

Governors Island Hybrid-Electric Ferry

Design and Construction

Samuel Waterhouse, PE | August 21, 2024

EBDG Project Experience

- **Governors Island Ferry** – nearing construction completion at Conrad Industries Shipyard, Morgan City
- **TxDOT JWJ Repower** – at SWS
- **Casco Bay Ferry** – under construction at Senesco Marine
- **Cameron Parish Ferry** – under construction ThomaSea, completion estimated Q4 2025
- **TxDOT New Build 2** – out for bid in November
- **160 Class Washington State Ferry** – in contract design
- **Hydrogen One** – in contract design, DBA accepted



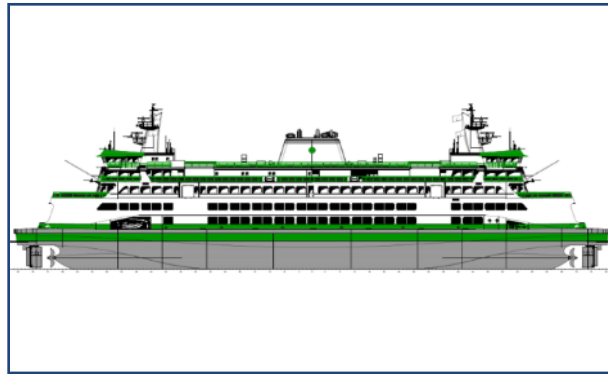
Governors Island Ferry



Hydrogen One



Casco Bay Lines



Washington State Ferries



Louisiana DOTD



Texas DOT



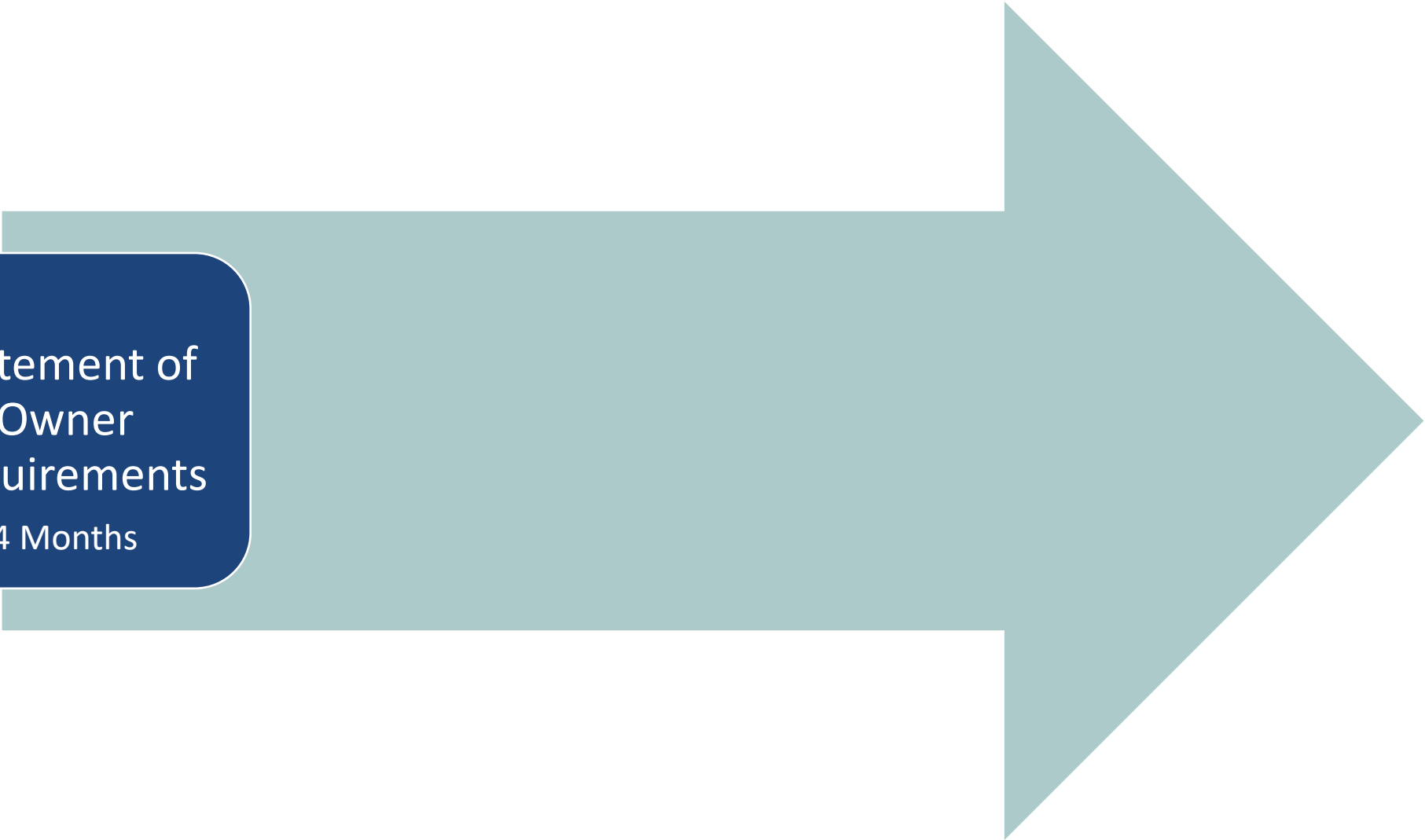
Governors Island Terminals and Operation

- 172 acres at the center of New York Harbor
- Former military base transferred to local control in 2003
- Solely accessible by ferry; minutes from Lower Manhattan and Brooklyn
- 120 acres of open space including new 43-acre park
- 1.3M SF of Historic Buildings, plus 33 acres designated for new development



Process

Statement of
Owner
Requirements
4 Months

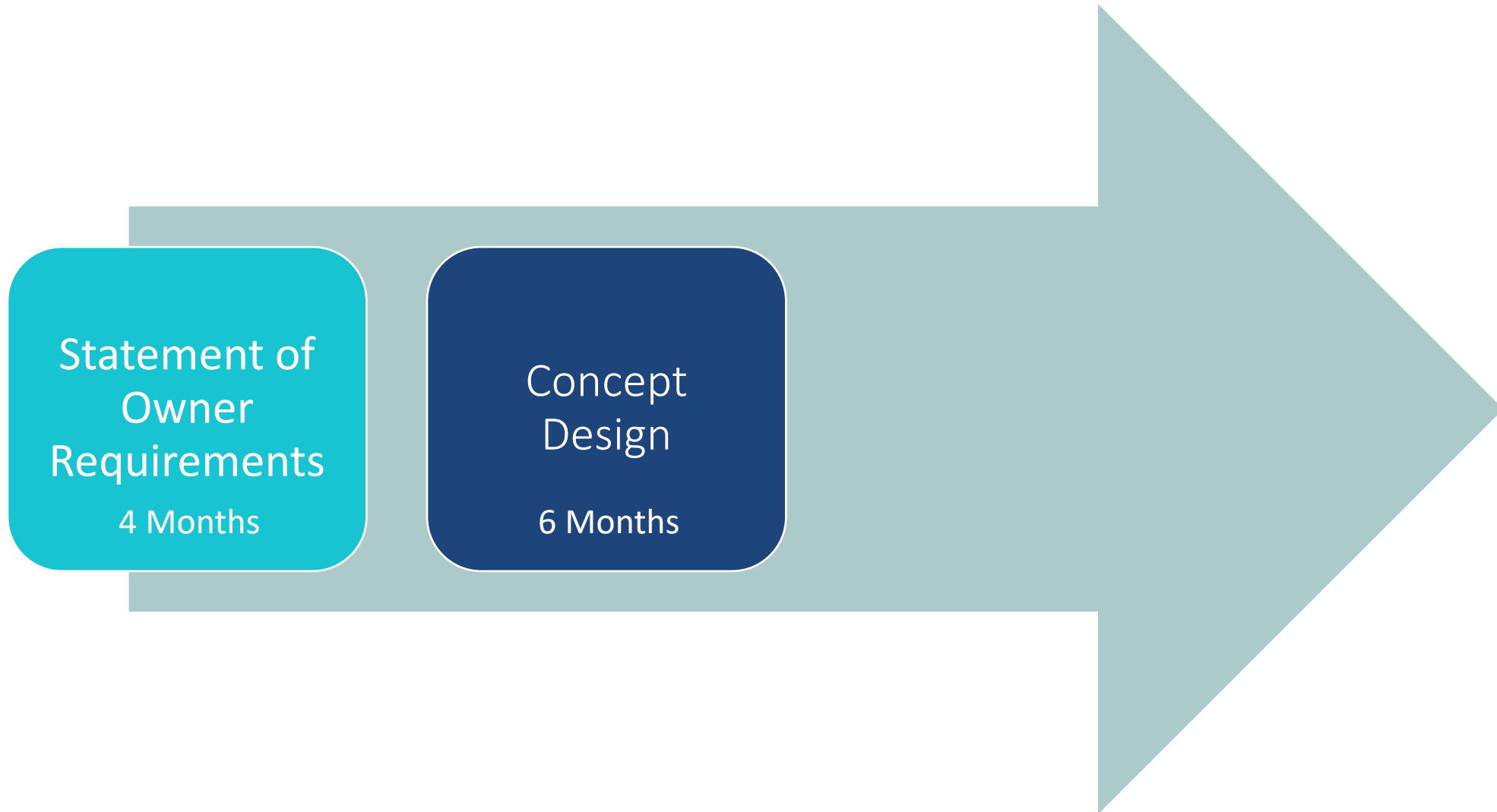


Owner's Requirements

- Trust owns and maintains two ferries:
 - COURSEN (180' vehicle ferry) built 1955
 - GOV 1 (132' passenger ferry) built 2019
- COURSEN is past useful life and will be replaced with a New Vehicle Ferry ("NVF")
- Trust design objectives for the NVF:
 - Increase vehicle capacity (incl. handling full FDNY response)
 - Maintain max passenger capacity
 - Reduce operating costs and downtime
 - Significantly improve maneuverability
 - Alignment with Trust sustainability goals (i.e. pathway to decarbonization)



Process



Arrangement Considerations

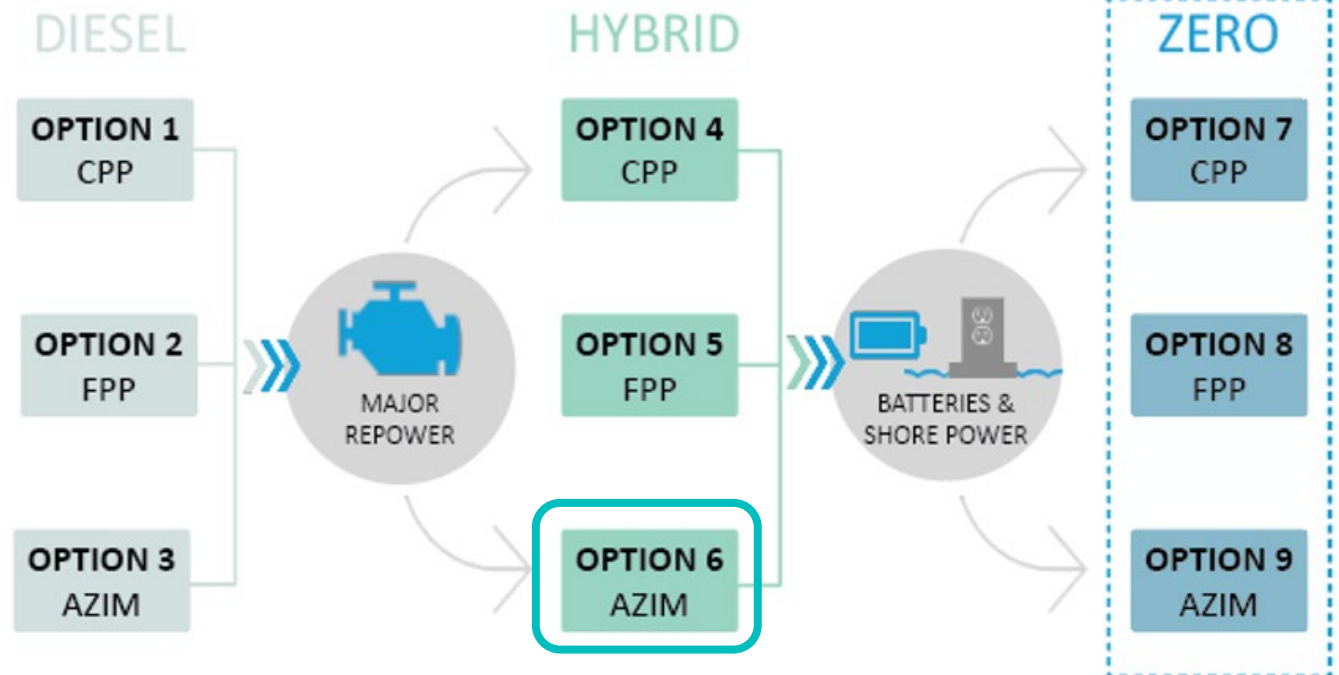
- Capacity up to 1,200 pax (Subchapter K)
- Extant New York Harbor School
- FDNY Emergency Vehicles
- ADA access
- Areas of refuge
- Unlimited vehicle vertical clearance



Propulsion System Development

- **Environmental:** reduced emissions compared to diesel mechanical, hybrid technology for versatility.
- **Reliability/Redundancy:** multiple operating modes / sources of power.
- **OpEx:** energy storage allows generators to run at 90% MCR.
- **Maneuverability:** challenging waterfront with currents and traffic.

ZERO EMISSION POTENTIAL



Propulsion System Development

Refinement: Propulsion System Integrator (PSI)

- Manage significant variation in size and arrangements of systems between vendors
- Reduce project risk
- Ensure solution is capable of All-Electric operation
- Strong market response to RFP with six (6) qualified respondents: selected Siemens Energy

Propulsion System Integrator



Principal Characteristics

Length Overall:	190'-1 ½"
Beam over guards:	62'-4"
Depth at Side:	13'-0"
Draft at DLWL:	8'-6"
Maximum Passenger Capacity:	1,200
Design Vehicle Capacity:	220 LT
Lightship Weight:	~600 LT
Gross Tonnage:	<100 GRT
Crew:	1 captain, 3 deck hands
Service Speed:	10 kt
Generators:	3x 565kW
Propulsors:	2x 560kW azimuthing propellers
Battery Capacity:	~200kWh



Process



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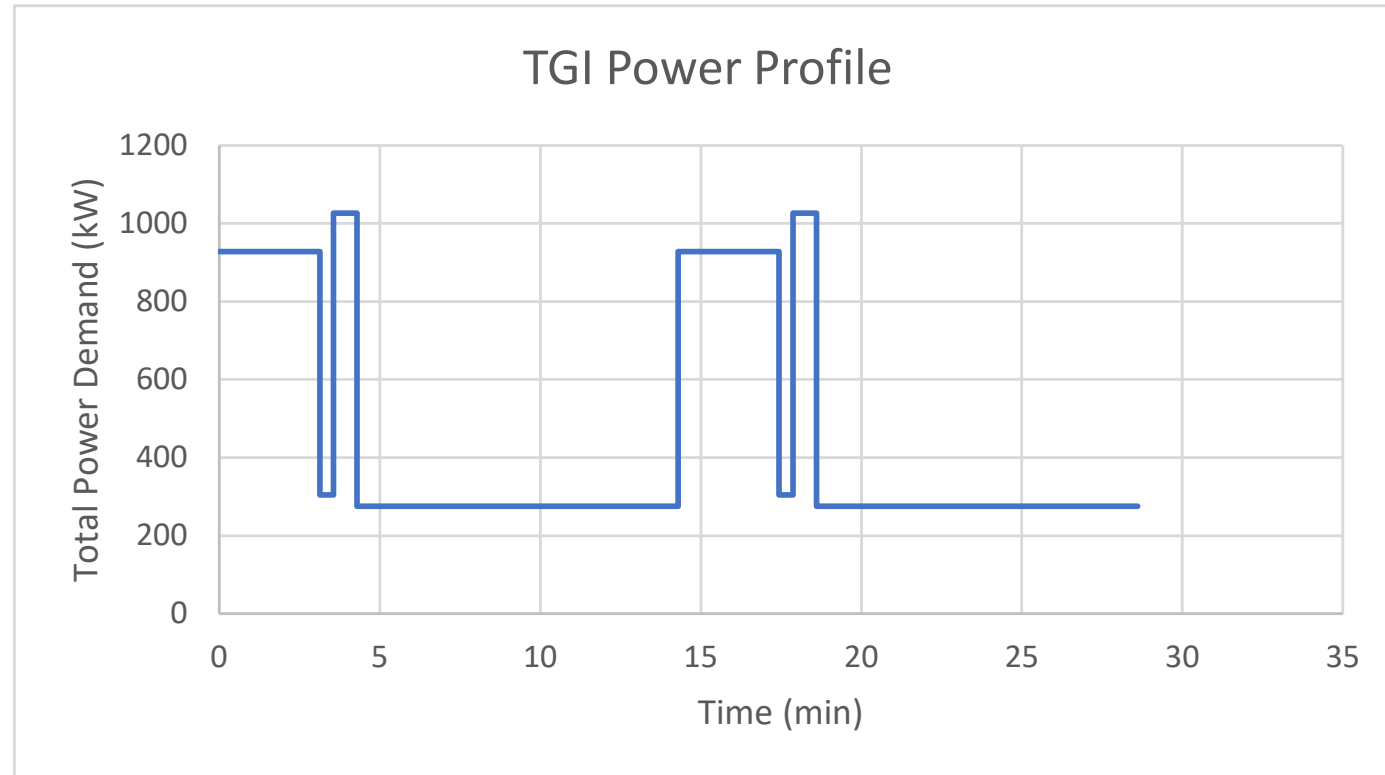
Concept
Design
6 Months

Contract
Design
16 Months



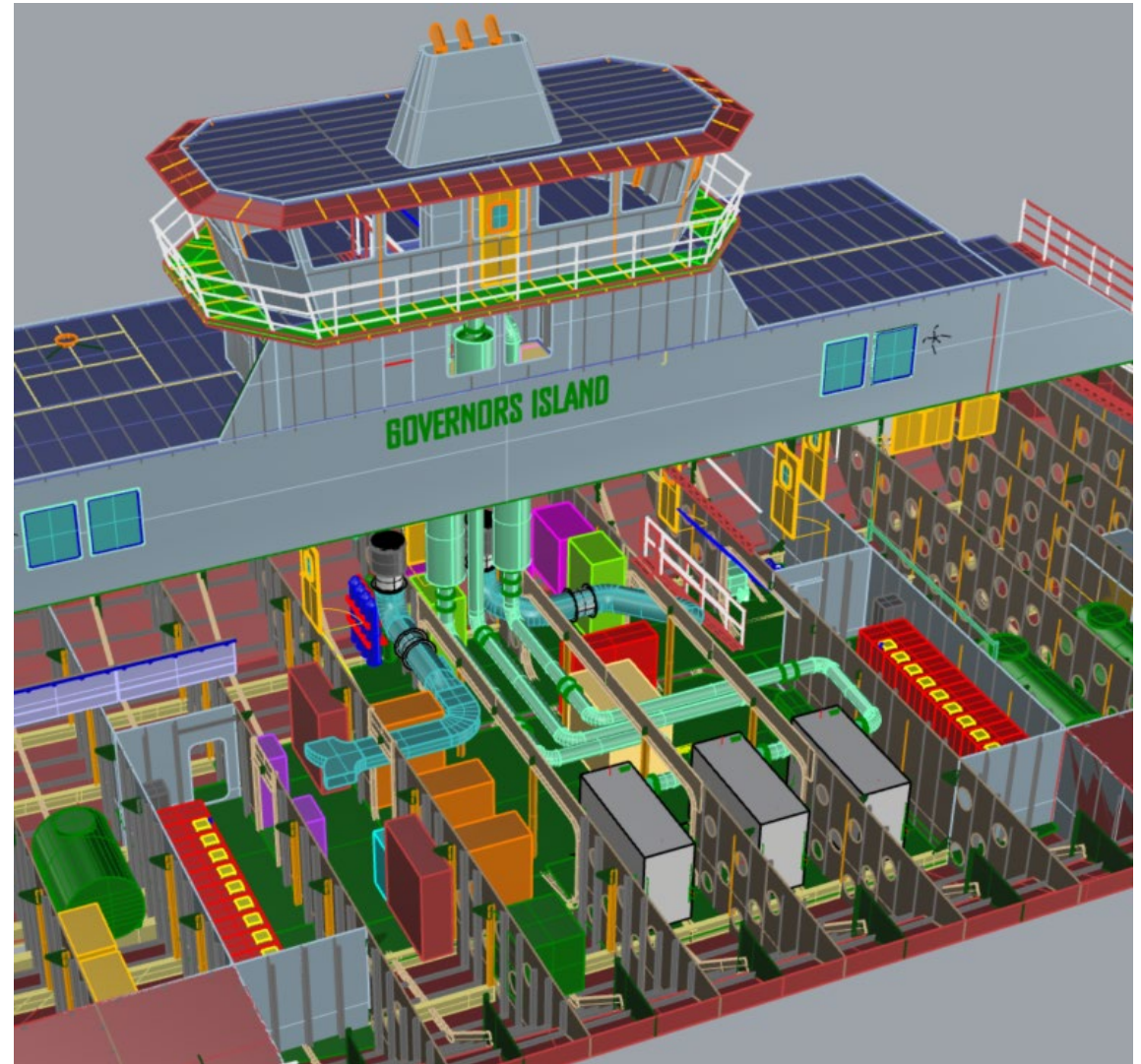
“Plug-In Ready” – Designing for Electrification with PSI

- Increased installed battery capacity sufficiently for all-electric operations
 - ~200 kWh to ~800 kWh sensitive to:
 - parasitic loads
 - all operating conditions
 - loads while charging
 - Short run (~800 yards) ideally suited for electrification



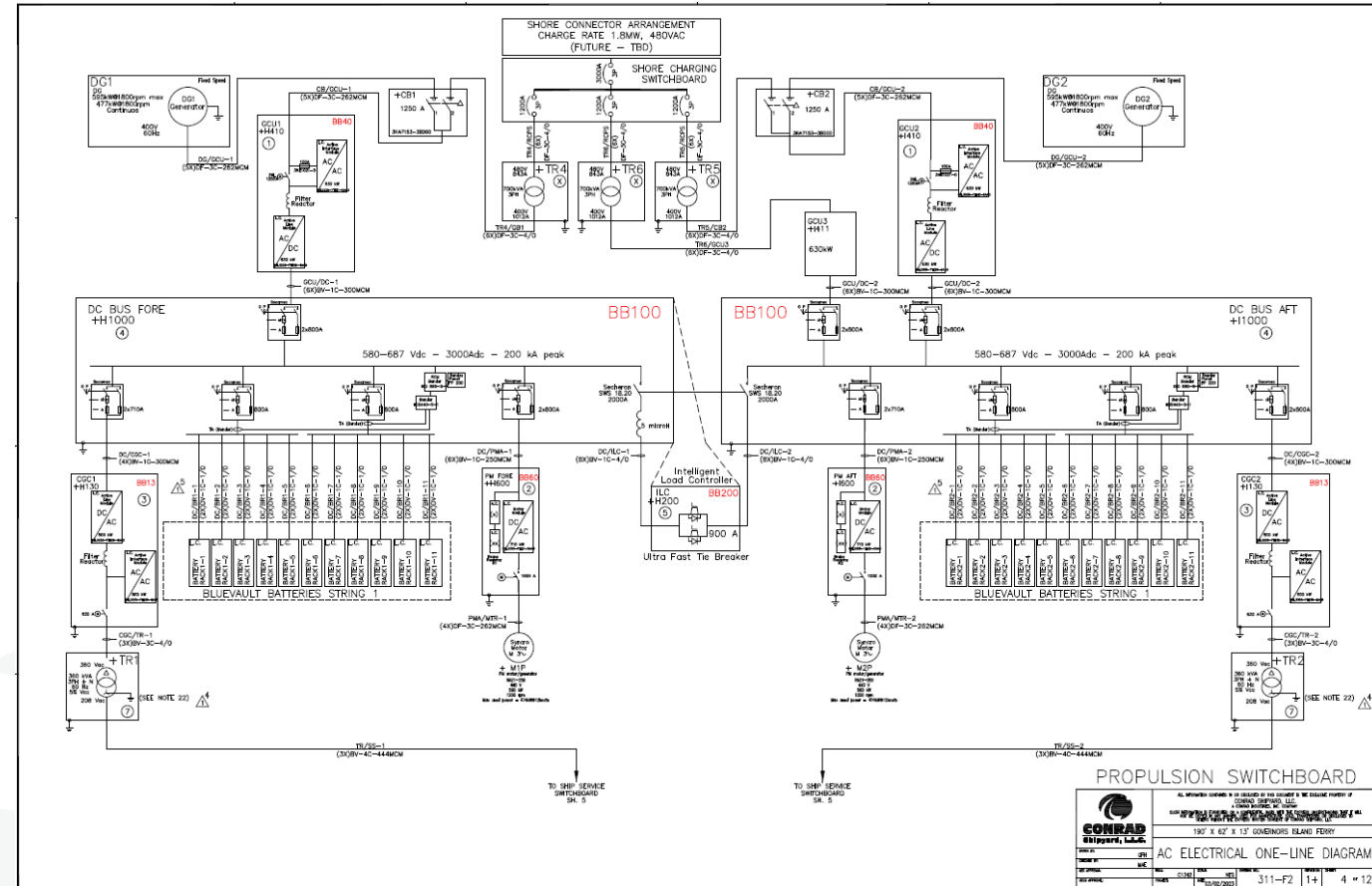
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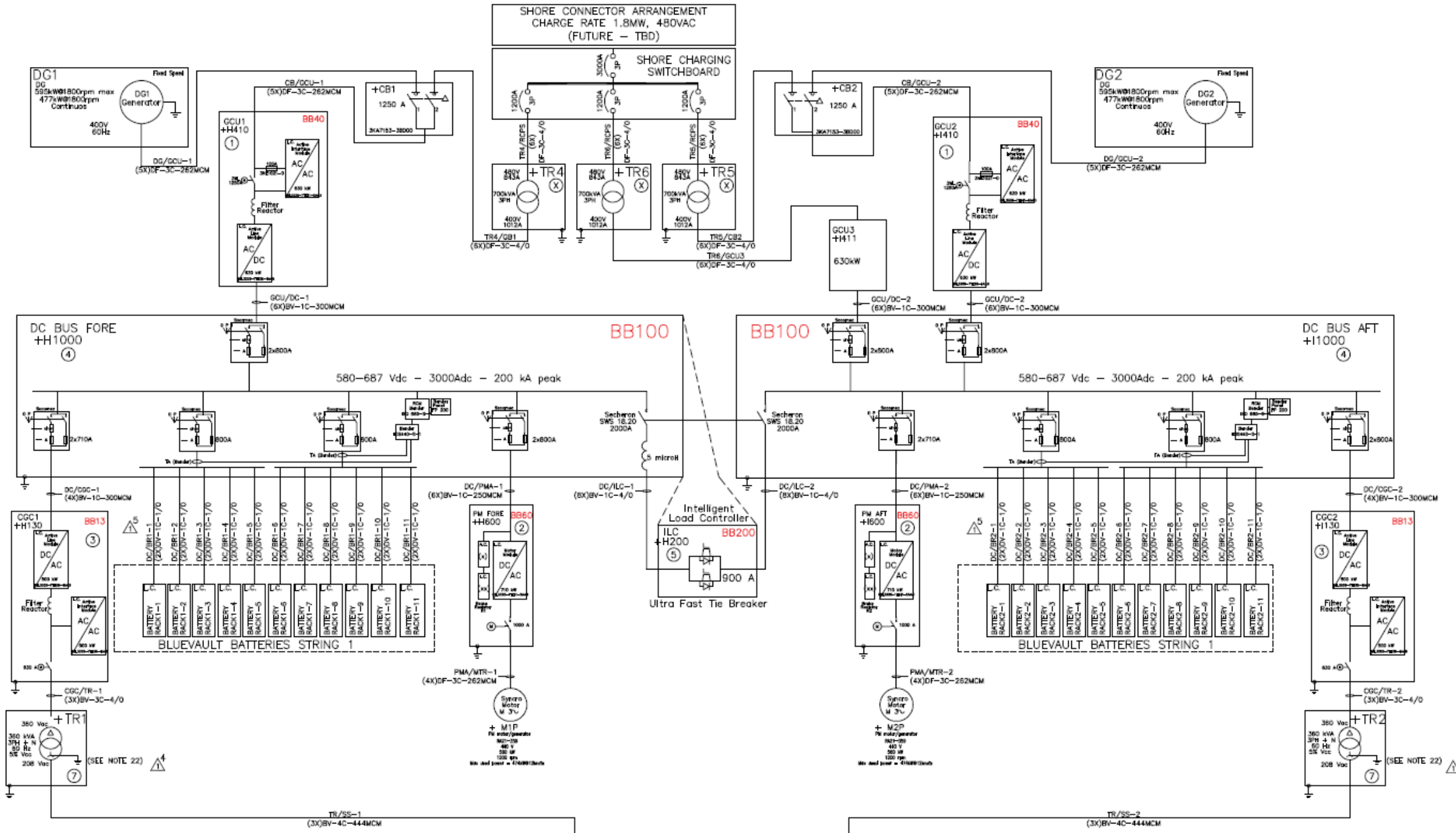
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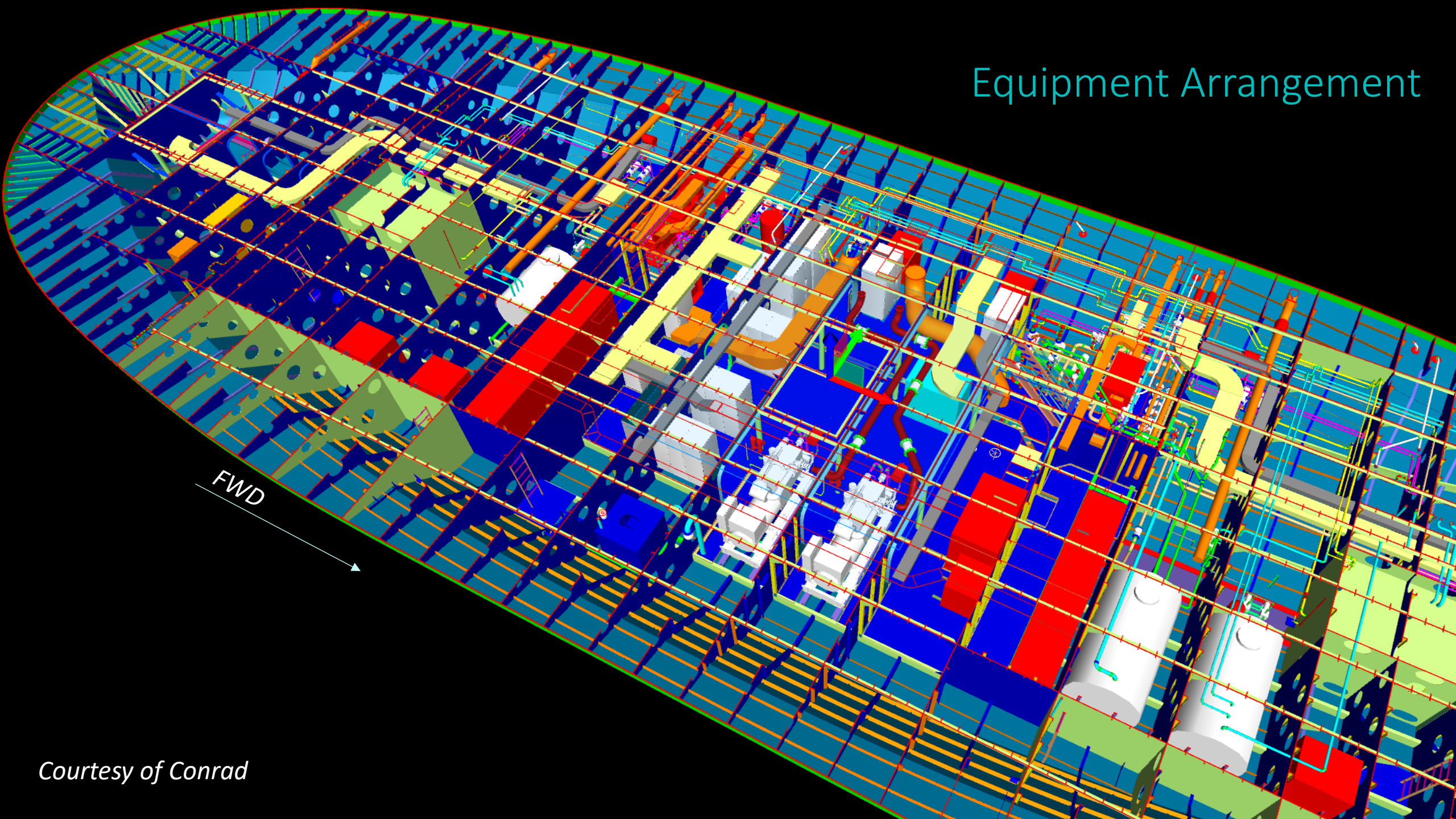
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- Addition of switchgear and transformers necessary for rapid charging
- Space reservations for charging receptacle(s) with spooled cables





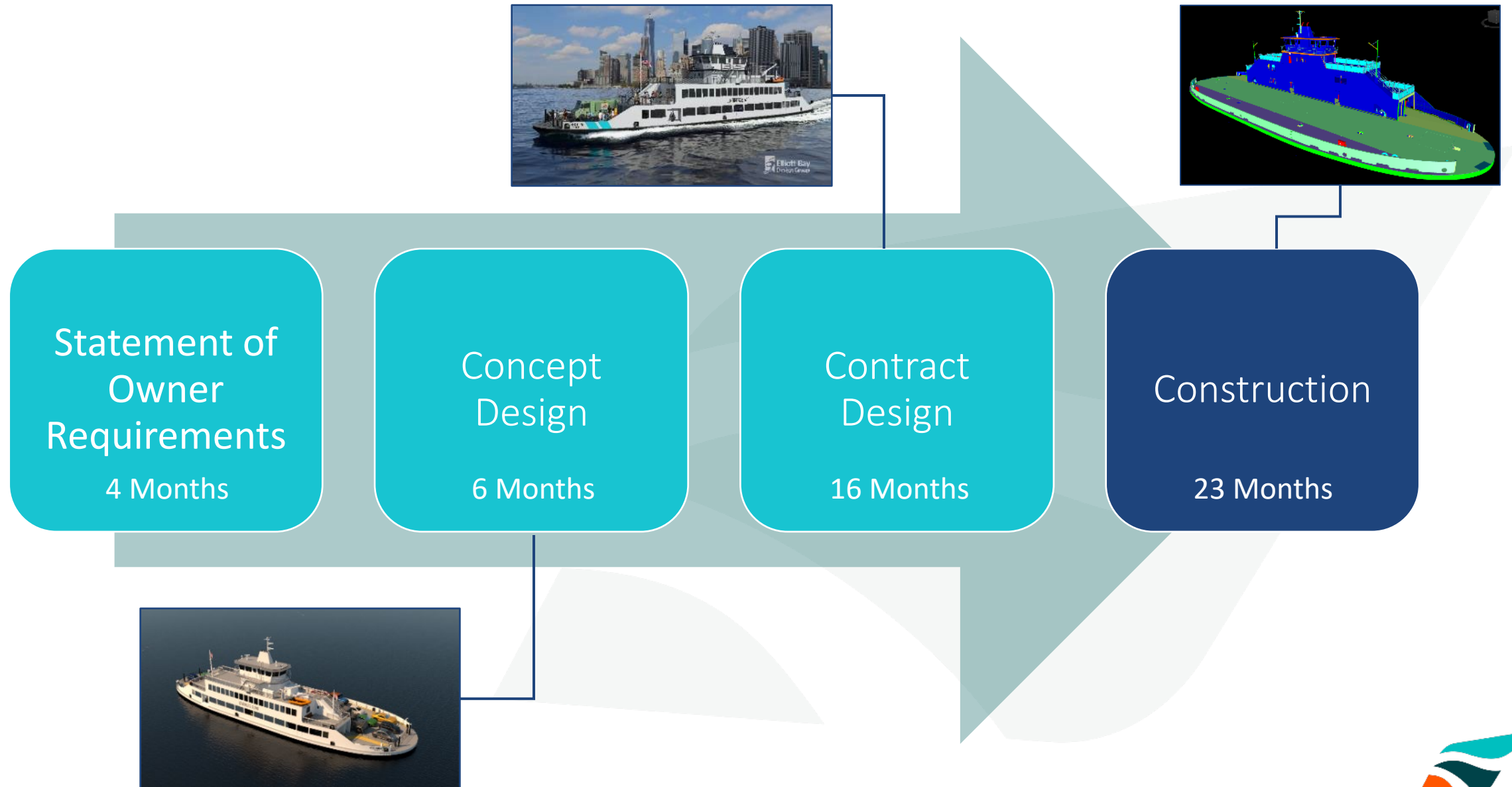
PROPULSION SWITCHBOARD

Equipment Arrangement

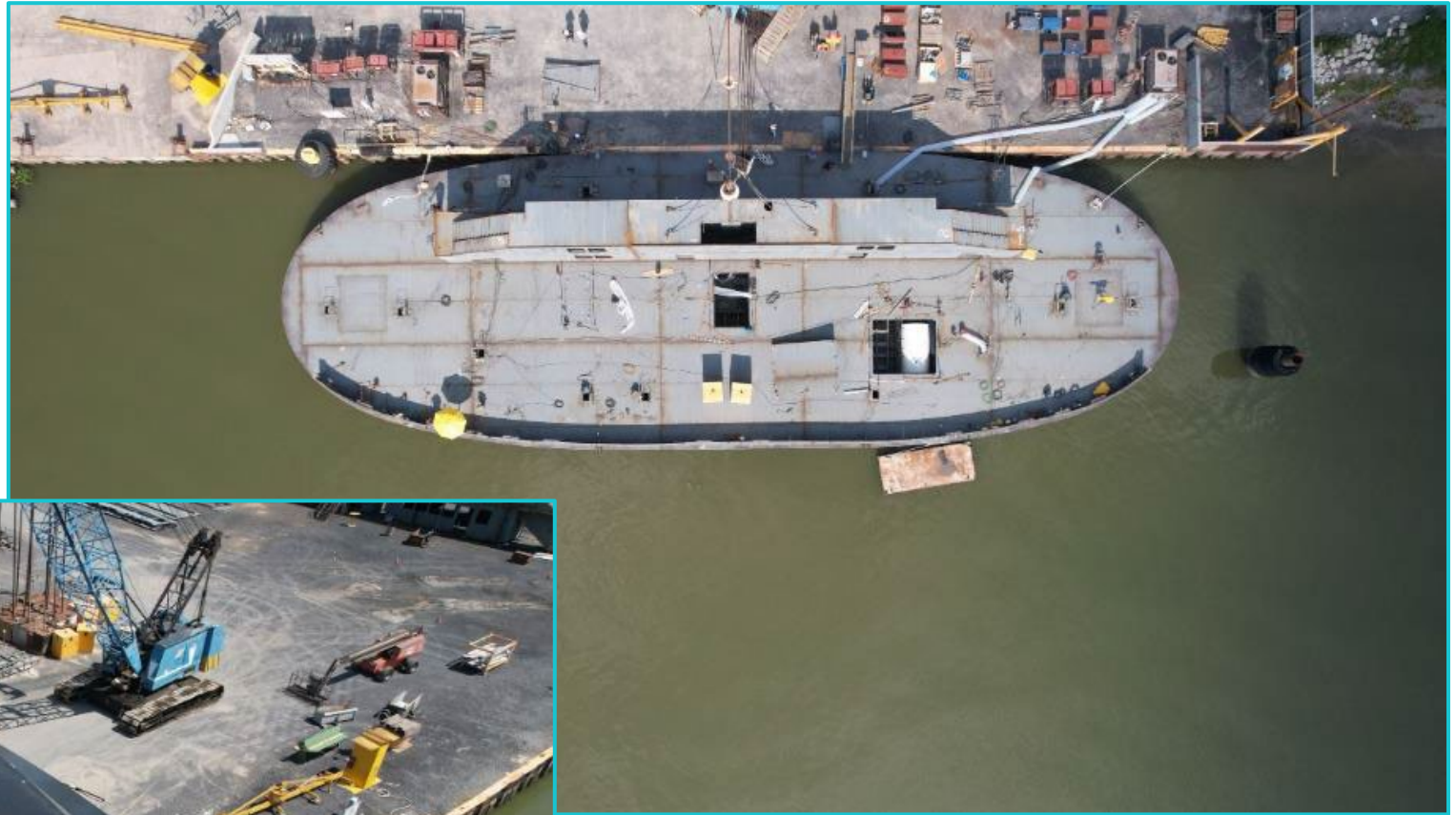


Courtesy of Conrad

Process



Construction Progress



Construction Progress



Lessons Learned in the Shipyard

Lofting

- Make generous space reservations for panels and cableways.
- Check interfacing with ventilation and exhaust.

Ventilation

- Hazardous zones are different for batteries
- Difficult to locate

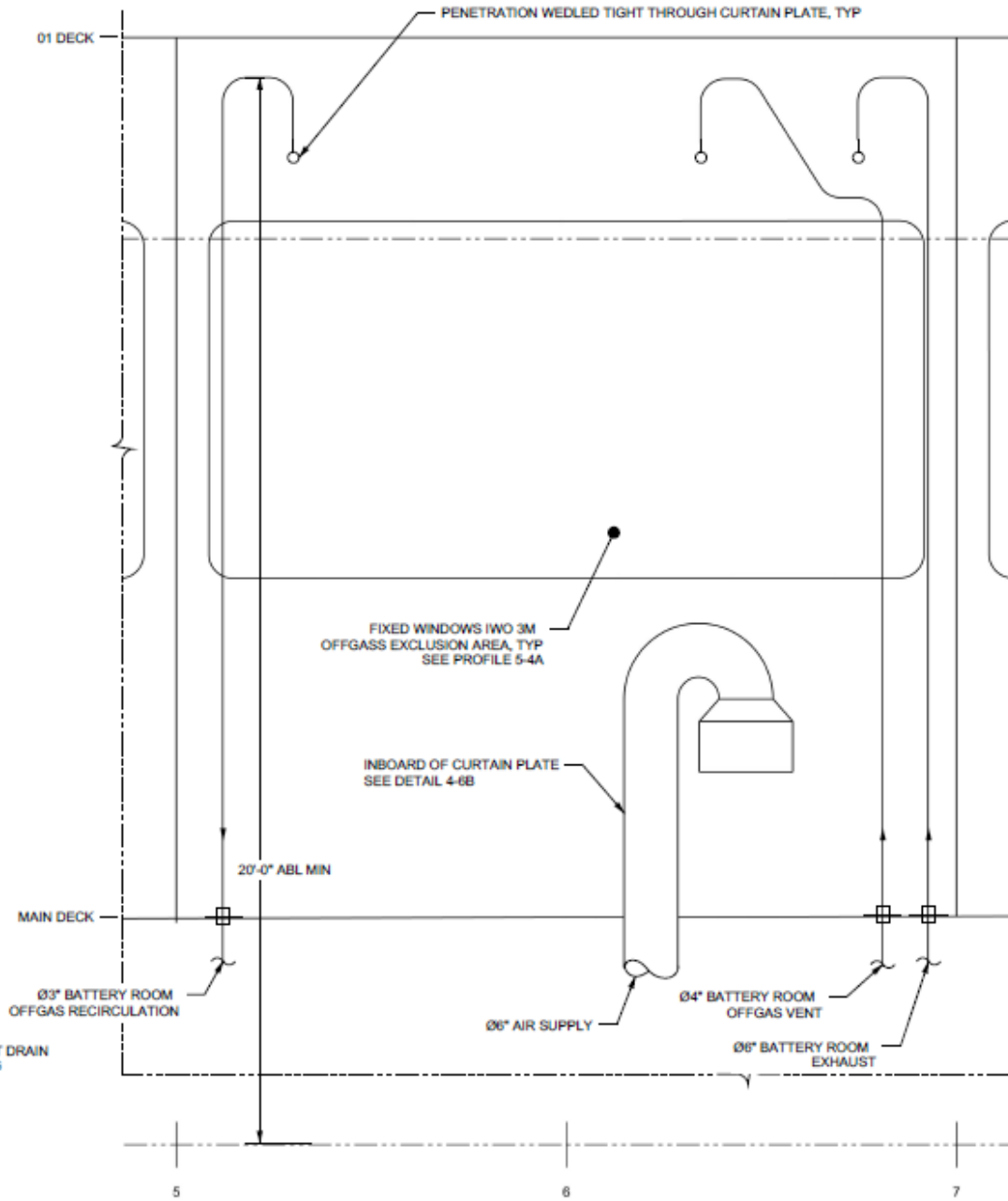
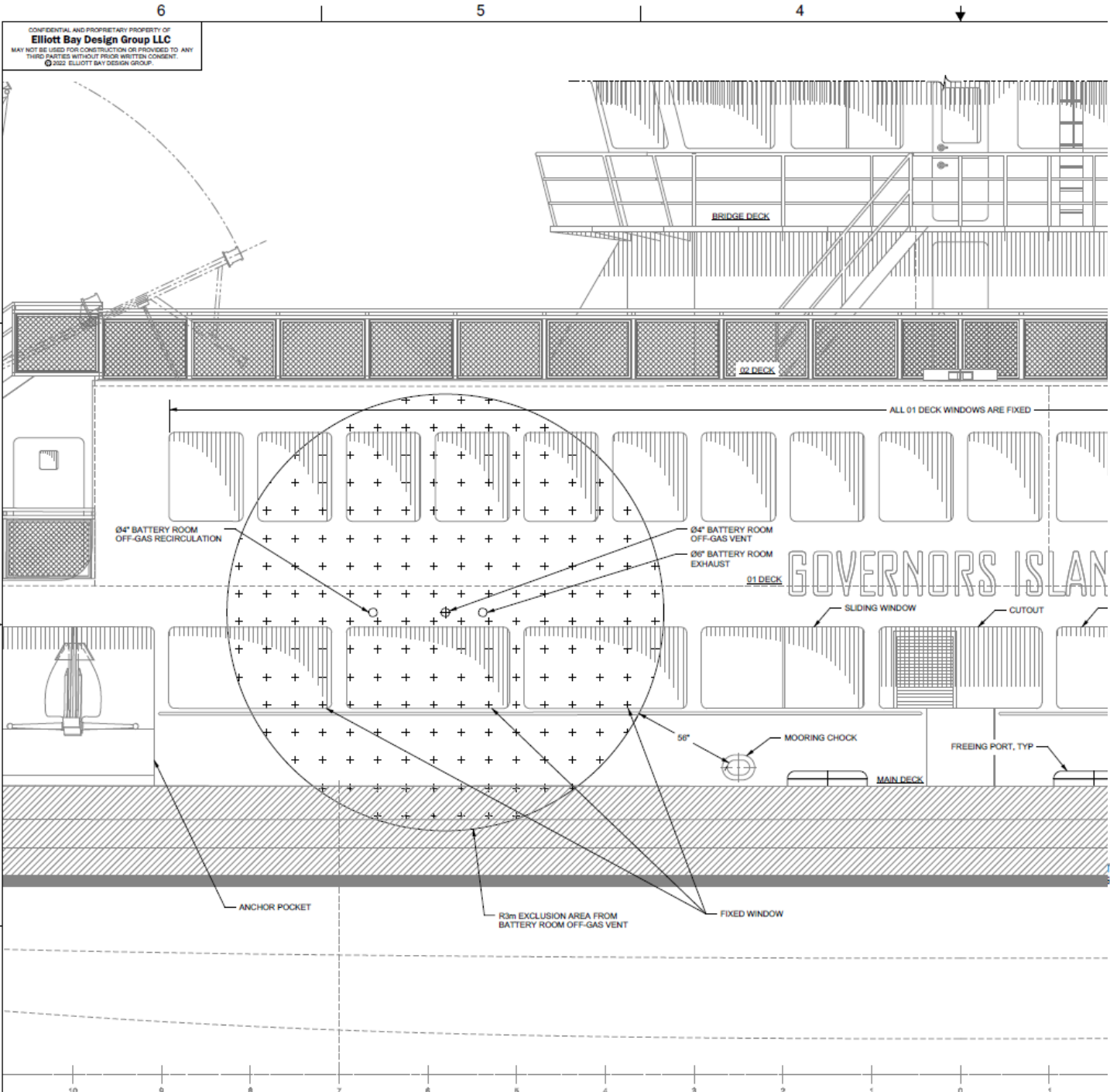
Fire suppression systems

- Different agents have different ventilation requirements
- Water mist is expensive
- Consider a shore hookup

Weights

- Cables are heavy >4% of lightship!
- Consider balancing large equipment: e.g. transformers, switchboards





ELEVATION 4-1B
 BATTERY ROOM VENTILATION AND OFF-GAS
 LKG OUTBOARD AT PORT CASING, END A
 END B SIM & OPPOSITE
 1/2"=1'-0"

Lessons Learned in the Shipyard - Procurement

- **Risks:**
 - Long lead times on equipment
 - Storage requirements for equipment
- **Risk Management:**
 - Timing of equipment receipt to match build schedule
 - Planning climate control of batteries/sensitive equipment
 - Separating receipt of racks and modules



