	Nov 2005	Nov 2005	May 2006	Nov 2005	
Lead Ship Awards	Jan 2006	Aug 2006	Feb 2007	Feb 2008	
Milestone B Re-approval	N/A	Sep 2010	Mar 2011	Oct 2010	
First Ship Delivery	Sep 2012	Apr 2014	Oct 2014	Apr 2020	Yes
Operational Evaluation	Sep 2013	Oct 2015	Apr 2016	Dec 2022	Yes
IOC	Jan 2014	Apr 2016	Oct 2016	Dec 2022	Yes
Milestone C	Mar 2015	Apr 2016	Oct 2016	Dec 2022	Yes

Schedule Notes:
First ship Hull Mechanical and Electrical delivery occurred in May 2016 marking completion of DDG 1000 at point of pre-mission systems activation. FY 2017 National Defense Authorization Act language recommended a provision that would require the Secretary of the Navy to deem ship delivery to occur at completion of the final phases of construction.

Since all three ships of the class are under contract, IOC is used as the Milestone C date.
DDG 1000 Final Delivery - Apr 2020 - OWLD - Dec 2021
DDG 1001 Final Delivery - Sep 2022 - OWLD - Mar 2023
DDG 1002 Final Delivery - Oct 2024 - OWLD - Sep 2025

Deviation Explanations:
Final DDG 1000 delivery was previously reported in the December 2019 SAR as March 2020, and has moved to April 2020. The shift in date is driven by first-in-class combat systems shipboard test, integration, and activation, to include operational demonstrations.

Operational Evaluation, IOC, and Milestone C were previously reported in the December 2019 SAR as September 2021, and has moved to December 2022. The shift in date is driven by the rescheduling of Test and Evaluation Master Plan events.

Significant Schedule Risks

Significant Schedule Risks	
Revised Milestone B (October 2010)	
1.	Since there was a Nunn-McCurdy Breach, then a Schedule adjustment was made in accordance with Nunn-McCurdy Certification. Mitigation: Schedule adjustment shifts IOC to FY 2016 via Milestone B ADM. Risk mitigated through adjustment to APB, and realized through BIW and Navy evaluation of yard-wide performance, identified in December 2014 Risks.
Current Estimate (December 2021)	
1.	There are no risks identified with this program.

Performance

Performance Characteristics					
Development APB Objective	**Current APB Development Objective/Threshold**		**Demonstrated Performance (include Date of Demonstration)**	**Current Estimate/Actual**	**Deviation**
Number of Advanced Vertical Launch Cells					
			TBD		
Number of ship's company personnel (helicopter detachment included)					
125	125	175	TBD	In accordance with DDG 1000 ORD Change 2, dated July 16, 2018, the ships crew has been increased to 217. L1C1 and Conventional Prompt Strike integration will have a future impact on crew manning size. Assessments on crew manning is in process.	
Operational Availability (Ao) for mission critical systems: **Ao for 120-day wartime profile**					
0.95	0.95	0.90	TBD	0.95	
Ao for 18 month extended forward deployment					
0.95	0.95	0.90	TBD	0.95	
Interoperability: All top-level IERs will be satisfied to the standards specified in the Threshold and Objective values.					
Achieve 100% of top-level Information Exchange Requirements. DD(X) joint tactical battle management and command and control computer	Achieve 100% of top-level Information Exchange Requirement. DD(X) joint tactical battle management and command and control computer	Achieve 100% top-level Information Exchange Requirement designated as critical. DD(X) joint tactical battle management and	TBD	Achieve 100% of interfaces; services; policy enforcement controls; and data correctness, availability and	

Performance Characteristics					
Development APB Objective	**Current APB Development Objective/Threshold**		**Demonstrated Performance (include Date of Demonstration)**	**Current Estimate/Actual**	**Deviation**
programs shall conform to the Single Integrated Air Picture System Engineer's Integrated Architecture and Integrated Architecture Behavior Model now being developed. DD(X) will remain in compliance with Chairman of the Joint Chiefs of Staff Instruction 6212.01 (Series), Inter-operability and Support-ability of IT and National Security System, including future updates.	programs shall conform to the Single Integrated Air Picture System Engineer's Integrated Architecture and Integrated Architecture Behavior Model now being developed. DD(X) will remain in compliance with Chairman of the Joint Chiefs of Staff Instruction 6212.01 (Series), Inter-operability and Support-ability of Information Technology and National Security Systems (IT and NSS), including future updates.	command and control computer programs shall conform to the Single Integrated Air Picture System Engineer's Integrated Architecture and Integrated Architecture Behavior Model for Track Management now being developed. DD(X) will remain in compliance with Chairman of the Joint Chiefs of Staff Instruction 6212.0 (Series), Inter-operability and Support-ability of Information Technology and National Security Systems (IT and NSS), Including future updates.		processing requirements designated as enterpriselevel or critical in the Joint integrated architecture. This includes the ORD threshold requirements for meeting the Information Exchange Requirements which are listed in DDG 1000 ORD Rev 15 (Table B) and the DDG 1000 TEMP Rev D (Table D-3).	

Performance Notes:
Classified Performance information is available in the Classified Annex.
DDG 1000 ORD Change 3 dated July 17, 2021
JROCM 015-13 dated January 23, 2013

Requirements Source: DDX ORD Change 1 dated January 23, 2006

Acronyms and Abbreviations
CJCSI - Chairman of the Joint Chiefs of Staff Instruction
CNO - Chief of Naval Operations
IER - Information Exchange Requirement
IT - Information Technology

NSS - National Security System
Rev - Revision
SIAP - Single Integrated Air Picture
TEMP - Test and Evaluation Master Plan

Acquisition Budget Estimate

Total Acquisition Cost

		Development APB	APB Name (Current) 03/25/2011)		Budget Estimate PB 2023		
Category	Base Year	Objective (BY$)	Objective (BY$)	Threshold (BY$)	BY$	TY$	Deviation
RDT&E	2005	8,313.2	8,994.0	9,893.4	9,271.2	9,755.7	
Procurement	2005	23,324.7	10,195.3	11,214.8	11,054.0	14,480.2	
MILCON	2005	0.0	0.0	0.0	0.0	0.0	
Acq. O&M	2005	0.0	0.0	0.0	0.0	0.0	
Total		31,547.9	19,189.3	N/A	20,325.2	24,235.9	
PAUC	2005	3,154.790	6,396.433	7,036.076	6,775.067	8,078.633	
APUC	2005	2,323.470	3,398.433	3,738.276	3,684.667	4,826.733	

Total End Item Quantity

Quantity Category	Current APB Quantity	Current Estimate Quantity
Development	0	0
Procurement	3	3

Budget Notes:
No cost estimate for the program has been completed in the previous year.
PB 2023 Budget Estimate and APB Objective/Threshold do not include Conventional Prompt Strike funding.

History of Acquisition Cost and Unit Cost since December 2001:

- November 2005: The program achieved Milestone B. Procurement quantity is ten.
- February 2010: DDG 1000 program Nunn-McCurdy breach to the PAUC and APUC. This breach was due to the change in ship procurement quantity (from ten to three).

Risk and Sensitivity Analysis

Current Baseline Estimate	
Current Procurement Cost (December 2021)	
1.	The Current Procurement Cost remains below the threshold of the Revised Original Estimate (March 2011).

Unit Cost

Current Baseline Compared with Current Estimate

Category ($M)	Current APB	Current Estimate	% Change	NMC Breach
PAUC				
Cost	19,189.3	20,325.2	-	-
Quantity	3	3	-	-
Unit Cost	6,396.433	6,775.067	+5.92%	
APUC				
Cost	10,195.3	11,054.0	-	-
Quantity	3	3	-	-
Unit Cost	3,398.433	3,684.667	+8.42%	

Original Baseline Compared with Current Estimate

Category ($M)	Current APB	Current Estimate	% Change	NMC Breach
PAUC				
Cost	19,189.3	20,325.2	-	-
Quantity	3	3	-	-
Unit Cost	6,396.433	6,775.067	+5.92%	
APUC				
Cost	10,195.3	11,054.0	-	-
Quantity	3	3	-	-
Unit Cost	3,398.433	3,684.667	+8.42%	

Unit Cost Notes:
Current Estimates are below the threshold of the Revised Original Estimate (March 2011).

Actions Taken or Proposed to Control Future Cost Growth:
The program will continue to monitor cost and funding and will update APB cost and funding objectives and thresholds if new requirements require procurement funding.

Technologies and Systems Engineering

Significant Technical Risks

Significant Technical Risks	
Current Estimate (December 2021)	
1.	DDG 1000 Program has retired or mitigated all program level technical risks.

Deliveries and Expenditures

Deliveries				
Delivered to Date	**Planned to Date**	**Actual to Date**	**Total Quantity**	**Percent Delivered**
Development	0	0	0	0.00%
Production	0	1	3	33.33%
Total Program Quantity Delivered	0	1	3	33.33%

Expended and Appropriated (TY $M)

Total Acquisition Cost: $24,235.9
Expended to Date: $23,297.1
Percent Expended: 96.13%
Total Funding Years: 33
Years Appropriated: 28
Percent Years Appropriated: 84.84%
Appropriated to Date: $23,588.1
Percent Appropriated: 97.33%

The above data is current as of April 18, 2022.

Deliveries and Expenditures Notes:
In accordance with 10 U.S. Code § 4351(g), SAR is no longer required after a program achieves 90% planned expenditures. As this Code applies to the DDG 1000 Program, the Program Office, PEO, and Deputy Assistant Secretary of the Navy - Acquisition Policy and Budget all agree that SAR reporting will continue beyond the 90% expenditure threshold until at least two ships of the three ship class acquisition achieve final delivery.

Low Rate Initial Production (LRIP)

Item	Initial LRIP Decision	Current Total LRIP
Approval Date	11/22/2005	10/8/2010
Approved Quantity	8	3
Reference	Milestone B ADM	Milestone B ADM
Start Year	2007	2007
End Year	2014	2009

Rationale if Current Total LRIP Quantity exceeds 10% of the total Procurement quantities:
The Current Total LRIP Quantity is more than 10% of the total production quantity due to the revised Milestone B ADM of October 8, 2010 reducing the LRIP quantity to three ships, which represents the total quantity of the program.

Operating and Support Costs

Total Program O&S Cost Compared with Baseline

	Current APB Objective (BY$)	Current APB Threshold (BY$)	Current Estimate (BY$)	Current Estimate (TY$)	Deviation
Total O&S ($Millions)	7,744.4	8,518.8	8,681.0	20,156.0	Yes

Deviation Explanation:
O&S Cost has breached primarily due to updated Visibility and Management of Operating and Support Costs data, cost of fuel, rate changes, 34% increase in crew size (from 147 to 197), and 60% increase in man-days required for Depot level maintenance aligning with OPNAV 4700 (from 13,000 to 20,930 man-days / ship / year).

O&S Cost Breakdown

Allocate O&S estimate by each weapon system (or system variants) acquired by the program) into the CAPE Cost Categories. Add a fresh column for each variant/system.

Category (BY 2005$ Million)	DDG 1000	DDG 51
Unit-Level Manpower	16.314	19.158
Unit Operations	6.503	6.766
Maintenance	27.261	12.204
Sustaining Support	19.326	2.291
Continued System Improvements	13.272	7.921
Other	0.000	0.000
Total O&S	82.676	48.340

Cost Estimate Source: O&S cost estimates have been updated by NAVSEA 05C (February 25, 2022)

Disposal Cost Estimate: $ 53.340 BY 2005$M (Service ICE, February 25, 2022)

Equation to Translate Annual Cost to Total Cost: The equation that links the unitized cost to the total cost for DDG 1000 is Total Cost = average annual cost per ship * number of ships * service life = $82.676M per Ship x 3 Ships x 35 year (service life) = $8,680.980M (BY 2005)

Sustainment Strategy: DDG 1000 maintenance is apportioned to either the ship or a land-based facility. There are two levels of maintenance planned for the DDG 1000 ship class: "on-ship" - accomplished by ship's force and "off-ship" - accomplished through maintenance support contracts in addition to the legacy Navy maintenance infrastructure. Maintenance support contracts similar to legacy Multi Ship/Multi Option contracting strategy for repairs and overhauls are planned. The DDG 1000 program provides Integrated Logistics Support oversight and guidance to Participating Acquisition Resource Managers that develop various sustainment approaches for combat systems and Communications, Command, Control, Computers, and Intelligence.

- **Date of Estimate:** February 25, 2022
- **Source of Estimate:** Service ICE
- **Quantity to Sustain:** 3
- **Unit Expected Service Life:** 35.0 years
- **First Operational Fiscal Year:** FY 2016
- **Final Operational Fiscal Year:** FY 2056

O&S cost estimates have been updated by NAVSEA 05C to account for crew size (from 147 to 197), and fact of life changes in Rate/ Visibility and Management of Operating and Support Costs (VAMOSC) data. Costs are shown in BY 2005 dollars. The estimate is based on an average unit cost of three ships with an average 35 year service life. The estimate includes separately priced mission system equipment sustainment cost. Mid-life modernization is not included.

The DDG 1000 cost estimates have been validated by NAVSEA 05C to reflect the surface strike mission and manning requirements. There are no actuals for the DDG 1000 class as the first ship delivery occurred April 2020.

Disposal Cost is included in the Operating and Support Cost of the current APB objective and threshold for this program.

Antecedent Information: The Antecedent System is the DDG 51 ship class. The DDG 1000 and DDG 51 ships differ in various aspects that make comparison difficult. Considerations include new technologies, size difference, and an all electric ship design. The unit cost of the DDG 51 (Antecedent) is derived using the Navy VAMOSC database for FY 2005 – FY 2014 for all systems in service during that time and is shown in BY 2005 $M. DDG 51 estimates are based on a service life of 35 years for the 28 Flight I and Flight II ships and 40 years for the 71 Flight IIA and Flight III ships.