Shipyard Infrastructure Optimization Program

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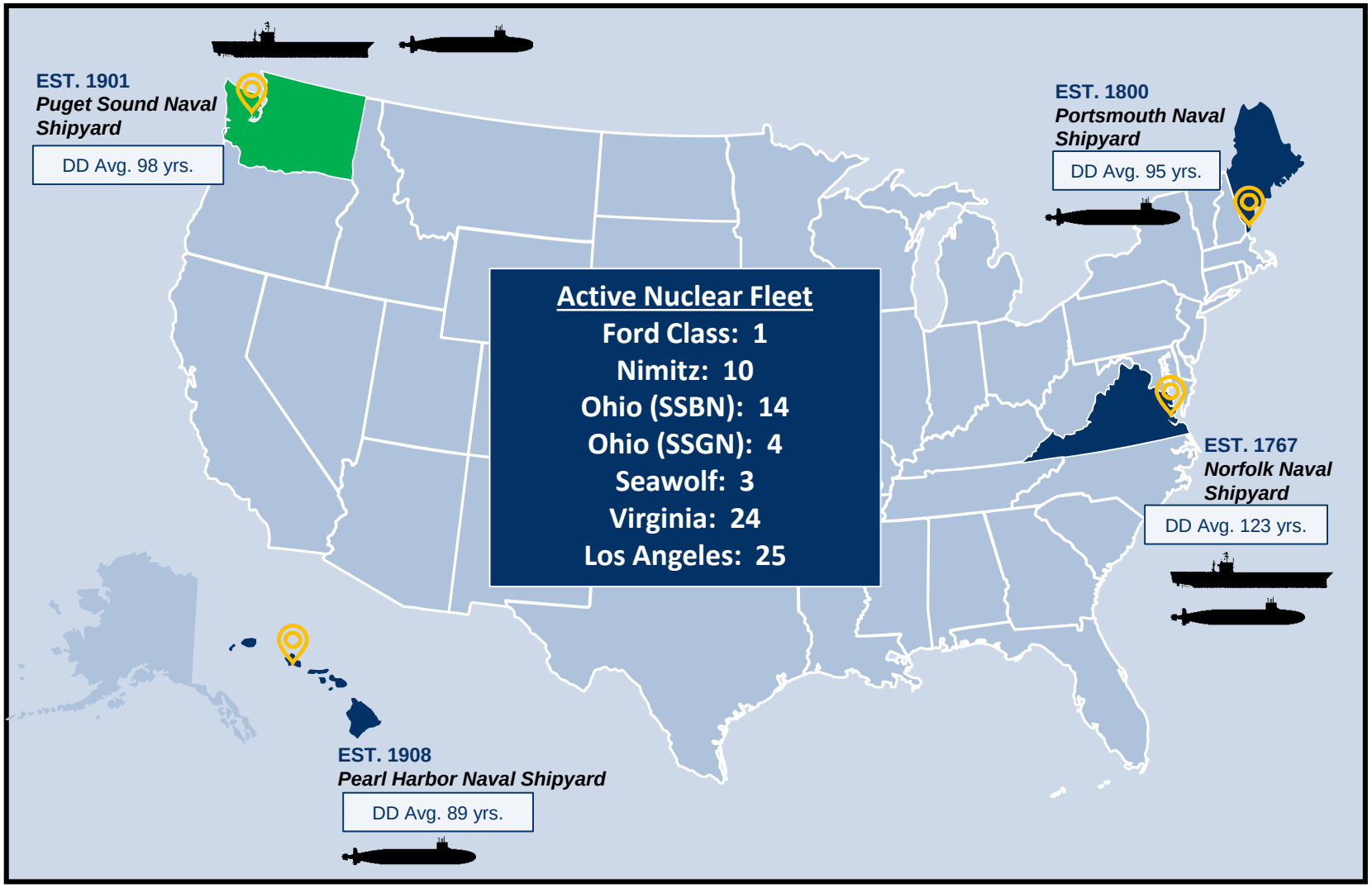
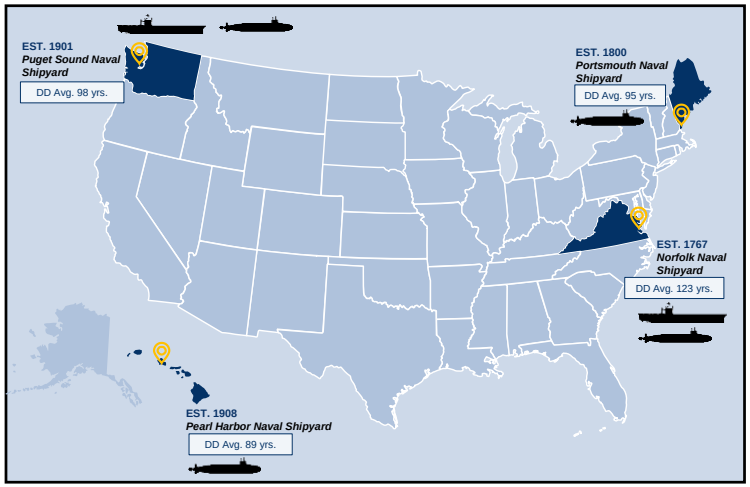
The Nation's Four Public Shipyards



Shipyard Infrastructure Optimization Program

Problem Statement

- Condition, capacity, and configuration of facilities, dry docks, and equipment at the four public shipyards contribute to inadequate throughput and loss of fleet operational availability.
- Shipyards designed for constructing conventional ships are not optimized for repairing the nuclear fleet.



Baseline Performance (2018)

- Dry dock capability/survivability gaps: insufficient dry docks for VIRGINIA Blk V and FORD-class.
- Inadequate facilities and equipment led to maintenance delays that contributed to >1,300 lost operational days for carriers and >12,500 lost operational days for submarines. (FY00-16, GAO).

Solution – SIOP

LOE 1: Construct and recapitalize dry docks and piers

LOE 2: Recapitalize and reconfigure infrastructure for optimization

LOE 3: Modernize industrial plant equipment

SIOP North Star

Enable increased submarine and carrier maintenance throughput by recapitalizing shipyard infrastructure and equipment required to conduct scheduled depot maintenance and by reconfiguring infrastructure layout to deliver reductions in availability durations.

SIOP Mission and Lines of Effort

SIOP is a holistic investment plan that integrates all infrastructure and industrial plant equipment investments at the Navy's four public shipyards to meet nuclear fleet maintenance requirements and improve Navy maintenance capabilities by expanding shipyard capacity and optimizing shipyard configuration.

LOE 1. Construct and recapitalize dry docks and piers

- New capabilities to support dimensions and utility requirements of Virginia Class submarines and Ford Class aircraft carriers
- Foundational investment to meet class maintenance plans

LOE 2. Recapitalize and reconfigure infrastructure towards improved industrial performance

- Phased modeling and simulation informs optimum shipyard configuration
- Reduce travel time, locate quick-turn shops at waterfront, place mechanics and engineers together, provide QoS amenities, rebuild utilities for resiliency

LOE 3. Modernize Industrial Plant Equipment

- Capital equipment (>$350K) to maintain, modernize and establish new industrial capabilities
- Regularly updated, connected equipment and modern material tracking applications that reduce total ownership cost

Create new platform capability

Increase capacity for existing platforms

Modernize towards optimization

LOE 1 – Dry Dock Modernization

Norfolk Naval Shipyard – Dry Dock 8 Modernization
Five projects including $486M cooling water for Ford class aircraft carriers
Ford class in the Atlantic

Portsmouth Naval Shipyard – Dry Dock 1 Expansion
$2.5B project underway in support of Virginia class submarines
3 to 5 dry docks

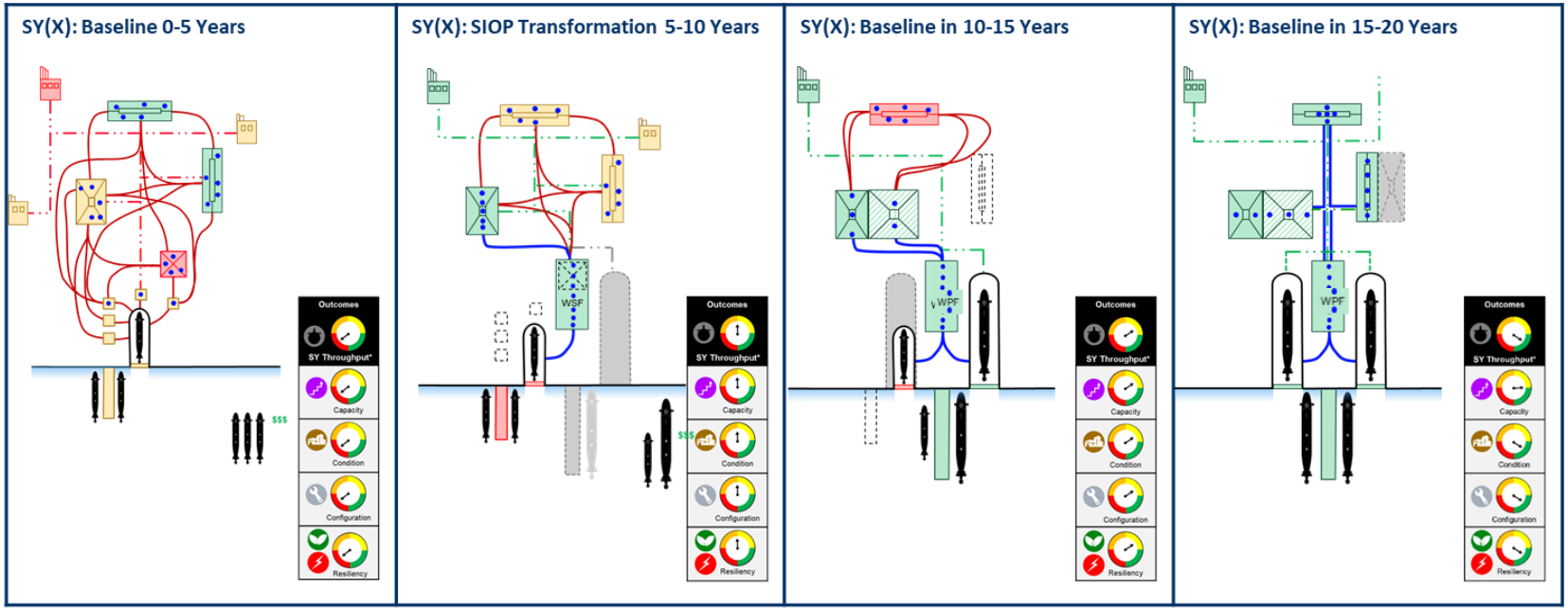
Active Nuclear Fleet
Ford Class: 1
Nimitz: 10
Ohio (SSBN): 14
Ohio (SSGN): 4
Seawolf: 3
Virginia: 24
Los Angeles: 25

Pearl Harbor Naval Shipyard – New Dry Dock 5
$4.5B project underway in support of Virginia class submarines
2 to 3 Virginia class dry docks

Puget Sound Naval Shipyard – New Multi-Mission Dry Dock
Approaching 80% design, NEPA, and Tribal consultations underway
Ford class in the Pacific

LOE 2 – Facilities Optimization

Shorten availability durations and reduce man-days expended by reconfiguring workflow at the shipyard, building, and shop level



- **Future shipyard layouts determined via modeling & simulation**
  - 22 availabilities (10K+ activities/avail) analyzed for location, duration, staffing, and critical path
  - Relocate buildings and shops to reduce travel time
  - Move quick-turn shops to waterfront adjacent to dry docks
  - Move in-house shops, logistics, and administration away from docks
  - Locate engineers, tool rooms, locker rooms, and training spaces near shops
  - Distribute workforce support facilities (gates, parking, eating, security, clinics)
- **Construct or renovate facilities to modern standards and for future resiliency and agility**
- **Rebuild utilities systems throughout shipyards for resiliency and adaptability**

LOE 3 – Industrial Equipment Recapitalization

Background

- 1,113 pieces of equipment ($3B) across all four public shipyards. Average age: 24 years
- Private sector average age: 7-10 years
- Most equipment unsupported by original manufacturers
- Significant supply chain stressors: Chips, steel, gears, etc.
- Minimal commonality of machinery or maintenance approach across shipyards

Path Forward

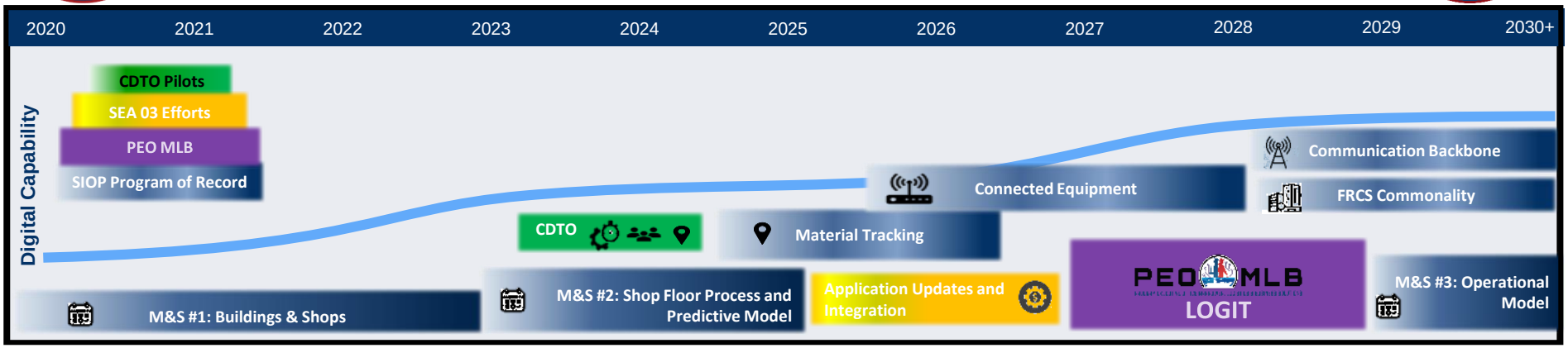
- Consistent, sufficient procurement to bring all equipment within expected service life
- Create commonality: procurement & maintenance efficiencies; workforce exchange
- Cost savings
- Establish enterprise-wide supplemental maintenance contracts
- Connected equipment
  - Transmit designs to machines and among shipyards
  - Monitor performance and health
- Remote material tracking for geo-location
- Predictive modeling & simulation through digital model
- Advanced Manufacturing allow buy/make trade-off

Shaft Lathe (PSNS)

Boring Mill (PHNS)

237 pieces of capitalized equipment installed by SIOP to date
90% domestically sourced

Digital Roadmap



SIOP

Facilities Related Controls
- Facilities managed automatically
- Standardized across buildings for maintenance and cybersecurity

Modeling and Simulation
- Includes the inputs to production, project schedules and equipment
- Create detailed MRO process model as leave-behind for shipyard operations

Material Tracking
- On-yard tracking of rip-out and new material, shipyard equipment
- Eliminate lost material
- RFID, mesh, GPS capable
- Integrated with NMMES

Connected Equipment
- Equipment status communicated in real time
- Machine instructions from engineering to equipment
- Inter-shipyard capability

Digital Backbone
- Integrated with construction and electrical distribution
- Fiber optic, 5G

Efforts by Others

NMMES Modernization
- More than 35 business applications that enable shipyard maintenance operations

Labor Skills
- Skills available linked to daily work assignments

Electronic Work Packages
- Digitalizing work status and progression for searchability and repeatability

Network Development
- Establishing environment to enable communication

Naval Maintenance, Repair, Overhaul
- Plan, predict, schedule, and execute maintenance

Naval Supply Chain Management
- Plan, procure, receive, store, distribute, dispose and manage material, goods and services

Naval Product Lifecycle Management
- Manage weapon system data required for life cycle support
- Workforce automation, optimization, and process standardization for program lifecycle management

Integration & Infrastructure
- Data exchange and integration among modernized, legacy, and external IT systems
- Synchronization of enterprise and edge instances of components

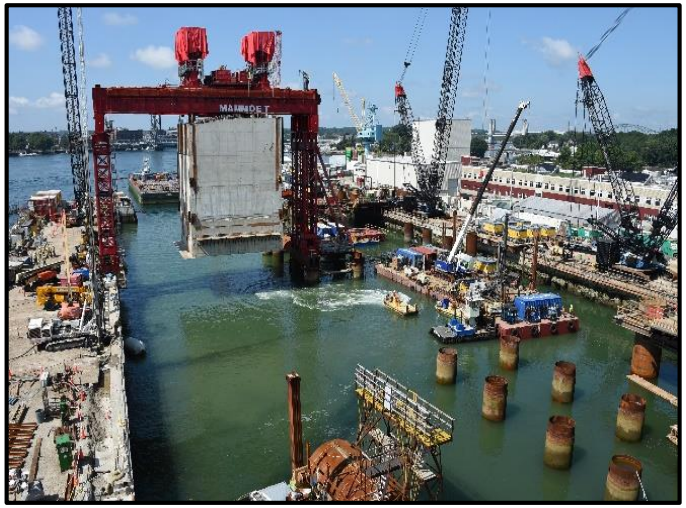
Logistics Integrated Data Environment
- Aligns data systems to support the other 4 pillars, enable analytics, and broader data efforts

SIOP Progress

- **Work Underway**
  - **$6.3B** of construction, including **four** dry docks
  - **66** pieces of industrial plant equipment in procurement valued at **$560M**
  - PHNS Dry Dock 5, NNSY Dry Dock 8, and PNSY Dry Dock 1 are underway
- **Completed Since 2018**
  - MDAP Gates 1-3 (requirements and alternative selection) and Gate 4 (configuration baseline) at PHNS
  - **40** completed projects valued at **$1.1B**
  - **237** pieces of industrial plant equipment delivered valued at **$586M**
- **Improvements**
  - § Dry docks recertified, training facilities operating, waterfront production facility completed, LACL berths upgraded for VACL, faster lathes, etc.
  - § Implementation of GAO best practices improved cost & schedule estimates
  - § Early and frequent industry engagement and new contracting models
- **Program Governance**
  - Rigorous requirements definition, change control, and fleet coordination
  - SYSCOM/PEO oversight ensures project management is focused on cost and schedule performance; three-tier governance for barrier removal

	PHNS	PSNS	NNSY	PNSY
	In Progress: # projects / total value under contract			
MILCON Design	1 / $20M	4 / $185M	2 / $24M	2 / $27M
MILCON Construction	1 / $3,280M	1 / $145M	2 / $226M	3 / $1,494M
RM Design	8 / $57M	12 / $27M	4 / $7M	5 / $8M
RM Construction	12/ $153M	17 / $204M	3 / $249M	12 / $176M
IPE Procurement	14 / $86M	17 / $116M	21 / $287M	14 / $71M

PHNS DD 5 Dredging

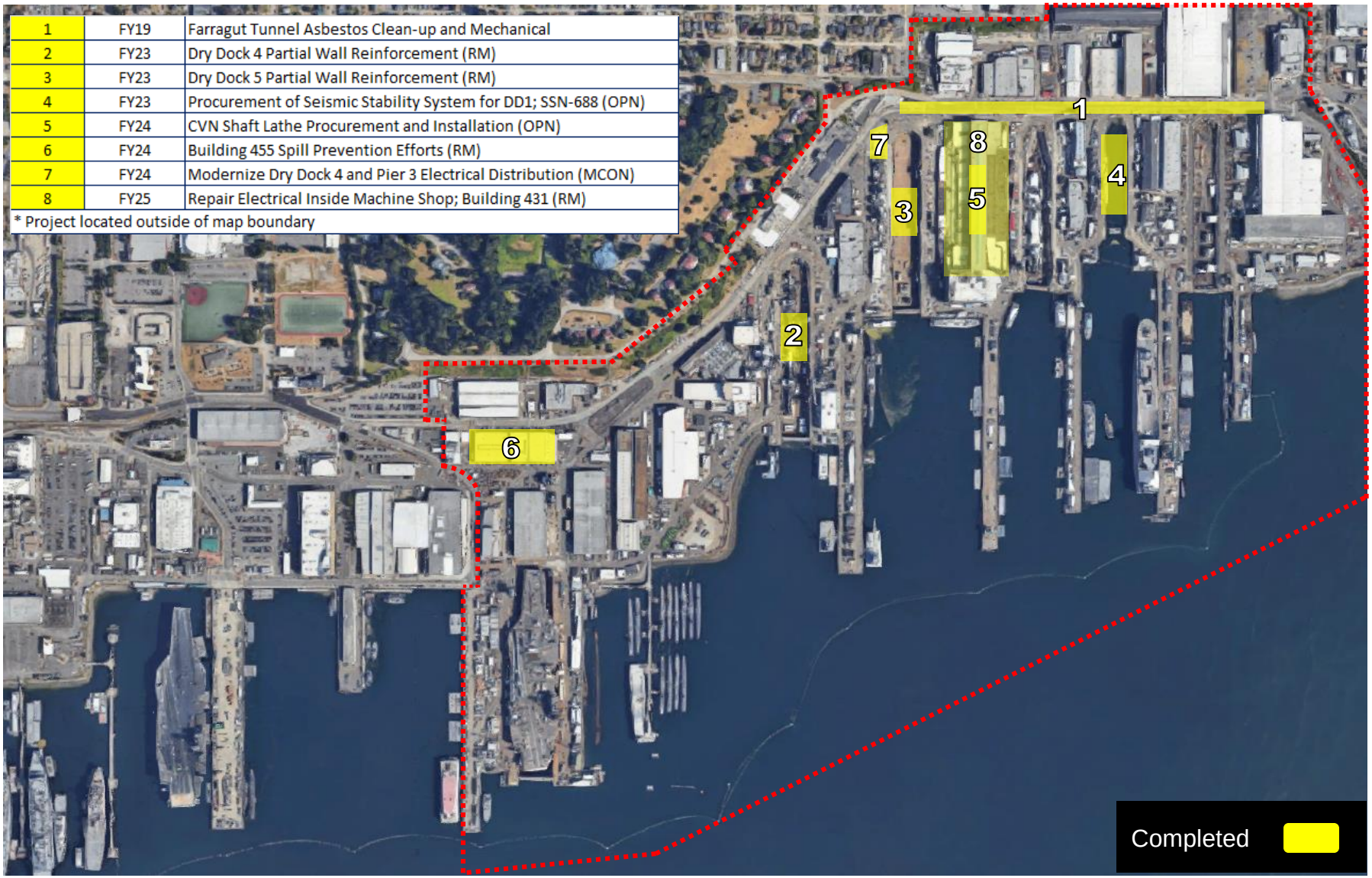


PNSY DD 1 Monolith Install

PSNS: Completed SIOP Facility Projects

1	FY19	Farragut Tunnel Asbestos Clean-up and Mechanical
2	FY23	Dry Dock 4 Partial Wall Reinforcement (RM)
3	FY23	Dry Dock 5 Partial Wall Reinforcement (RM)
4	FY23	Procurement of Seismic Stability System for DD1; SSN-688 (OPN)
5	FY24	CVN Shaft Lathe Procurement and Installation (OPN)
6	FY24	Building 455 Spill Prevention Efforts (RM)
7	FY24	Modernize Dry Dock 4 and Pier 3 Electrical Distribution (MCON)
8	FY25	Repair Electrical Inside Machine Shop; Building 431 (RM)

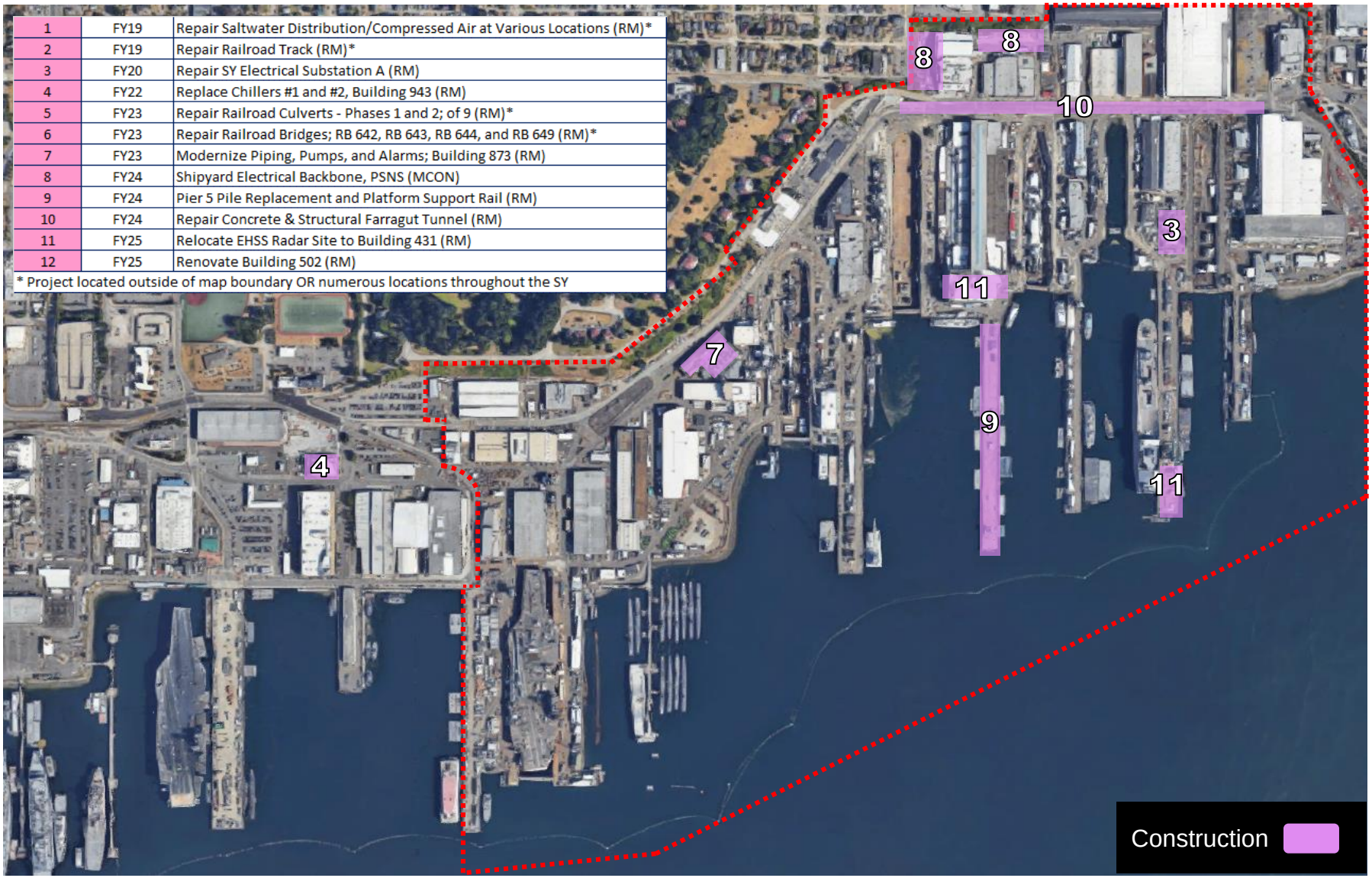
* Project located outside of map boundary



PSNS: SIOP Facility Projects (Construction)

1	FY19	Repair Saltwater Distribution/Compressed Air at Various Locations (RM)*
2	FY19	Repair Railroad Track (RM)*
3	FY20	Repair SY Electrical Substation A (RM)
4	FY22	Replace Chillers #1 and #2, Building 943 (RM)
5	FY23	Repair Railroad Culverts - Phases 1 and 2; of 9 (RM)*
6	FY23	Repair Railroad Bridges; RB 642, RB 643, RB 644, and RB 649 (RM)*
7	FY23	Modernize Piping, Pumps, and Alarms; Building 873 (RM)
8	FY24	Shipyard Electrical Backbone, PSNS (MCON)
9	FY24	Pier 5 Pile Replacement and Platform Support Rail (RM)
10	FY24	Repair Concrete & Structural Farragut Tunnel (RM)
11	FY25	Relocate EHSS Radar Site to Building 431 (RM)
12	FY25	Renovate Building 502 (RM)

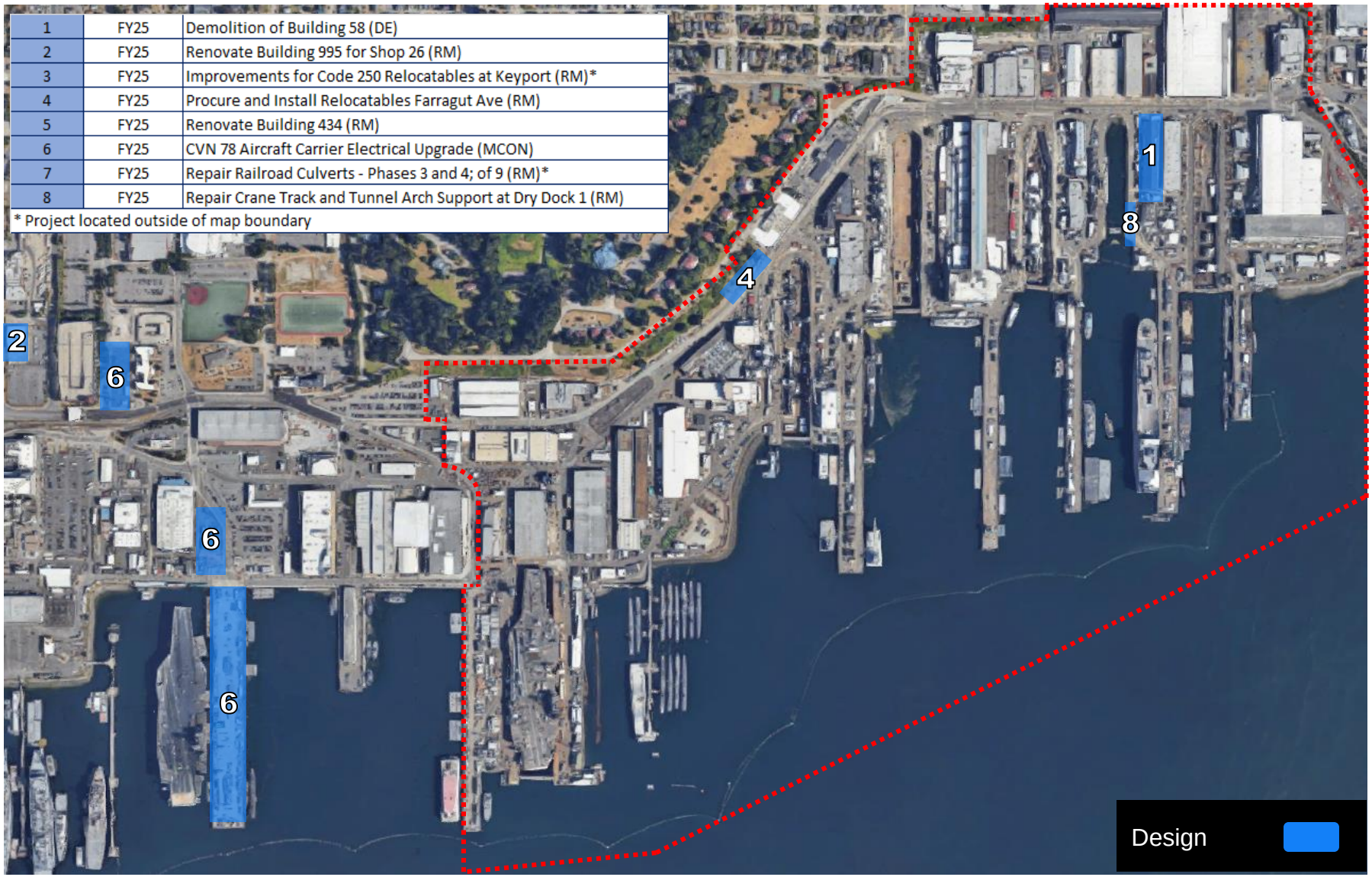
* Project located outside of map boundary OR numerous locations throughout the SY



PSNS: SIOP Facility Projects (Non-M2D2 Design)

1	FY25	Demolition of Building 58 (DE)
2	FY25	Renovate Building 995 for Shop 26 (RM)
3	FY25	Improvements for Code 250 Relocatables at Keyport (RM)*
4	FY25	Procure and Install Relocatables Farragut Ave (RM)
5	FY25	Renovate Building 434 (RM)
6	FY25	CVN 78 Aircraft Carrier Electrical Upgrade (MCON)
7	FY25	Repair Railroad Culverts - Phases 3 and 4; of 9 (RM)*
8	FY25	Repair Crane Track and Tunnel Arch Support at Dry Dock 1 (RM)

* Project located outside of map boundary



PSNS Multi-Mission Dry Dock (M2D2)

Operational Impact

- Will be only dry dock in the Pacific capable of FORD-class
- Replaces 1962 dry dock, constructed for FORRESTAL CV-class
- Large dry dock chamber for efficient work: 1,210 ft x 210 ft x 62 ft
- Portal crane access to all areas; utilities for multiple ship classes

Scale

- 4x the volume, cooling capacity, and electrical supply of PHNS DD5 under construction (PHNS DD5 is $4.5B and 5 years construction)
- Meets seismic criteria: 2,475-year return period

Acquisition Strategy

- Maximize meaningful competition
- Control bid prices by reducing contractor economic risk
- Assign integration responsibilities with clear demarcation
- Create bounding final cost and dock availability date
- Place performance risk on contractors

Schedule (FY27 to FY38 construction – preliminary)

- *Significant events*
  - *Preparatory leases, renovations, and moves ((in-progress)*
  - Pier 2 construction (in-water work), demolish facilities
  - Demolish Piers 6 & 7, dredging, logistics pier
  - Cofferdam, dredging
  - Excavation and demolish DD3
  - Dry dock structure, utilities
  - Utility buildings and cranes
  - Completion & Certification

Tribal and Environmental

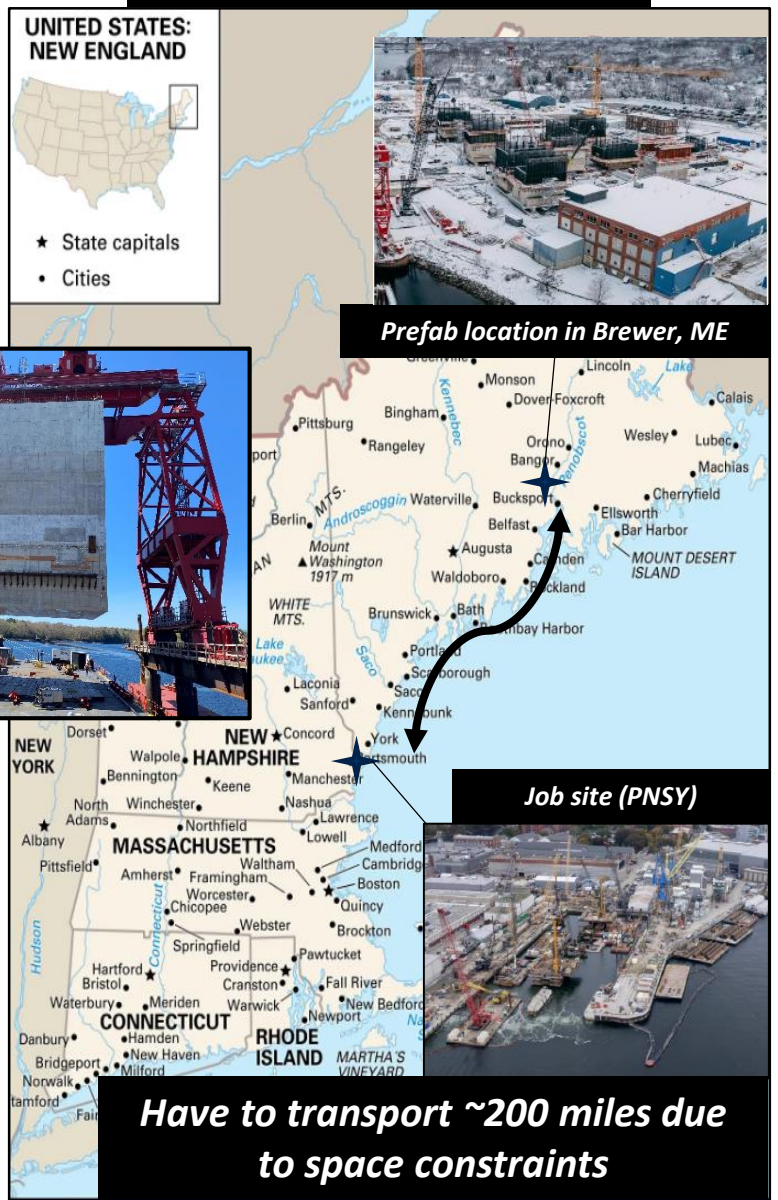
- Environmental review and permits are required to implement projects
- Navy will implement measures to avoid, reduce, and mitigate impacts
- NEPA review and tribal/agency consultations are ongoing
- 900K CY of excavation and 700K CY of dredging

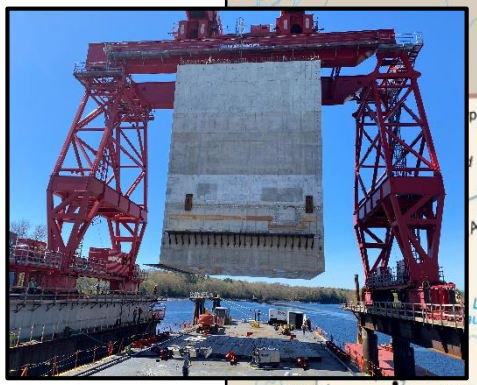
Challenges of Working in a Shipyard

- **Cannot interfere with the vital work of maintenance availabilities – must work around**
  - Limited ingress due to security (Controlled Industrial Area)
  - Limited space for laydown. Constrained areas.
  - Aged infrastructure – some buildings uninhabitable, unsafe; tools and equipment broken or lost, etc.
    - Avg. age 82 years
  - **Environment**
    - Soil contaminants
    - Flooding/natural disasters
    - Electrical power instability
    - Seismic safety considerations
    - Historic and natural resources

Temporary Lifting Device

Portsmouth Dry Dock Project





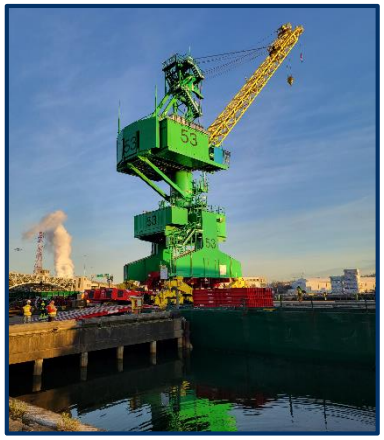
Closing

PHNS DD5 Floor Unit Fabrication

PNSY DD1 Monolith Manufacturing

PNSY Paint, Blast, and Rubber

RFID Hand-Held Scanners



TRF Bangor 25T Portal Crane

USS Cheyenne Departing PNSY DD1

SIOP Industry Day

NNSY DD8 Pump Well Motor Install

NNSY DD4 RSC Modular Assembly Yard

PSNS Electrical Transformer Replacement