Liwa Class Ferry Design Program

Building and Operating Committee
September 26, 2024
Agenda Item No. 3

John Gray
Director of Engineering & Maintenance
Ferry Division

Why Build New Ferries?

- CARB CHC Rule
- Funding Plan
- Procurement Methodology

Driveline Selection

- Six MAN Engines
- Emissions Reductions

Liwa Class Design

- Constraints / Existing Terminals
- Community Outreach
- Design Renderings

Commercial Harbor Craft Rule

CHC Rule Amendments Approved in Dec 2022, Effective Jan 1, 2023

- Engine Emissions Tier Requirements above & beyond EPA
- Facilities Requirements – Electric Power for ZEAT Vessels
- Required R99 or R100 fuel within California Regulated Waters
- Operating limitations on idle time
- Testing and Annual Reporting

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PASSENGER FERRY

Table 17: Compliance Dates for Tier 2, Tier 3, or Tier 4 Engines on Ferries (Except Short-Run Ferries), Pilot Vessels, All Tug/Towboats, and Push Boats

Engine Model Year and Vessel Category	Compliance Date
2009 and earlier (Except Pilot Vessels)	12/31/2024
2012 and Earlier Pilot Vessels	12/31/2025
2010 – 2012 All Other Vessels*	12/31/2025
2013 – 2015**	12/31/2026
2016 – 2019**	12/31/2027
2020 – 2021**	12/31/2028
2022 and later**	12/31/2029

*Ferries (Except Short-Run Ferries), All Tug/Towboats, and Push Boats. **All vessels listed in the title of this table, including ferries (except short-run), pilot, all tug/towboats, and push boats. [Note: For example, for a 2020 model year diesel engine on a tugboat operating in Regulated California Waters, the owner or operator must bring the engine into compliance with the requirements of subsection (e)(12)(C) by December 31, 2028.]

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COMPLIANCE EXTENSIONS

Section (e)(12)(E)5 p.88

- Owners may request extensions from the compliance dates in (e)(10), (e)(12)(D) or (e)(12)(E)5.b
  - E5 – Schedule Extension
    - 1-year extension that is renewable within specified window
    - Prove equipment manufacturer delays
    - Prove Shipyard delays
    - Multiple engines within the fleet have the same compliance dates
    - Multiple engines on the same vessel have difference compliance dates

Fleet Replacement Schedule

VESSEL	Build Year	Retire & Replace (December 31)	Prop. Engine Model Yr.	Aux. Engine Model Yr.	CARB Compliance Date	Extension Request (years)
Liwa	2026	N/A	2025	N/A	N/A	0
Del Norte	1998	12/31/2026	2008	2019	12/31/2024	2
Golden Gate	1998	12/31/2027	2009	2019	12/31/2024	3
Napa	1999	12/31/2028	2009	2019	12/31/2024	4
Mendocino	2001	12/31/2029	2008	2018	12/31/2024	5
Marin	1976	12/31/2030	2016	2018	12/31/2027	3
San Francisco	1977	12/31/2031	2013	2020	12/31/2026	5
Sonoma	1976	12/31/2032	2018	2020	12/31/2027	5

GOLDEN GATE FERRY FLEET FUNDING PLAN (draft July 2024)								
VESSEL	**Liwa**	**Del Norte**	**Golden Gate**	**Napa**	**Mendocino**	**Marin**	**San Francisco**	**Sonoma**
CLASS	Catamaran	Catamaran	Catamaran	Catamaran	Catamaran	Spaulding	Spaulding	Spaulding
STATUS	New	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement	Replacement
Retire (DEC 31) (Pending CARB approval)		2026	2027	2028	2029	2030	2031	2032
Start Replacement Construction (DEC 31)	2024	2025	2026	2027	2028	2029	2030	2031
Replacement Enters PAX Service (DEC 31)	2026	2027	2028	2029	2030	2031	2032	2033
BUDGET	$ 30,000,000	$ 29,492,000	$ 29,492,000	$ 30,000,000	$ 30,000,000	$ 31,500,000	$ 31,500,000	$ 30,000,000
FUNDING SUMMARY								
Federal Secured	$ 10,967,808	$ 4,000,000	$ -	$ -	$ -	$ -	$ -	$ -
Federal Programmed	$ -	$ 12,000,000	$ -	$ -	$ -	$ -	$ -	$ -
Federal Planned	$ -	$ 7,593,600	$ 23,593,600	$ 24,000,000	$ 24,000,000	$ 25,200,000	$ 25,200,000	$ 24,000,000
Total Federal	**$ 10,967,808**	**$ 23,593,600**	**$ 23,593,600**	**$ 24,000,000**	**$ 24,000,000**	**$ 25,200,000**	**$ 25,200,000**	**$ 24,000,000**
State Secured	$ 12,563,611	$ 5,372,100	$ -	$ -	$ -	$ -	$ -	$ -
State Planned	$ -	$ 526,300	$ 5,898,400	$ 6,000,000	$ 3,101,600	$ -	$ -	$ -
Total State	**$ 12,563,611**	**$ 5,898,400**	**$ 5,898,400**	**$ 6,000,000**	**$ 3,101,600**	**$ -**	**$ -**	**$ -**
District	**$ 6,468,581**	**$ -**	**$ -**	**$ -**	**$ 2,898,400**	**$ 6,300,000**	**$ 6,300,000**	**$ 6,000,000**
Total Funding	**$ 30,000,000**	**$ 29,492,000**	**$ 29,492,000**	**$ 30,000,000**	**$ 30,000,000**	**$ 31,500,000**	**$ 31,500,000**	**$ 30,000,000**
Fed Share	37%	80%	80%	80%	80%	80%	80%	80%
State Share	42%	20%	20%	20%	10%	0%	0%	0%
District Share	22%	0%	0%	0%	10%	20%	20%	20%

Procurement Strategy

Design-Build

- RFP establishes functional requirements and some constraints
- Contract for one entity to be responsible for design and build of the vessel
- Design is generally one step ahead of construction to maintain project delivery schedule

Design-Bid-Build

- RFQ to select Naval Architect
- Design Vessel
- RFP for Construction
- Shipyard builds to provided design package

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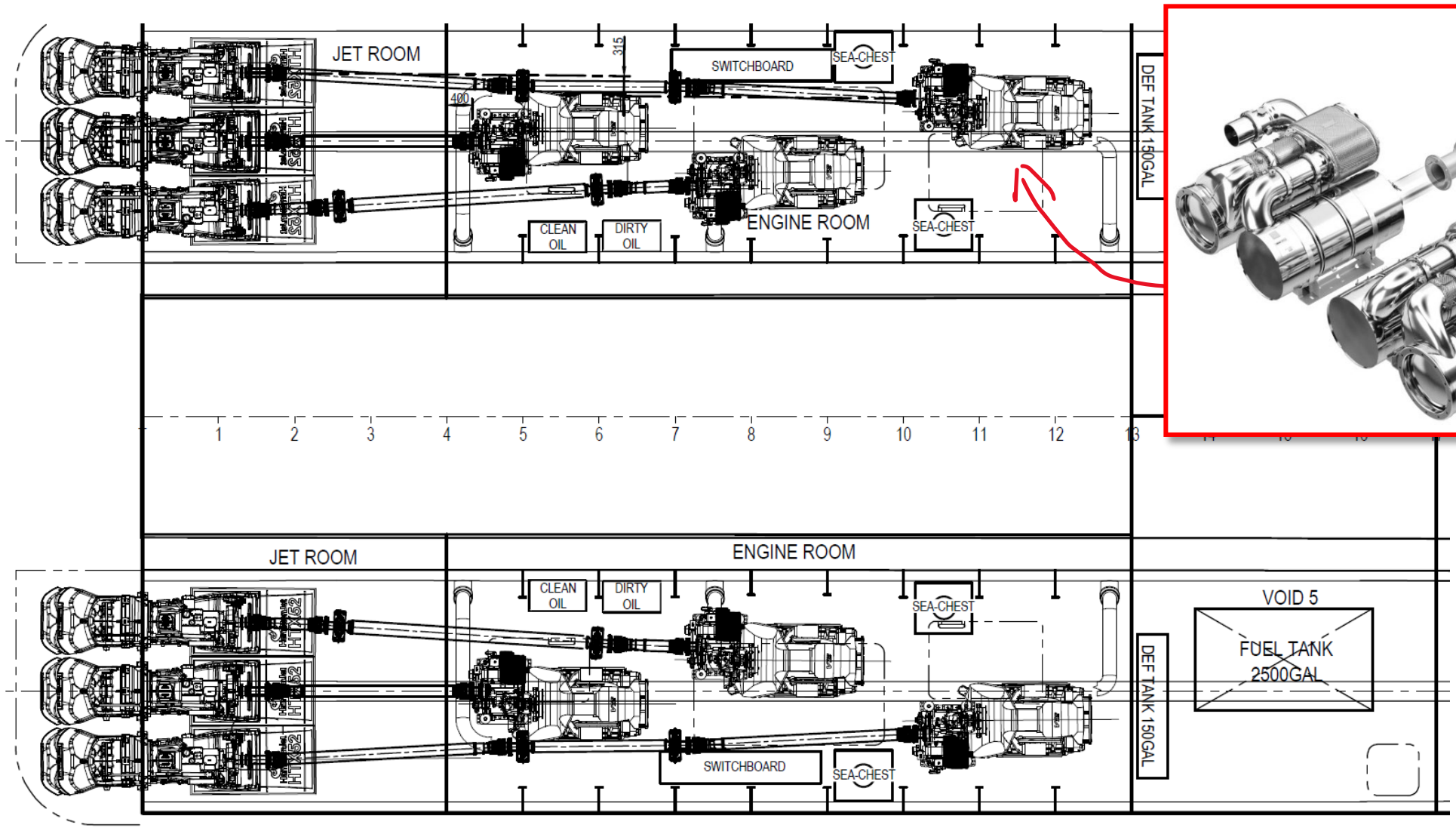
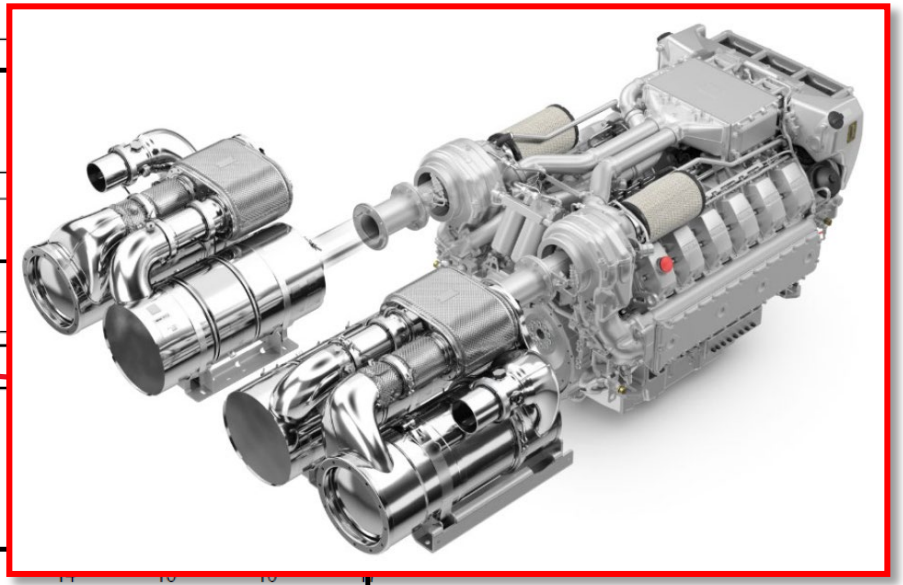
September 2022 - Design Contract Awarded to Aurora Marine Design

Selected MAN Engine & Driveline





Emissions Reductions

When Compared to the Current High-Speed Vessels
(Napa & Golden Gate)

The Liwa Class Vessels...

...Carry 50 additional passengers (500 seats)

...Consume 36% less fuel

...Reduce NOx emissions by 85%

...Reduce PM emissions by 95%

Existing Terminal Infrastructure

Larkspur & SF constructed in 1970s for the Spaulding Class Ferries

Upper Deck Boarding Ramps

Sausalito, Tiburon, Angel Island, Ballpark, Chase Center, WETA

Main Deck Boarding

Larkspur – Home Port

4 berths, rafted vessels at night

Larkspur Terminal

Larkspur Terminal

San Francisco Terminal

Liwa Class Replacement Program

Vessel Particulars

• Length (Overall)	50.5m
• Beam (Overall)	13m
• Draft (Full Load)	1.3m
• Fuel	2 x 2,000 USG
• Water	1 x 500 USG
• Sewage	1 x 650 USG
• Passenger Decks	2

Liwa Class Replacement Program

Vessel Particulars

Length (Overall)	165 ft 8 in
Beam (Overall)	42 ft 7 in
Draft (Full Load)	4 ft 3 in
Fuel	2 x 2,000 USG
Water	1 x 500 USG
Sewage	1 x 650 USG
Passenger Decks	2

Liwa Class Replacement Program

Passenger Features of the Liwa Class Vessels

• 449	Internal Seats
• 51	External Seats
• 12	ADA Wheelchair (Internal & External)
• Elevator	1 ADA Lift between decks (Lift Emotion)
• Heads	2 ADA & 1 non-ADA Main Deck
• Snack Bar	1 Main Deck
• Loading Gates	4 Upper Deck, 5 Main Deck
• Bikes	76 Total Both Decks

Community Engagement

Accessibility Advisory Committee

- Modifications to door locations, preferred seating arrangements, table shapes, storage space for mobility devices, etc.

Pedestrian & Bicycle Advisory Committee

- Boarding “traffic” flow
- Bicycle arrangements and stowage options

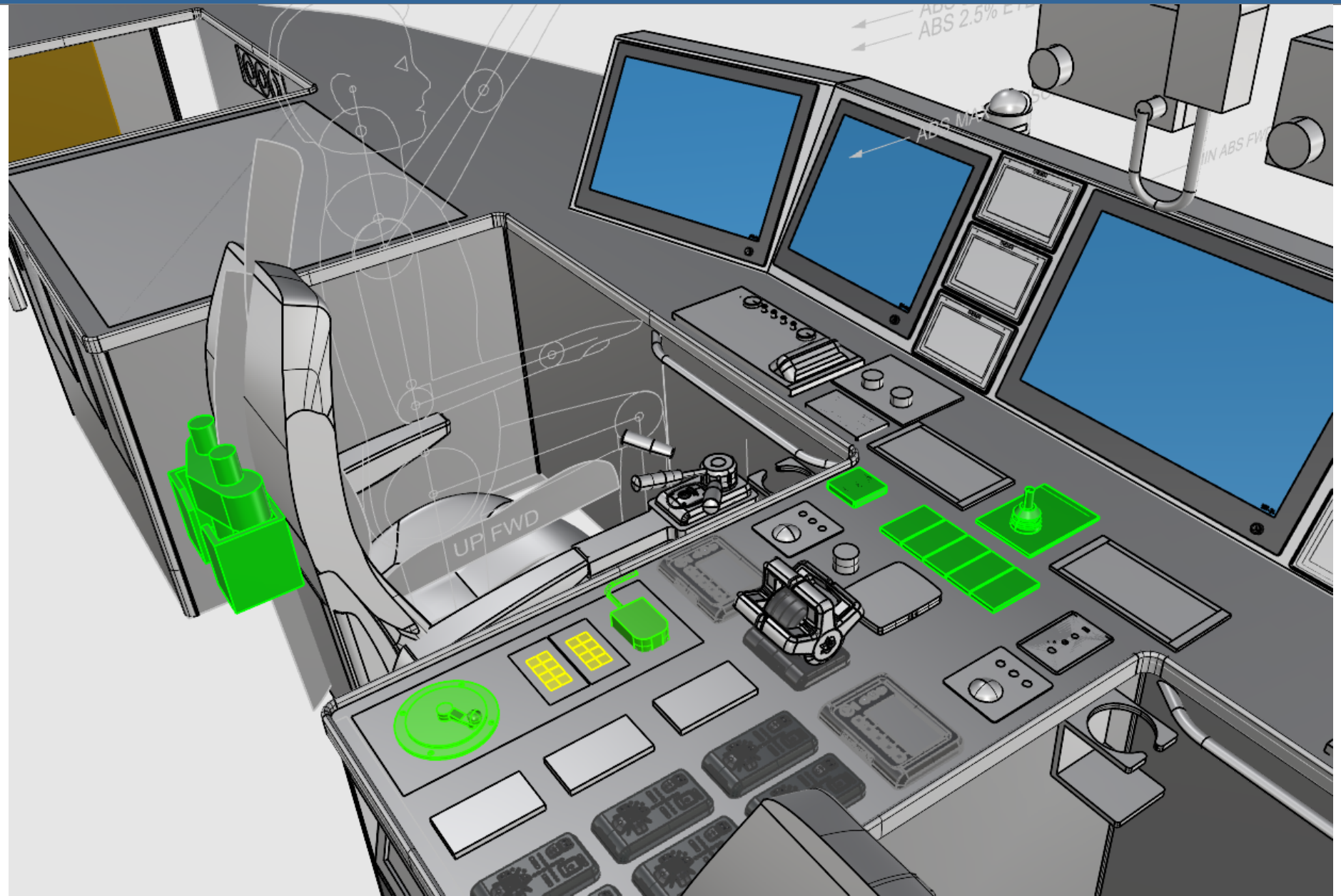
Ferry Passenger Advisory Committee

- “Nice boat, when do we get to ride it?”

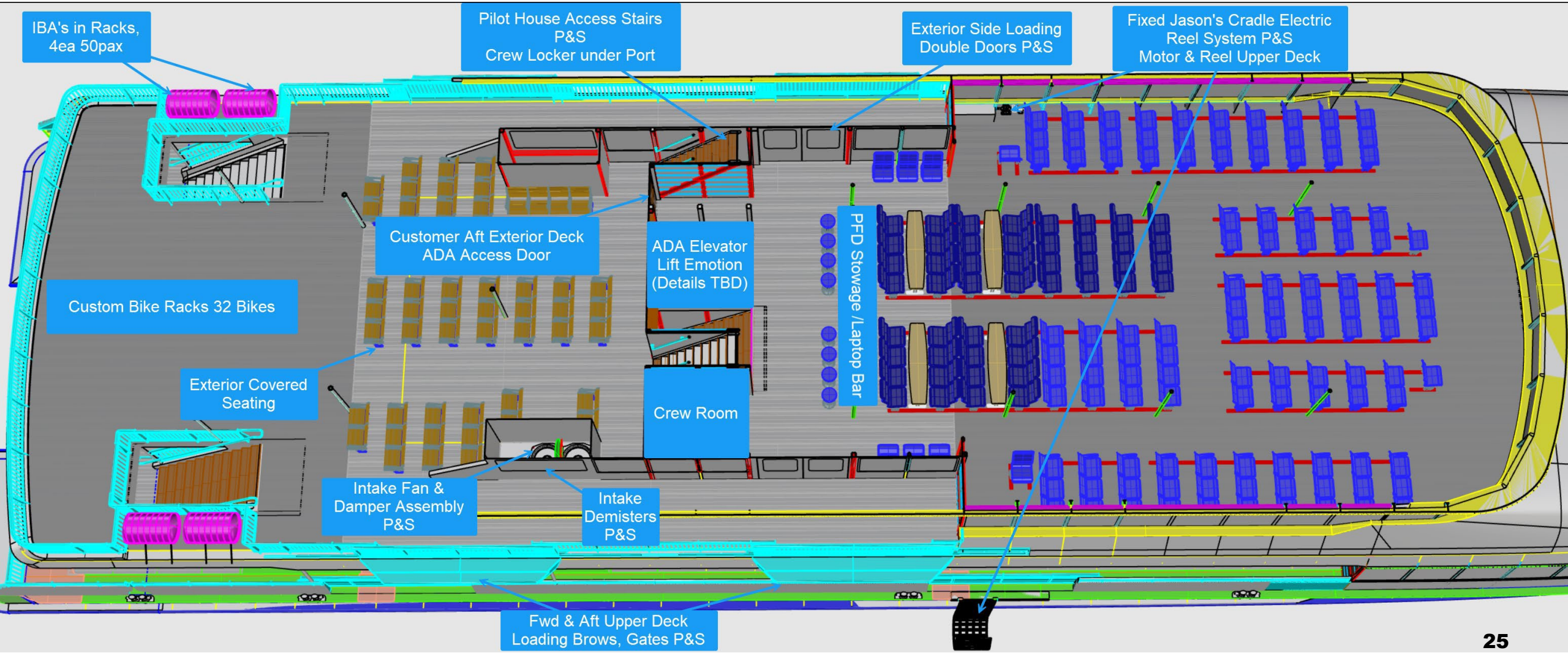

GOLDEN GATE
FERRY


LIWA
LARKSPUR
LIWA

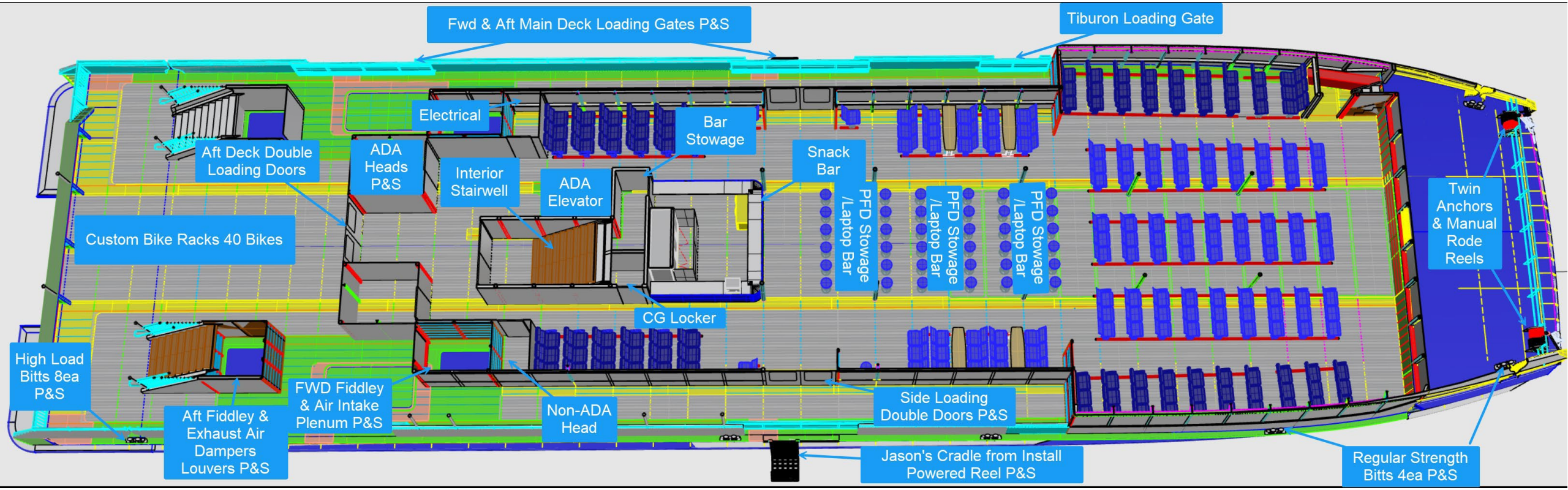
Pilothouse Helm Station



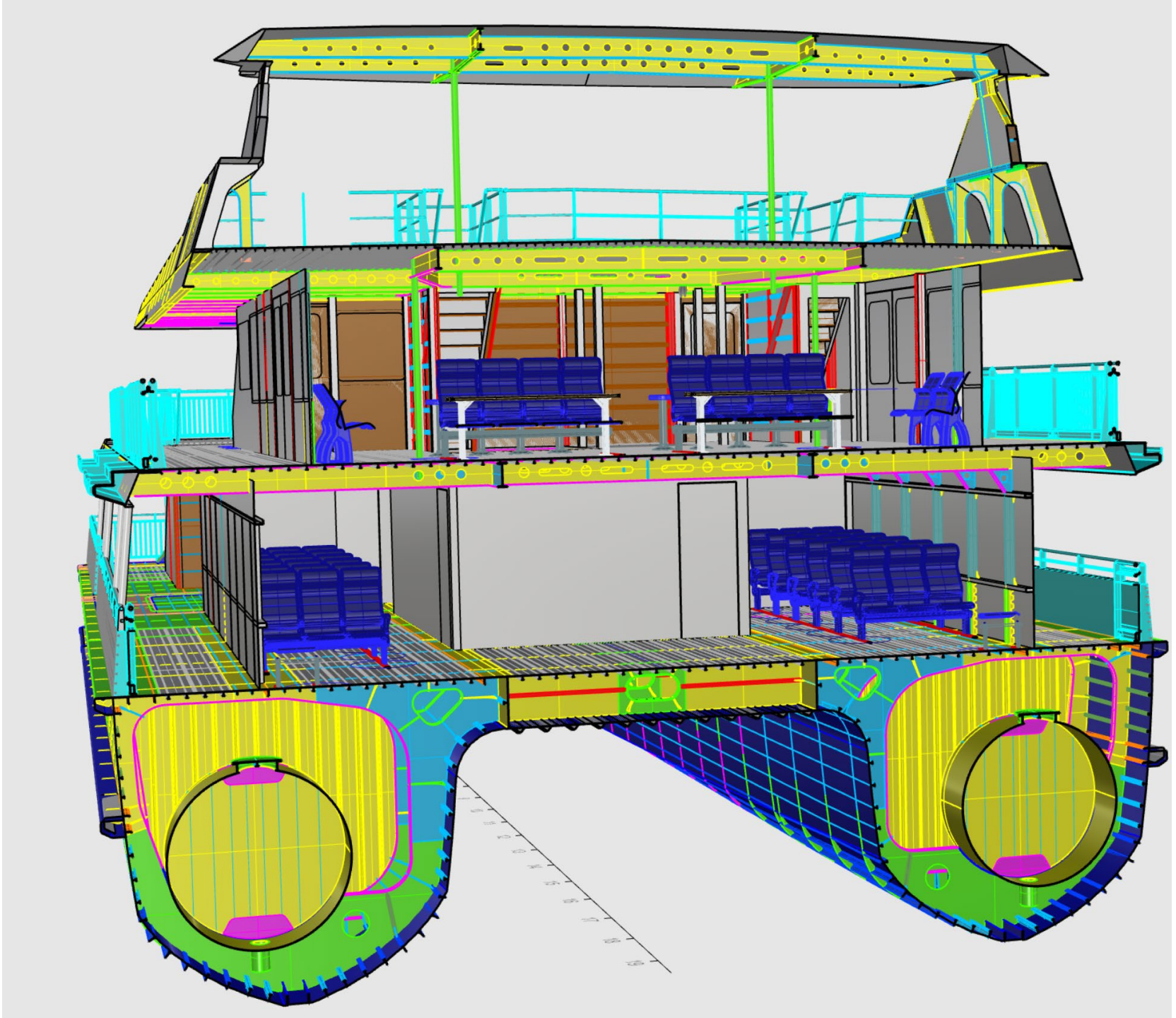
Upper Deck


IBA's in Racks, 4ea 50pax
Pilot House Access Stairs P&S
Crew Locker under Port
Exterior Side Loading Double Doors P&S
Fixed Jason's Cradle Electric Reel System P&S
Motor & Reel Upper Deck
Customer Aft Exterior Deck ADA Access Door
ADA Elevator Lift Emotion (Details TBD)
PFD Stowage /Laptop Bar
Custom Bike Racks 32 Bikes
Exterior Covered Seating
Crew Room
Intake Fan & Damper Assembly P&S
Intake Demisters P&S
Fwd & Aft Upper Deck Loading Brows, Gates P&S

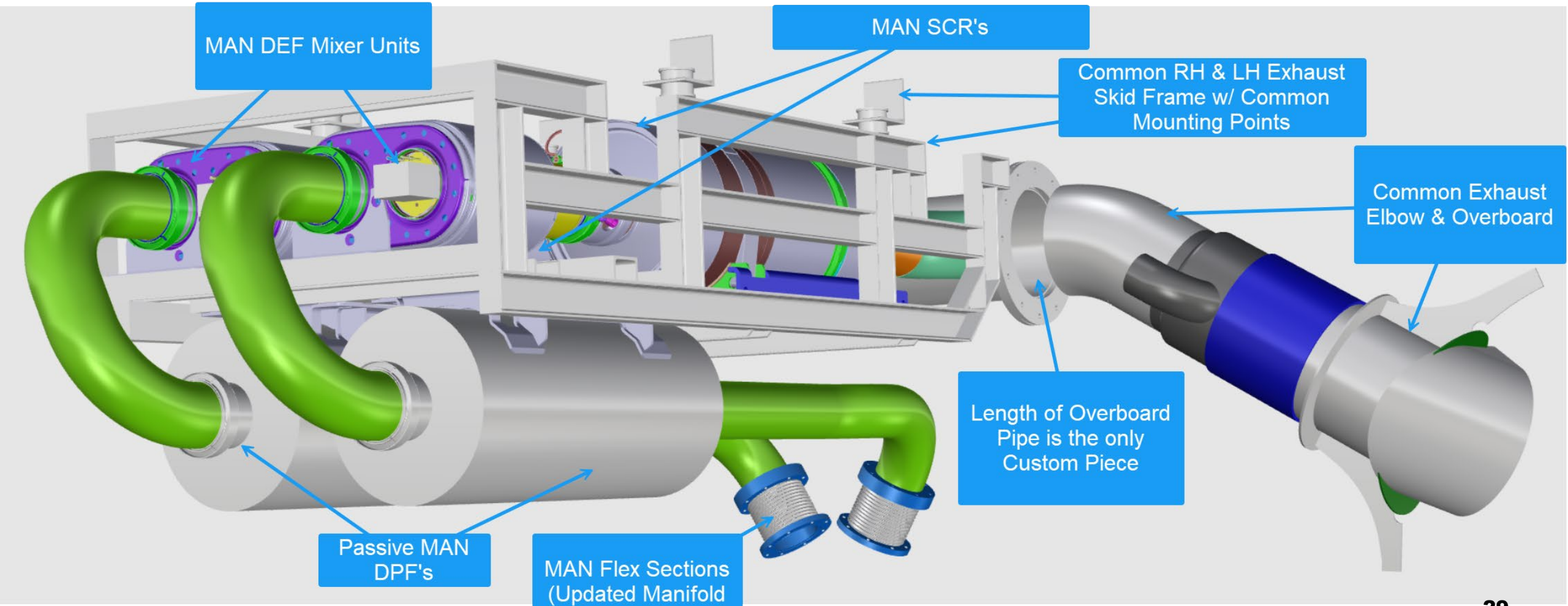
Main Deck


Fwd & Aft Main Deck Loading Gates P&S
Tiburon Loading Gate
Electrical
Bar Stowage
Snack Bar
Aft Deck Double Loading Doors
ADA Heads P&S
Interior Stairwell
ADA Elevator
PFD Stowage /Laptop Bar
PFD Stowage /Laptop Bar
PFD Stowage /Laptop Bar
Twin Anchors & Manual Rode Reels
Custom Bike Racks 40 Bikes
CG Locker
High Load Bitts 8ea P&S
FWD Fiddley & Air Intake Plenum P&S
Aft Fiddley & Exhaust Air Dampers Louvers P&S
Non-ADA Head
Side Loading Double Doors P&S
Jason's Cradle from Install Powered Reel P&S
Regular Strength Bitts 4ea P&S

Main Deck



Focus on Subassemblies & Production Efficiencies



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