



Coast Guard Yard Dry-dock Facilities and Industrial Equipment

June 10, 2015

Fiscal Year 2015 Report to Congress



Homeland
Security

U.S. Coast Guard

Foreword

JUN 10 2015

I am pleased to present the following report, "Coast Guard Yard Dry Dock Facilities and Industrial Equipment," as prepared by the U.S. Coast Guard.

This document has been compiled pursuant to a requirement set out in the Joint Explanatory Statement and Senate Report 113-198 accompanying the *Fiscal Year 2015 Department of Homeland Security Appropriations Act* (P.L. 114-4), which directs the Commandant to report on the condition of all dry dock facilities, and associated cranes and industrial equipment at the Coast Guard Yard.



Pursuant to congressional requirements, this report is being provided to the following Members of Congress:

The Honorable John Carter
Chairman, House Appropriations Subcommittee on Homeland Security

The Honorable Lucille Roybal-Allard
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable John Hoeven
Chairman, Senate Appropriations Subcommittee on Homeland Security

The Honorable Jeanne Shaheen
Ranking Member, Senate Appropriations Subcommittee on Homeland Security

I am happy to answer any further questions you may have. Please do not hesitate to contact me at (202) 372-4411 or the Department's Chief Financial Officer, Chip Fulghum, at (202) 447-5751.

Sincerely,

A handwritten signature in blue ink that reads "Paul F. Zukunft". The signature is written in a cursive style.

Paul F. Zukunft
Admiral, U.S. Coast Guard
Commandant



Coast Guard Yard Dry-dock Facilities and Industrial Equipment

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I. Legislative Language

This report responds to the language set out in the Joint Explanatory Statement and Senate Report 113-198 accompanying the *Fiscal Year (FY) 2015 Department of Homeland Security Appropriations Act* (P.L. 114-4).

The Joint Explanatory Statement includes the following provision:

Coast Guard Yard

The Coast Guard Yard located at Curtis Bay, Maryland, is recognized as a critical component of the Coast Guard's core logistics capability that directly supports fleet readiness. Sufficient industrial work should be assigned to the Yard to sustain this capability.

The Coast Guard shall provide a report on drydock facilities at the Coast Guard Yard, as directed in the Senate report.

Senate Report 113-198 states:

COAST GUARD YARD

The Coast Guard Yard located at Curtis Bay, Maryland, is recognized as a critical component of the Coast Guard's core logistics capability which directly supports fleet readiness. The Committee is concerned with the service life and condition of the Yard's drydock facilities, which may impact the critical in-service vessel sustainment [ISVS] project over the next 10 years. Therefore, the Coast Guard is directed to provide the Committee with a report no later than 90 days after the date of enactment of this act on the condition of all drydock facilities, and associated cranes and industrial equipment. This report shall include an assessment of equipment service life and specify drydock requirements and resources necessary to complete all ISVS work projected in the latest Capital Investment Plan report to Congress, along with all planned repair work over the same period, including the future needs to accommodate the Offshore Patrol Cutter.

II. Background

A. Coast Guard Yard

Since 1899, the Coast Guard Yard has built, repaired, and renovated ships on its 112-acre facility in Baltimore, Maryland, for the U.S. Coast Guard. It is the Coast Guard's only shipyard, largest industrial facility, and an essential part of the Service's core industrial base and fleet support operations. The Yard operates as a revolving fund activity under the authority of Title 14 U.S.C. § 648, with annual revenue of approximately \$100 million. With the exception of certain Acquisition, Construction, and Improvement (AC&I)-funded capital investments, the full costs for operation and maintenance of the shipyard (including industrial equipment) are paid for from the proceeds of this revolving fund. The Yard performs the following services to the Coast Guard:

- **Modernization** – Develop and install new systems on cutters and boats.
- **Availabilities** – Repair vessels on a scheduled or emergency basis.
- **Remanufacturing** – Overhaul engines, ordnance, critical underwater appendages, and other components and systems.
- **Detailed Design** – Engineer producible designs to facilitate future installations, from concept to reality.

The Coast Guard Yard has an inventory of ship-berthing, dry-dock, and haul-out facilities in various conditions. With the exception of the Yard's shiplift dry-dock facility, the majority of the waterfront structures at the Yard were sited and constructed in response to World War II shipbuilding and repair activities. The Yard's existing facilities provide the capability to dry-dock and perform depot-level maintenance to every current Coast Guard cutter class with the exception of medium and heavy icebreakers and the National Security Cutter.

A unique capability and core competency of the Coast Guard Yard is vessel renovation projects, such as those planned under the Coast Guard's AC&I In-Service Vessel Sustainment (ISVS) program, project, and activity (PPA). Specifically, the Yard has a unique mix of facilities, industrial equipment, and human capital that makes this specialized work particularly well-suited for the Coast Guard Yard.

B. In-Service Vessel Sustainment Program, Project, and Activity

The ISVS PPA is designed to support lifecycle event vessel repair availabilities including Midlife Maintenance Availabilities (MMA) and Service Life Extension Projects (SLEP),

on the Coast Guard's existing fleet of vessels. These projects are designed to enable in-service vessels to meet or exceed design service life through the recapitalization of select hull, mechanical, electrical, and electronic systems. The ISVS PPA is a central component of the Coast Guard's overall strategy of maintaining its fleet of cutters and boats, and is designed to be a continuous effort, spanning the entire fleet.

An MMA is an AC&I-funded availability designed to ensure that a cutter reaches its design service life by addressing the replacement of obsolete, unsupported, or maintenance-intensive equipment obsolescence. An MMA is typically conducted at the middle of a cutter's service life. A SLEP is an AC&I-funded availability that provides extended service life beyond the vessel's original design service life on the basis of service requirements. A SLEP is typically conducted as a vessel approaches the end of its designed service life.

The following is a summary of the ISVS PPA work planned from FY 2016–FY 2020, consistent with the *USCG Capital Investment Plan (FY 2015)* report to Congress:

140-ft. Ice-Breaking Tug (WTGB) SLEP: The first of nine cutters (MORRO BAY) entered production at the Coast Guard Yard on July 1, 2014. The WTGB SLEP project includes significant system upgrades and improvements to the propulsion plant; heating, ventilation, and air conditioning systems; installation of an engine-room fire-suppression system; boat launching davit replacement; Oily Water Separator replacement; stack exhaust configuration modifications; hull air-ice lubrication system; and crew habitability improvements to meet current standards (including removal of lead paint). The first WTGB SLEP is scheduled for 12 months; however, once the Yard achieves a satisfactory production labor learning curve (anticipated after Hull #3), the Yard will complete two 140-foot WTGB SLEPs per year, with an anticipated duration of 9 months each.

295-ft. Training Barque (WIX) SLEP: The Coast Guard's 295-ft Training Barque is Coast Guard Cutter EAGLE. The EAGLE SLEP will be broken into four 6-month phases (one phase per year) to allow the cutter to meet training commitments. The first phase of the SLEP began on September 16, 2014. Systems targeted for recapitalization include the gyrocompass, anchor windlass, main engine, wastewater treatment systems, reverse osmosis system, berthing area habitability, lead ballast replacement, repairs to the hull and structure, overhauls to the steering gear and sea water systems, solid waste management, electrical distribution system upgrades, remediation of lead paint and asbestos, and mast inspections and repairs.

225-ft. Seagoing Buoy Tender (WLB) MMA: The first of 16 cutters (OAK) will arrive at the Yard on July 1, 2015, to begin MMA. This MMA will address reliability and obsolescence of several engineering systems, including the power distribution system, aids to navigation crane, waste oil system, propulsion reduction gear, main propulsion control, ventilation, electronics systems upgrades, solid waste management, galley

upgrades, refrigeration system upgrade, and upgrades to the boat davit systems, as well as addressing crew habitability and hull/structural preservation. The first 225-foot MMA is scheduled for a 15-month performance period; however, once the Yard achieves a satisfactory production labor learning curve (anticipated after Hull #3), the Yard will complete two 225-foot WLB MMAs per year, with an anticipated duration of 12 months each.

47-ft. Motor Lifeboat (MLB) SLEP: The first 47-foot MLB will arrive at the Yard in mid-2015 for prototype work, with production anticipated in follow-on years. The 47-foot MLB SLEP includes replacement of the entire propulsion system; heating, ventilation, and air conditioning systems; structural repairs and upgrades; and replacement of electronics systems. A specific production schedule for the 47-foot MLB SLEP remains under development.

III. Discussion

A. Overview

The Coast Guard Yard's dry-docking facilities include a shiplift system, one floating dry-dock, and a series of piers and wharves designed to support docking of small vessels as well as pier-side work (required immediately prior to and following dry-docking). An illustration of the shipyard is provided in Figures 1A and 1B. These dry-docking facilities are supported by five tower (portal) rolling cranes, and ancillary industrial equipment (including steam, compressed air, and welding gas). The Yard must sustain its existing docking capacity (in terms of linear feet of dry-dock space), tower cranes, and industrial equipment in order to execute the renovation projects included under the ISVS PPA, and perform scheduled cutter dry-dock maintenance availabilities.

B. Land-Based Dry-docking Facilities

Shiplift System

Capability: The shiplift system consists of a Syncrolift, finger piers, and the land-based transfer area. The facility was constructed in 1996, and replaced antiquated floating dry-docks and marine rail-ways. The Syncrolift comprises 24 electrical winches mounted on top of two 340-foot long finger piers. The winches raise and lower a steel platform that is 325 feet long and 54 feet wide, with wood decking that supports rail "docking carts" positioned beneath the ship hull. The Syncrolift operates like an elevator—the platform is lowered down in the water, the ship floats over the platform, and it is lifted out of the water (landing on the docking carts). The docking carts are then used to roll the ship off of the Syncrolift onto the land-based transfer area. In its current configuration, the shiplift can accommodate a maximum ship length of 400 feet, with a 50-foot beam. The maximum lift capacity of the shiplift system is 3,550 long tons. The shiplift system is generally used to dock vessels that are greater than 110 feet in length. Smaller vessels are more efficiently docked on reinforced portions of the East, South, and West Wharves as outlined below.

Capacity: Generally speaking, the shiplift is able to dry-dock up to four ships at one time. The majority of current dry-dock repair and maintenance work performed at the Coast Guard Yard is accomplished on the land-based transfer area because this is the most efficient place to perform on-dock maintenance to large cutters. The land-based transfer area currently consists of two sets of steel rails that are 380 feet long and spaced at 52 feet center to center. Once a ship is rolled onto the primary rail track, it can be moved sideways to the second set of rails, freeing the primary track and Syncrolift to transport additional vessels until the tracks are filled or emptied.

Condition: The condition of the shiplift system is good, with 22 years of service life remaining.

Recent and Planned Maintenance Work: The average annual maintenance cost for the shiplift system is \$341,000 per year. Additional information regarding the shiplift is included in Table 1.

Piers and Wharves

Capability: The Yard dry-docks small cutters and boats (less than 200 long tons and 110 feet or less) on cradles or blocks placed on reinforced portions of the East, South, and West Wharves. To dock these small vessels, the Yard uses a commercial contractor that has a specially equipped barge crane capable of lifting these smaller cutters and boats onto the pier.

Prior to docking, and once large and small cutters are undocked, they are moored at one of the piers listed in Table 1.

Capacity: The Yard has five locations to dry-dock small cutters and boats.

Condition: The condition of the Yard's piers and wharves are listed in Table 1.

Recent and Planned Maintenance Work: The maintenance costs for the Piers and East, South, and West Wharves are included in Table 1.

Table 1: Land-Based Dry-dock Facilities

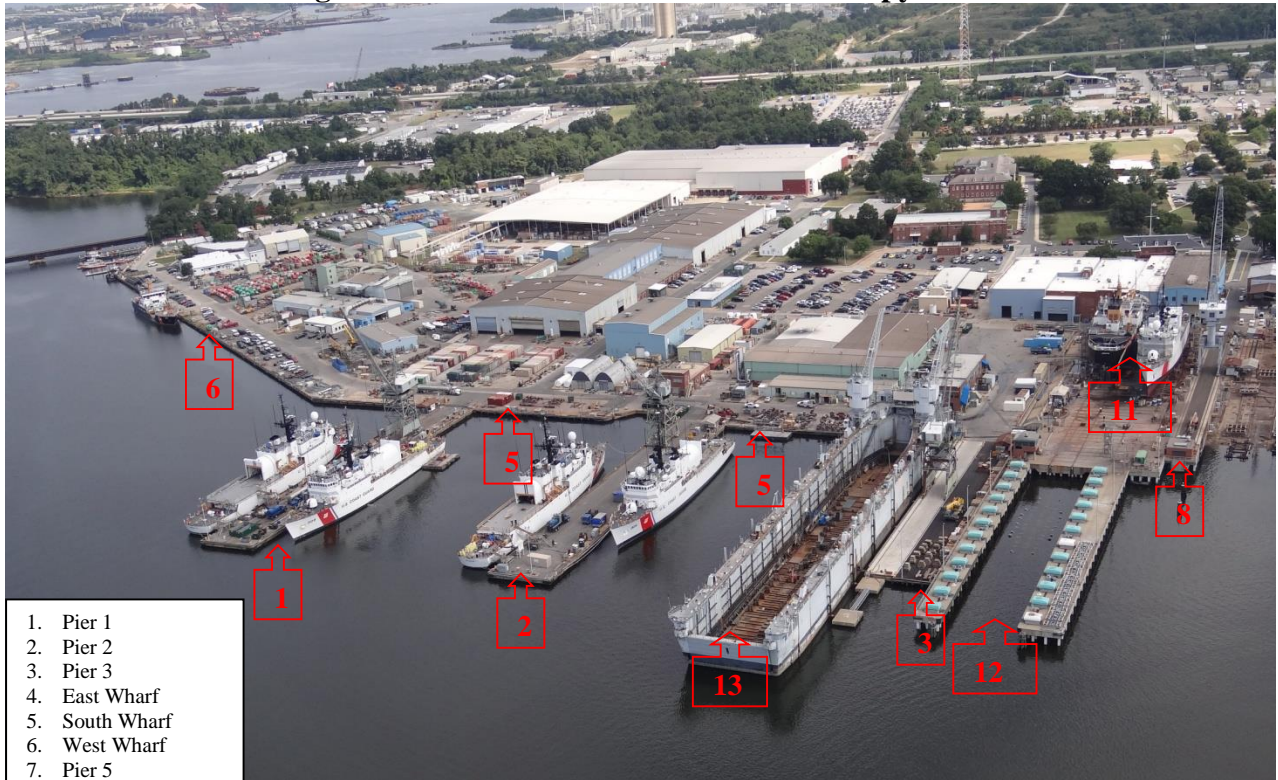
Structure	Description	Condition*	Date in Service	Age (yrs)	Service Life (yrs)	Recent Maintenance & Repair Work	Planned Maintenance and Repair Work
Pier 1	400-ft x 60-ft pier with crane rail. Wood piles, filled wood deck, asphalt surface.	Fair	1940	74	50	2007: \$400,000 Resurface**	\$75,000 Underwater Inspection every 5 years \$600–900,000 Structural Repairs every 10 years
Pier 2	395-ft x 60-ft pier with crane rail. Wood piles, filled wood deck, asphalt surface.	Poor	1940	74	50	2008: \$800,000 Repair/Resurface**	\$75,000 Underwater Inspection every 5 years \$600–900,000 Structural Repairs every 10 years
Pier 3	330-ft x 60-ft pier with crane rail to support dry dock. Concrete piles, concrete deck, asphalt/concrete surface.	Fair	1941	73	100	2013: \$350,000 resurface**	\$75,000 Underwater Inspection every 5 years \$600–900,000 Structural Repairs every 10 years
East Wharf & Pier 5	1,000-ft wharf with crane rail and cradle zones. Wood piles, concrete deck, asphalt/concrete surface.	Fair	1964	50	50	2011: \$50,000 Sinkhole Repair** 2014; \$1.13M Wharf Face Repair**	\$75,000 Underwater Inspection every 5 years \$300–500,000 Structural Repairs every 10 years
South Wharf	675-ft wharf with cut-outs to accommodate legacy floating dry-docks. Wood piles, concrete deck, asphalt/concrete surface.	Fair	1941	73	50	2011: \$351,000 Sinkhole Repair** 2014: \$500,000 Wharf Face Repair** 2015: \$700,000 Structural Repairs**	\$75,000 Underwater Inspection every 5 years \$300–500,000 Structural Repairs every 10 years
West Wharf	1,137-ft wharf with homeport cutter moorings. Wood piles, concrete deck, asphalt/concrete surface.	Poor	1943	71	50	2011: \$375,000 Sinkhole Repair**	\$900,000 Major Wharf Face and Deck Repair
Crane Way #4	390-ft crane way with wood piles, concrete beams, and concrete deck.	Fair	1941	73	50	2012: \$440,000 Crane Rail Repair**	\$2–3M Replacement within 15 years
Crane Way #5	380-ft crane way with wood piles, concrete beams, and asphalt/concrete deck.	Fair	1941	73	50	2013: \$923,000 Crane Rail Repair and Resurface**	\$2–3M Replacement within 15 years
Shipbuilding Way	40-ton haul-out marine railway and shipways for new ship construction.	Serious	1941	73	50	None	Facility is no longer required to support Yard work and is awaiting demolition.
Land Based Transfer Area	420-ft x 85-ft land-based dry-dock area. Concrete piles, concrete rail beams, and concrete deck.	Good	1996	18	40	None	\$100–200,000 Preventive Maintenance every 3–5 years

Structure	Description	Condition*	Date in Service	Age (yrs)	Service Life (yrs)	Recent Maintenance & Repair Work	Planned Maintenance and Repair Work
Syncrolift Finger Piers	32-ft x 334-ft (East) and 20-ft x334-ft (West) Piers to support Syncrolift system. Concrete piles and concrete deck.	Good	1996	18	40	None	\$100–200,000 Preventive Maintenance every 3–5 years

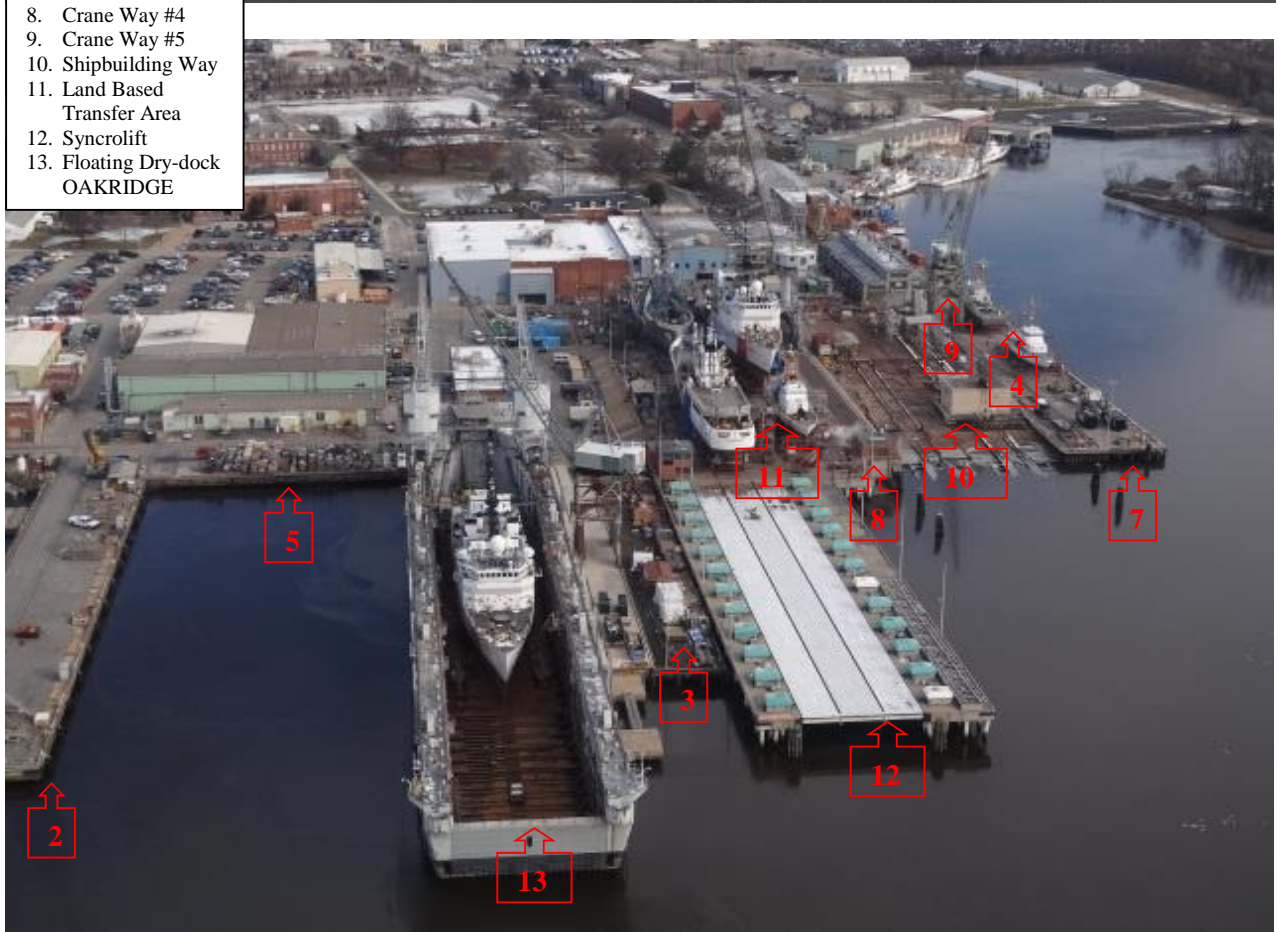
* Condition Ratings: Good, Satisfactory, Fair, Poor, Serious, and Critical. Rating is based on Routine Underwater Condition Assessment Ratings. Ratings based on structural inspection in 2010 by independent Architecture & Engineering firm

** Expended from Coast Guard Yard shore facility maintenance funds

Figures 1A and 1B: Overhead Views of Shipyard



1. Pier 1
2. Pier 2
3. Pier 3
4. East Wharf
5. South Wharf
6. West Wharf
7. Pier 5
8. Crane Way #4
9. Crane Way #5
10. Shipbuilding Way
11. Land Based Transfer Area
12. Syncrolift
13. Floating Dry-dock OAKRIDGE



C. Floating Dry-dock

Capability: The Yard's Floating Dry-dock is the ex-Navy USS OAKRIDGE, constructed in 1944, and later decommissioned in 1949. In 1963 it was reactivated, and operated until 2001, configured to dry-dock nuclear submarines. After the Navy decommissioned the dock in 2001, it was transferred to the Coast Guard Yard, intended to operate for a period of no more than 5 years.

OAKRIDGE is 551 feet in length, 81 feet wide, and has a displacement of 9,700 long tons. Although the dock is designed to operate at sea (towed by tugs), the Yard has moored it permanently to Pier 3, to minimize operating costs. OAKRIDGE is able to accommodate ships up to 437 feet in length, with a 42-foot beam and 6,000 long tons displacement.

Capacity: OAKRIDGE is configured and certified to dry-dock only one vessel at a time. OAKRIDGE is used by the Coast Guard to dry-dock large cutters only (210 feet or greater). Small cutters are not docked in OAKRIDGE because of the high dock operating cost and low elevation of their decks relative to the dry-dock side walls, making access to small ships extremely difficult.

Condition: The condition of OAKRIDGE is poor. OAKRIDGE sank in March 2011 immediately after undocking a 270-foot Medium Endurance Cutter as a result of a catastrophic ballast piping rupture, which resulted in progressive flooding and widespread damage to the electrical distribution system, pumps, motors, piping, and hull structure. The dock sank, but did not capsize given the shallow water depth and relatively deep draft of OAKRIDGE. The dock underwent significant repairs, and received a Professional Engineer certification for temporary operational service (2 years) in November 2013.

OAKRIDGE was originally certified to lift ships with a displacement of over 7,000 long tons, but has been de-rated because of extensive corrosion and buckling in portions of the dock. OAKRIDGE has its own portal cranes that run on rails along each sidewall; however, each of these cranes is out of commission because of equipment failure. Other installed equipment including diesel generators, auxiliary pumps, boilers, steam lines, welding gas, air compressors, air lines, and crew berthing have all been removed from service over the past 10 years as a result of disrepair.

The economic service life of OAKRIDGE was estimated by the Navy as 50 years; OAKRIDGE is 70 years old. The Coast Guard does not envision that it will be able to maintain the Professional Engineering certification to operate OAKRIDGE past 2018 on the basis of its current condition. Additionally, on the basis of OAKRIDGE's age and the construction time period, the products used in construction most likely contained

regulated hazardous materials. These materials include asbestos and heavy metals, which compound the difficulty in conducting maintenance and repairs.

Recent and Planned Maintenance Work: The Yard performed \$4 million in repairs from March 2011 to November 2013 after OAKRIDGE sank. This work was completed in October 2013. The repair work was classified as a capitalized expense in the Yard Working Capital Fund, the cost of which is amortized over a 5-year period (ending in 2018).

The annual maintenance and depreciation cost for OAKRIDGE is \$957,000 per year. At present, the operating and maintenance costs of OAKRIDGE are 11 times greater than the shiplift system (per linear foot of useable dock space).

Floating dry-docks are required to be dry-docked themselves once every 10 years, to perform hull inspections and maintenance, consistent with both Navy and Coast Guard requirements. The Yard performed dive inspections on OAKRIDGE instead of dry-docking; OAKRIDGE has not been docked since the mid-1990s. At present, there are no active shipyards in a safe transit distance from the Yard that have the capacity to dry-dock OAKRIDGE to perform this maintenance, and even if dry-dock facilities were available, the costs would be prohibitive, so this work has been permanently deferred until OAKRIDGE is removed from service.

Figures 2A and 2B: OAKRIDGE Floating Dry-dock and Syncrolift



D. Tower Cranes and Significant Industrial Support Equipment

A summary of the capability, capacity, condition, and maintenance of the Coast Guard Yard's Tower Cranes and significant industrial support equipment is outlined in Tables 2 and 3, respectively. In 2015, the Yard will complete a multi-year project to convert its tower cranes from diesel-electric to full electric as a means to reduce airborne emissions, modernize equipment, and lower operating costs. All Tower Cranes except for Tower Crane #2 will undergo this modernization. The Yard does not intend to electrify Tower Crane #2 given concerns regarding crane structural fatigue; instead, this crane will be removed from service without replacement. The cost to perform all crane conversion work was assumed as a capitalized expense in the Yard's Working Capital Fund, amortized over a period of 15 years.

Table 2: Cranes

Crane	Description	Condition*	Date in Service	Age (yrs)	Service Life (yrs)	M&R Costs	Planned Maintenance and Repair Work
Tower Crane #1	Located on Pier 1 - Provides service to western portion of South Wharf and ships moored at Pier 1. 38-Ton Capacity.	Good	1972	42	65	Crane underwent \$946,000 in maintenance in 2012, including a conversion from diesel-electric to full electric, extending its economic service life by 15 years. \$30,000 annual maintenance costs.**	\$42,000 annual depreciation for prior-year capital investment.
Tower Crane #2	Located on Pier 2 – Provided service to eastern portion of South Wharf and ships moored at Pier 2 when operational. Had a 7.5-Ton capacity at last certification.	Unserviceable	1938	76	50	Crane is inoperative - it is no longer cost-effective to fabricate replacement parts for crane engine, structure, and controls. **	None. Will be replaced with a mobile crane at a cost of \$800,000.
Tower Crane #3	Located on Pier 3 - Provides service to OAKRIDGE Floating Dry-dock, Pier 3, and the Syncrolift. 38-Ton Capacity.	Good	1966	48	65	Crane underwent \$1 million in maintenance in 2012, including a conversion from diesel-electric to full electric, extending its economic service life by 15 years. \$30,000 annual maintenance costs.**	\$23,000 annual depreciation for prior-year capital investment.
Tower Crane #4	Services Shiplift Transfer Area, portions of Syncrolift, and Shipways. 38-Ton Capacity.	Good	1995	19	50	\$30,000 annual maintenance costs.**	\$900,000 conversion from diesel-electric to full electric will be completed in 2015 as a capital investment; this will extend the service life of the crane by 15 years. The cost for the project will be depreciated over 15 years.
Tower Crane #5	Services Pier 5 and East Wharf. 38-Ton Capacity	Good	1966	48	65	\$30,000 annual maintenance costs**. Prior-year electrification (and service life extension) fully paid off.	None.
OAKRIDGE Gantry Cranes	Cranes provided service to OAKRIDGE when operational. These cranes are mounted on rails that traverse the wing-walls of the dry-dock.	Unserviceable	1963	51	50	Both cranes are inoperative; it is no longer cost-effective to fabricate replacement parts for crane engines, structure, and controls.	None.

* Condition Ratings: Good, Fair, Poor, Unserviceable. Rating is based on age, functionality, and known deficiencies.

** Expended from Coast Guard Yard shore facility maintenance funds

Table 3: Significant Industrial Support Equipment

System	Description	Condition*	Date in Service	Age (yrs)	Service Life (yrs)	M&R Costs	Planned Maintenance and Repair Work
Weld Gas System	7,188 feet of oxygen/gas line for welding.	Poor	1950	65	40	\$50,000 annually**	\$600,000 Major Maintenance/Replacement
Compressed Air System	10,413 feet of compressed air line.	Fair	1940	74	40	\$50,000 annually**	\$600,000 Major Maintenance/Replacement
Steam Distribution System	32,212 feet of steam line for ship repair and heat.	Fair	1940	74	40	2011: \$800,000 Maintenance** 2014: \$1.2 million; 2,000 feet replaced in 2014.**	\$4 million Major Maintenance/Replacement

* Condition Ratings: Good, Fair, Poor, Unserviceable. Rating is based on age, functionality, and known deficiencies.

** Expended from Coast Guard Yard shore facility maintenance funds

E. ISVS and Planned Repair Work Requirements

The Yard must sustain its existing docking capacity (in terms of linear feet of dry-dock space), tower cranes, and industrial equipment to execute the renovation projects included under the ISVS PPA, and to perform scheduled cutter dry-dock maintenance availabilities. Table 4 is an integrated schedule of work included as part of the ISVS PPA and other cutter dry-dock maintenance availabilities (funded from the Operating Expense Appropriation). For display purposes, this table only includes work that must be accomplished either on the shiplift or OAKRIDGE. Wharf space is not a significant constraint for either ISVS or dry-dock maintenance availabilities funded from the Operating Expense Appropriation. As outlined above, only small vessels (110 feet and below) are docked on the wharves.

As illustrated in Table 4, the Yard must sustain dry-docking capacity sufficient to dry-dock 5–6 large cutters (those greater than 110 feet) simultaneously from FYs 2015–2019. Sustaining the Coast Guard Yard’s existing dry-docking capacity will fulfill this requirement.

F. Offshore Patrol Cutter Requirements

The final dimensions of the Offshore Patrol Cutter (OPC) are still unknown at this point in the acquisition. If the dimensions exceed the maximum capacity of the Shiplift, in terms of length, beam, and/or displacement, some modifications will need to be performed to the Shiplift System or the work could be performed at another Yard. Such modifications would have to be performed in a manner that avoids impact to production at the Yard, impacts to the ISVS project, and costs associated with an idle workforce. The scope of these modifications cannot be assessed until the exact specifications of the OPC are available.