



WSF Hybrid Electric 160-Auto Ferry

Design Modifications

WSDOT – Washington State Ferries | August 21, 2024

Prepared for National Shipbuilding Research Program (NSRP)

Project History

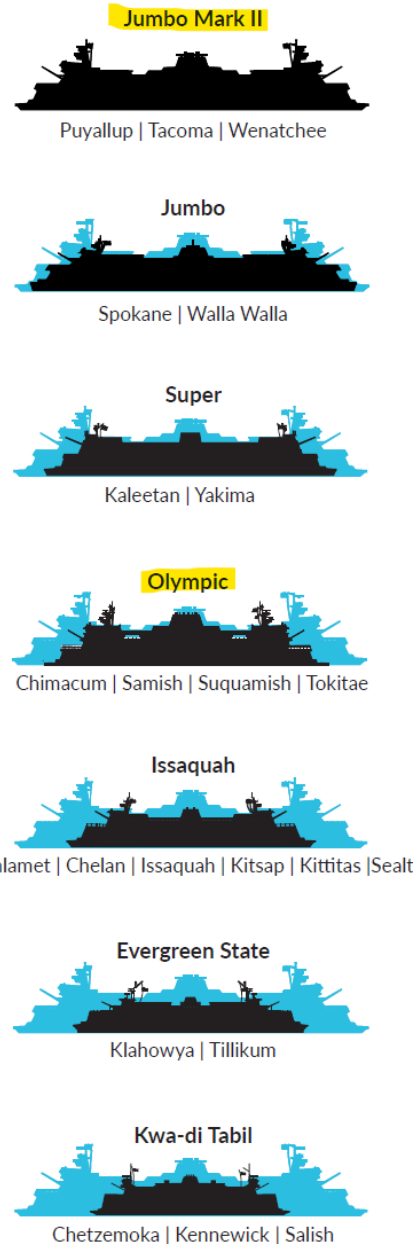


1. Electrification for WSF started around 2016
2. Governor executive order in 2018.
 - Hybrid for new construction
 - Hybrid conversion for Jumbo MkII Class
3. New legislation for Design-Bid-Build Contract
4. Additional Design Refinements to reduce risk, improve performance and lower lifecycle costs
5. Selection of a Propulsion Single Source Vendor

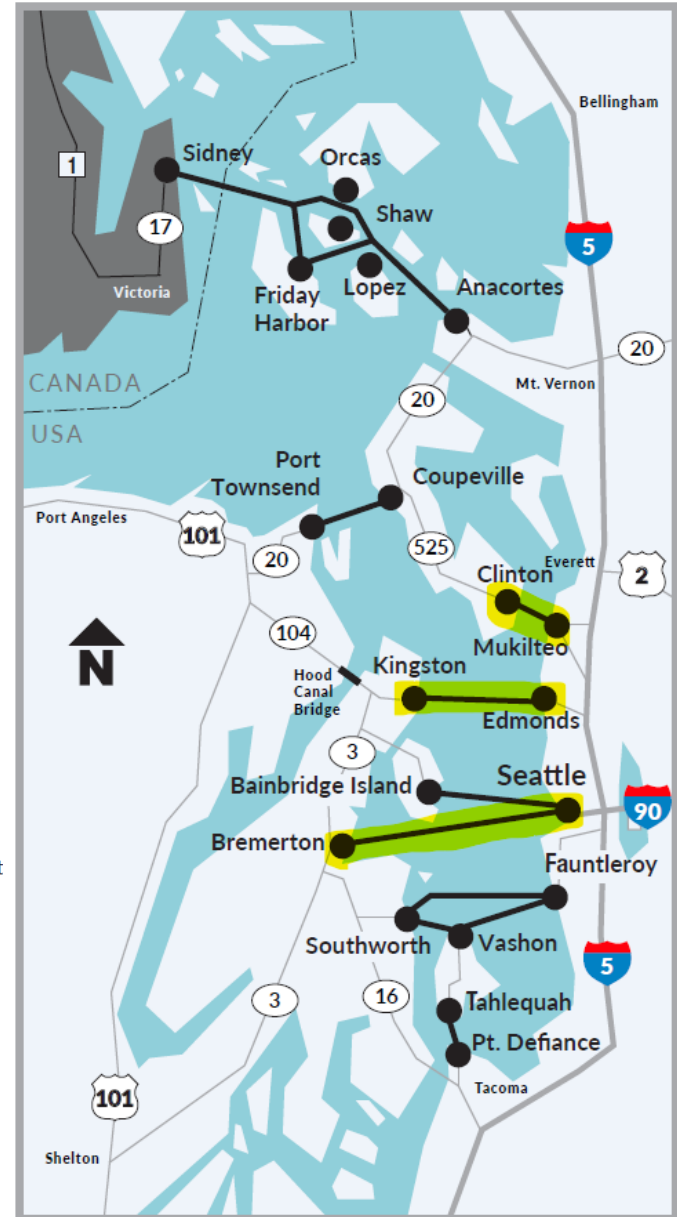
WSF Overview

1. 20 Terminals
2. 16 Existing vessels in service
3. Electrification Goals:
 - Emission-free fleet by 2050
 - Convert 6 existing vessels
 - Build 16 new vessels
 - Add shore charging to 16 terminals

Vessel Classes



WSF Route Map



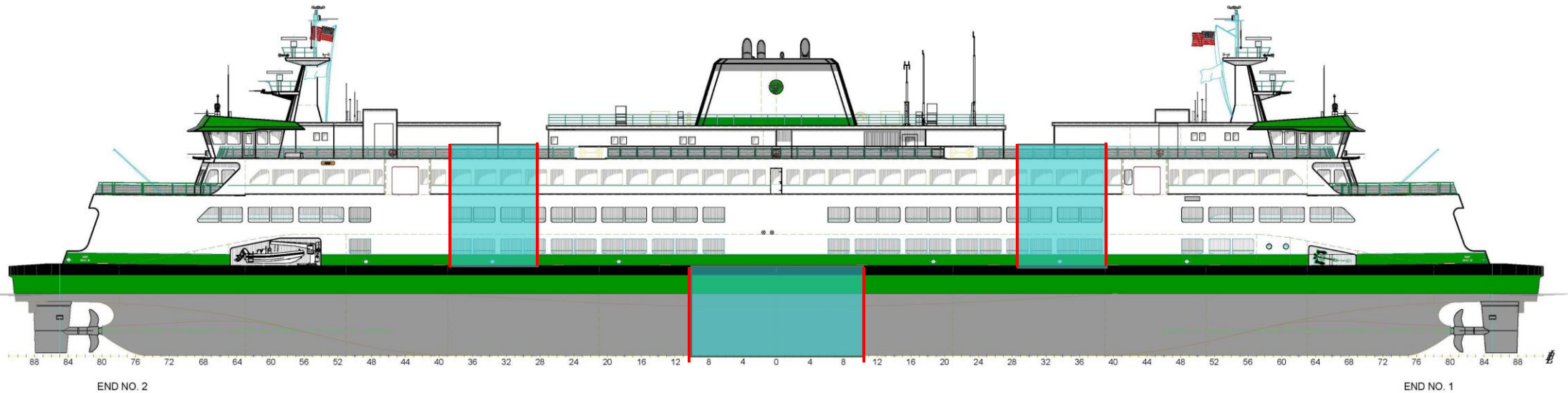
Scope of Modifications

1. 47 ft Mid-body extension
2. Lower Pilothouse to Bridge Deck
3. System level revisions, inc.:
 - Removal of Keel Coolers
 - Engineering Automation
 - Sewage and Water Tank Relocation
 - Increased Crew Accommodations
4. Energy Storage System
 - Change of Manufacturer
5. Vessel Charging System



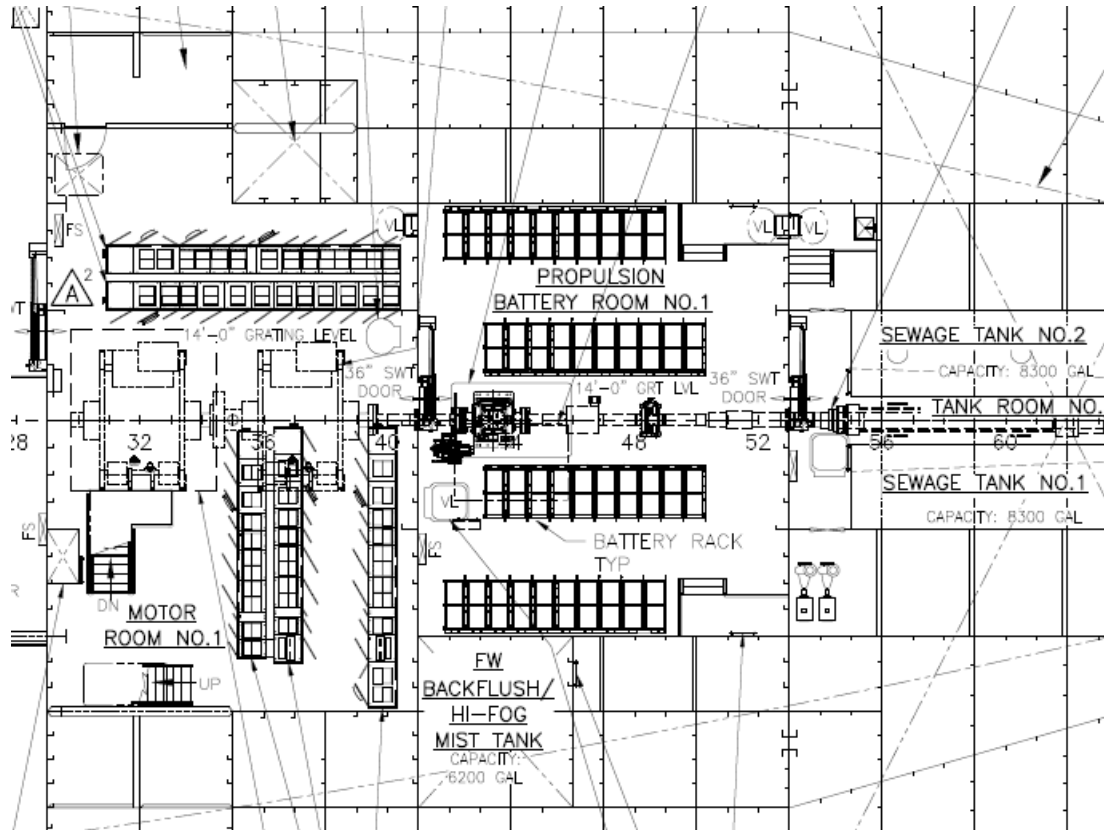
47 ft Mid-Body Extension

1. Vehicle Capacity increase from 144 to 160
2. Below Main Deck:
 - Extension added to the Mid-Body with new WT BHD at midships
3. Above Main Deck –
 - ½ Extensions added endward of the center superstructure block
 - Results in 3 Fire Zones (previously 2)

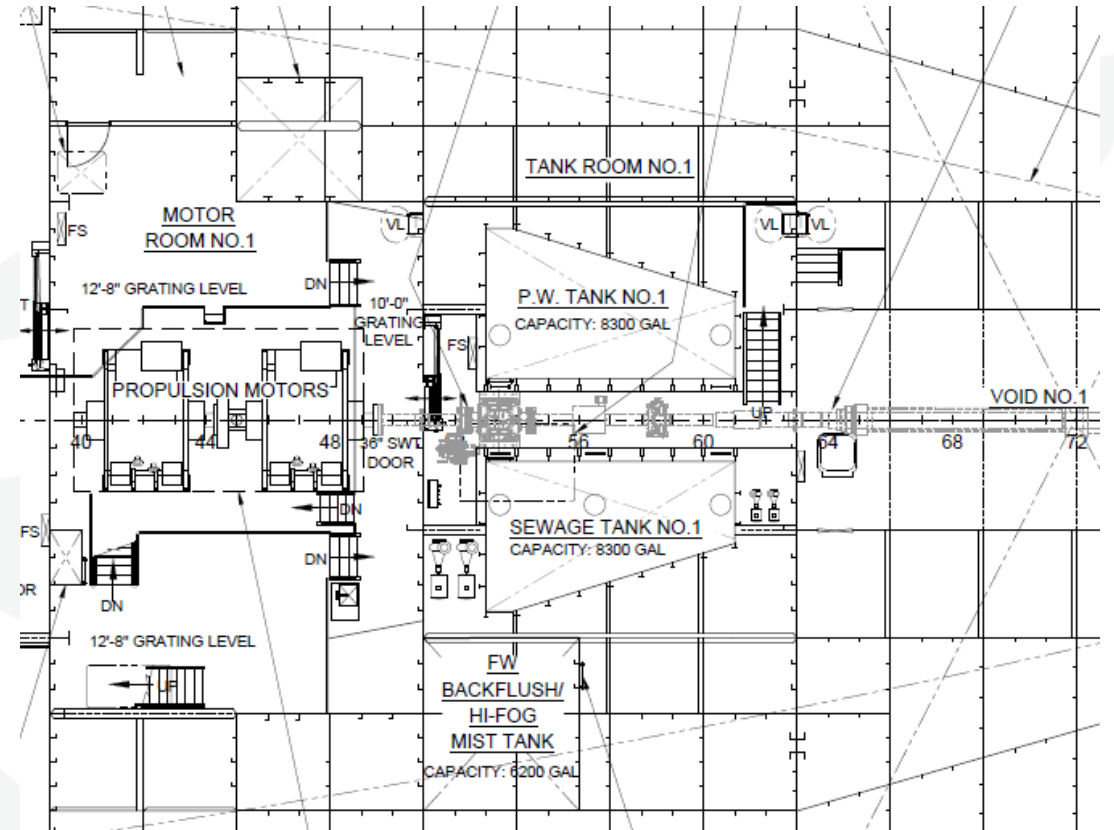


Tank, Battery, and Motor Room Arrangements

Initial Design

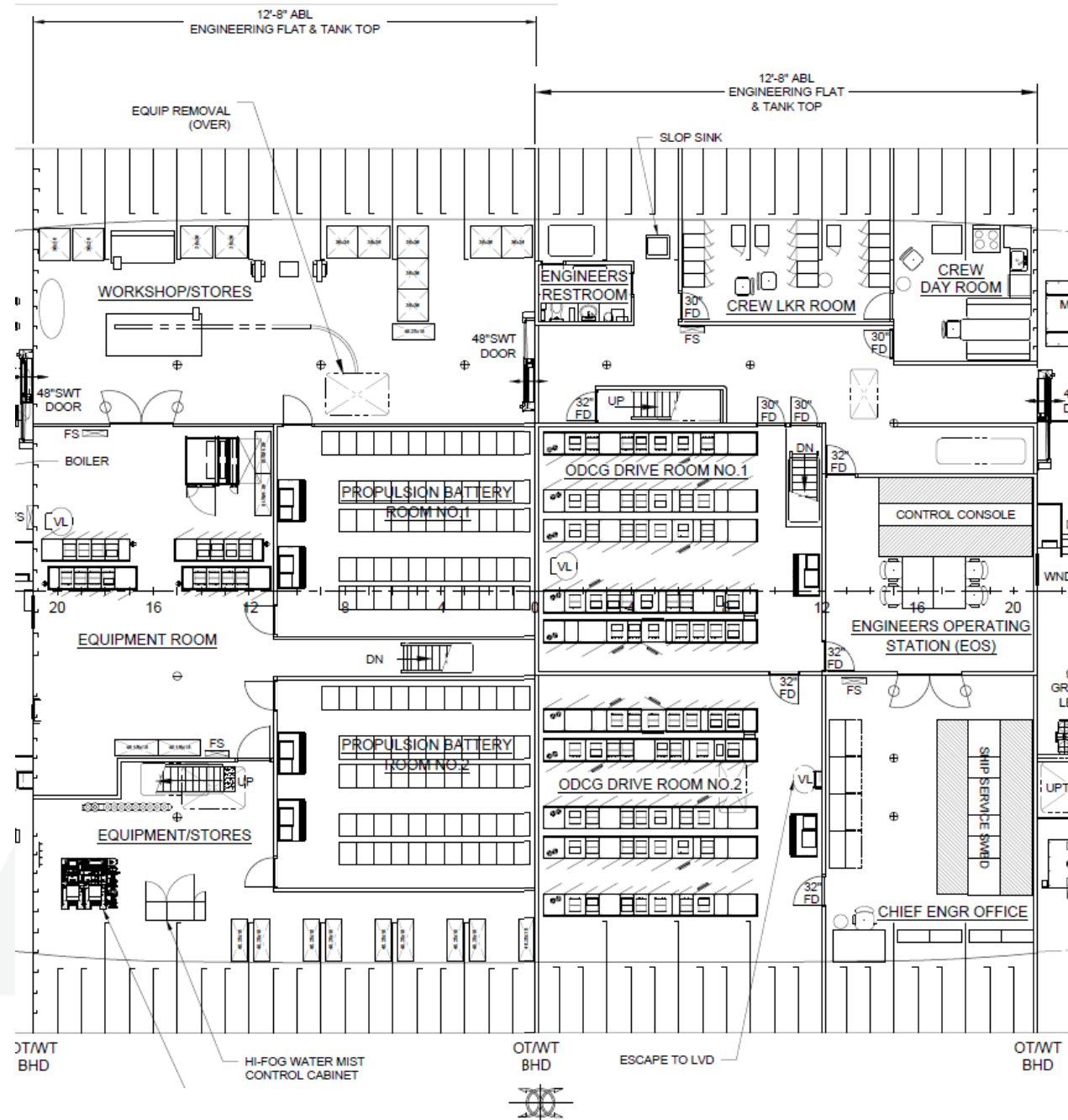
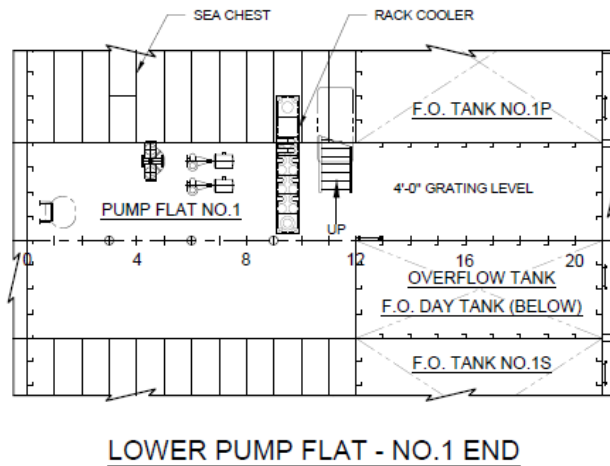


Current Design



Hold Modifications

1. New WT BHD at FR 0
2. Relocate Battery and Drive Rooms
3. Open Shaft Alley to a Pump Flat
4. Add Rack Coolers
5. Change of Battery Manufacturer



Pilothouse Modifications

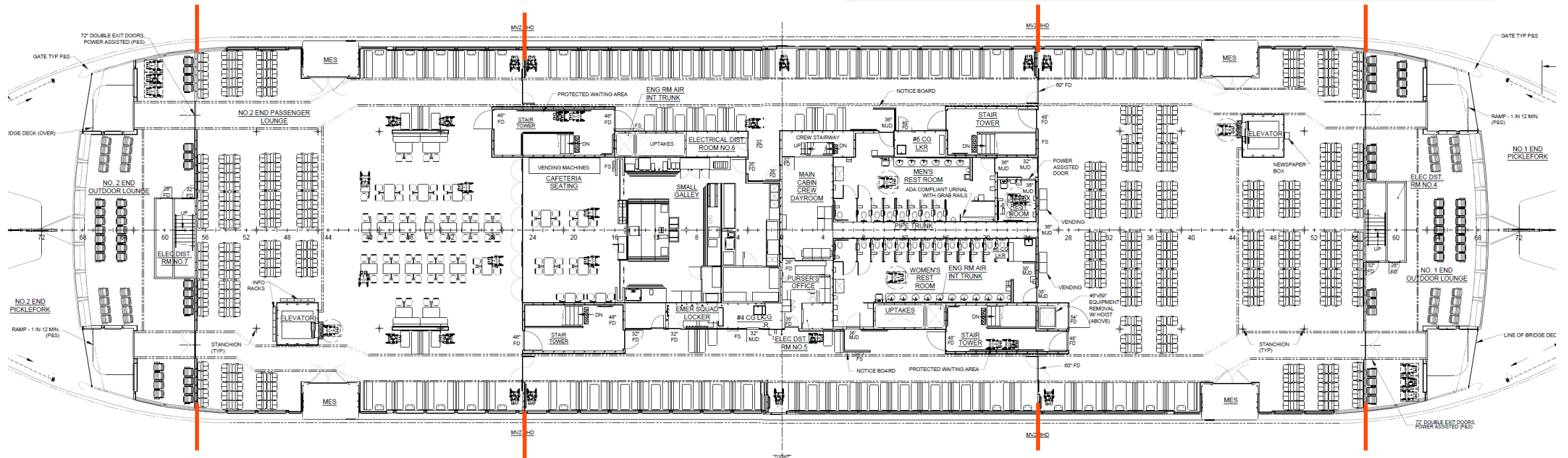


1. Revised Pilothouse arrangements
2. Removal of passenger access to Bridge Deck
3. Reduced Crewing



Passenger Deck Modifications

1. 3 Fire Zones (previously 2)
2. Stairtowers accessible from two zones
3. Exterior Seating

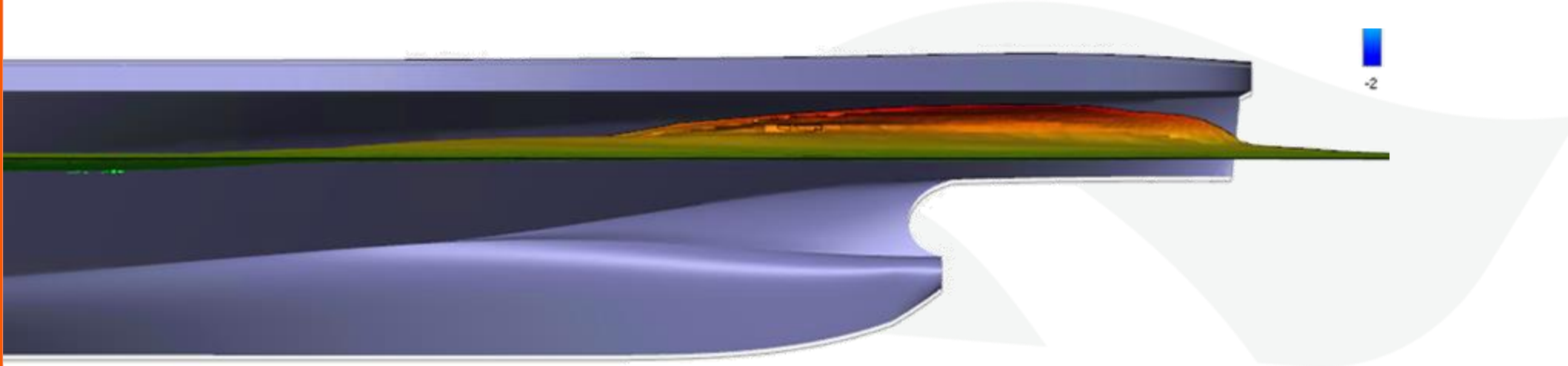
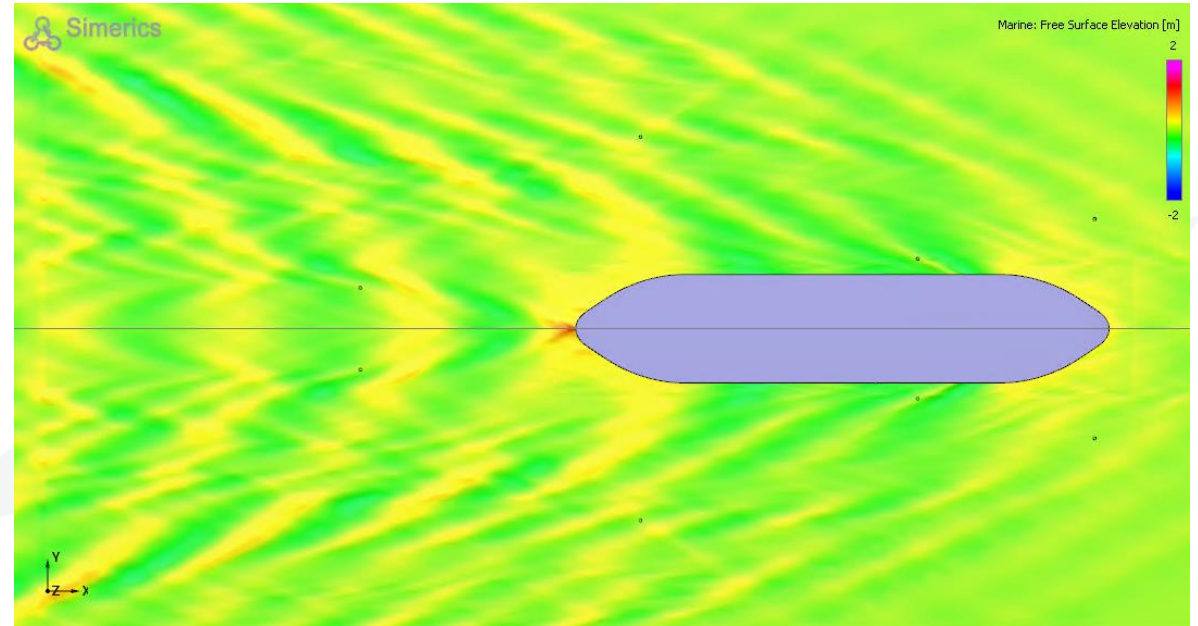


ESS Supplier Change

Effort Lead by the PSSV

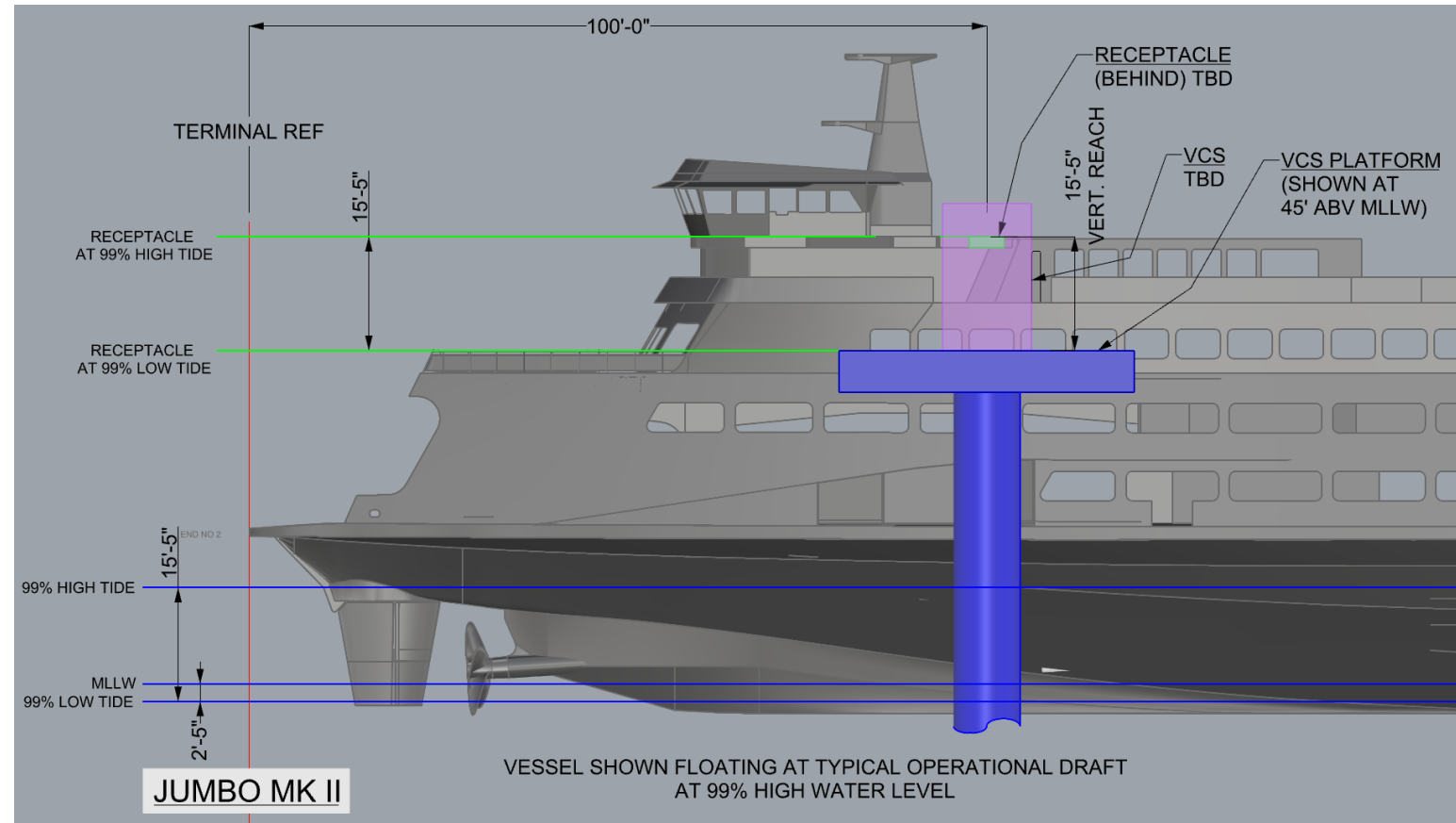
Technical Challenges:

- High charge rate (15 MW)
- Low dwell time (18 minute charge)
- Bremerton Route: 60 minute crossing
- Preference for water-cooled



Vessel Charging System

1. Shore based system
2. Receptacles located onboard
3. Challenges:
 - Substantial tidal range
 - Terminal compatibility
 - Maintenance access
 - Compatibility across vessels





Thank You