Zero-emission Fleet Transition - Update

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Discussion Topics

- A Brief Look Back
- Looking Forward
- Current Project Status
- Next Steps
- State of the Industry

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A Brief Look Back

KEY CONSIDERATIONS (from October 2021):

- Focus on green and efficiency and cost
- Funding availability
- Infrastructure requirements and available site space
- Fuel/Energy availability
- Vehicle performance (primarily range)
  - "Fit" into existing operations and our service to the community
- Resiliency for continuity of operations and emergency response

A Brief Look Back

	Battery Electric Bus	Fuel Cell Electric Bus
Reliable Range	130-190 miles on a single charge (or indefinite range with on-route charging)	200-320 miles before refueling
Fueling Technology	Depot or on-route charging • Plug-in charging • Wireless inductive charging • Overhead conductive charging	Hydrogen storage and fueling station • Purchased liquid or gaseous hydrogen (most common) • Produce hydrogen on-site through electrolysis or natural gas reformation
Capital Costs	• BEBs are currently more expensive than diesel buses • Charging infrastructure costs vary and do not scale easily; incrementally more charging infrastructure will be required for more buses	• FCEBs are currently more expensive than BEBs • Fueling infrastructure costs vary and depend on the required fueling rate. • Infrastructure scales more easily with similar equipment and space requirements. Additional buses do not necessarily require additional infrastructure
Fueling Considerations	• Depot-charged buses may require hours to fully recharge • Electricity rates will have a significant impact on fuel costs	• Refueling procedure and time required are slower than diesel buses, but similar to Compressed Natural Gas (CNG) fueling • Electricity costs may be significant if producing hydrogen on- • Relatively few hydrogen suppliers across the country; costs may vary based on the distance from the supplier

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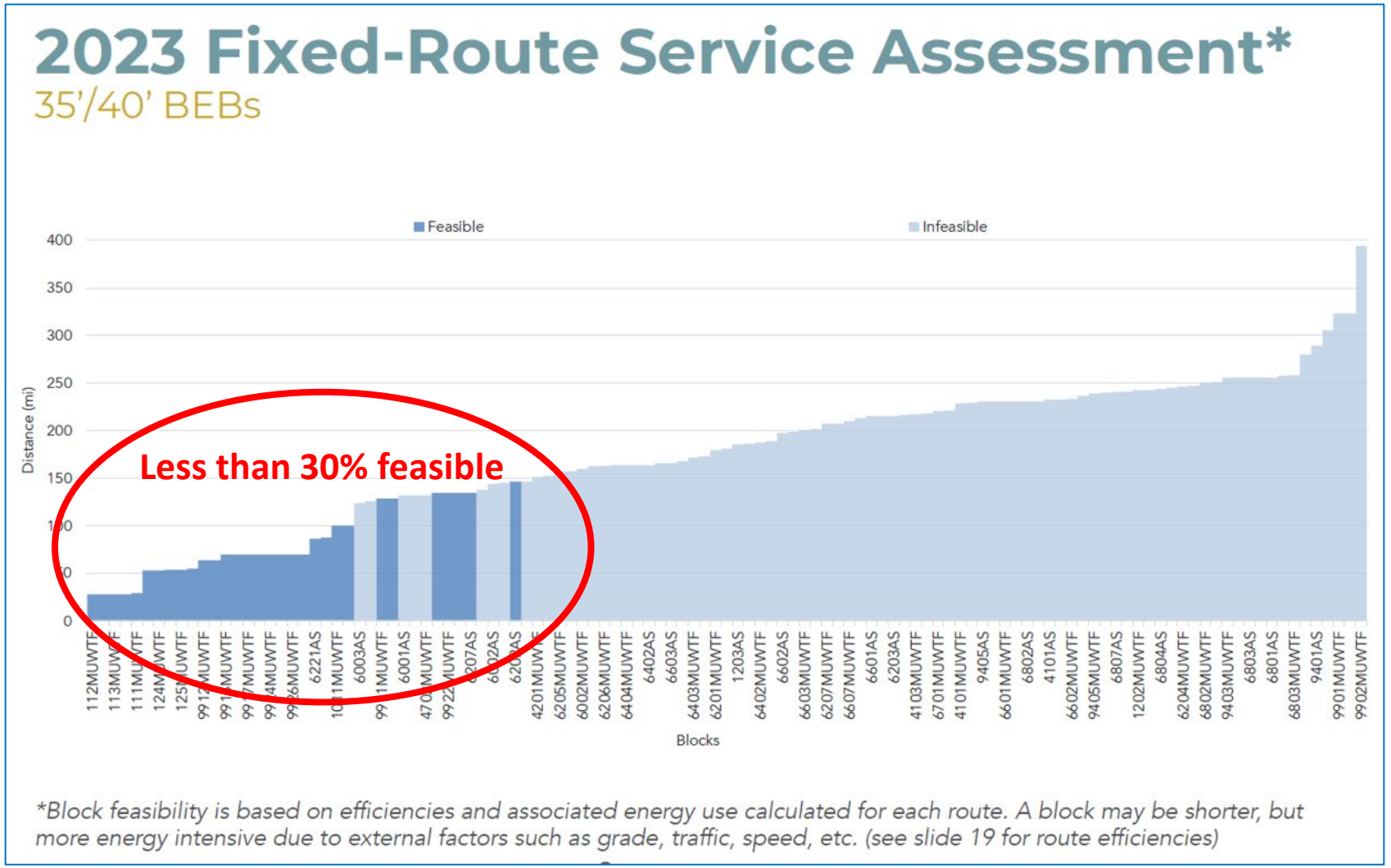
Look Back - Analysis Results



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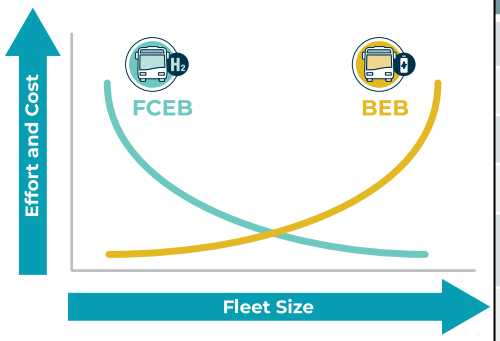
Look Back - Analysis Results



Cumulative cost projections 2023 – 2050 (Fixed Route only)

Total Cost of Ownership	Baseline	BEB Depot Charging Only	BEB Depot and On-Route Charging	Mixed Fleet (BEB/FCEB)	FCEB Only
Fleet	$270,264,000	$408,825,000	$468,644,000	$477,540,000	$493,523,000
Fuel	$109,293,000	$71,148,000	$50,543,000	$71,297,000	$102,052,000
Maintenance	$95,730,000	$81,464,000	$73,971,000	$79,948,000	$88,172,000
Infrastructure	$-	$10,598,200	$21,599,000	$17,677,000	$11,636,000
Total	**$ 475.3 M**	**$ 572 M**	**$ 614.8 M**	**$646.5 M**	**$ 695.4M**
Compared to Baseline	-	+ $ 96.8 M	+ $ 139.5 M	+ $ 171.2 M	+ $ 220.1 M
% of Blocks Achievable by 2050	0%	83%	100%	100%	100%
Cumulative Metric Tons of CO_2e Reduced	-	**~70,000**	**~108,000**	**~62,000 – 113,000**	**~0 – 121,000**

Assumptions:

- 100% ZEB purchases beginning in 2026 for fleet replacement
- Infrastructure totals DO NOT include property acquisition or utility upgrades
- Fuel costs:
  - Hydrogen = $8.61/kg – PNW H2 Hub was expected to drive costs down (~30%)
  - Electricity = $0.081/kwWh, Demand charges $11.16 - $15.24/kW (actual charging rate structure would be negotiated)
    - 6MW needed for BEB Depot Charging
    - No solution for resiliency included

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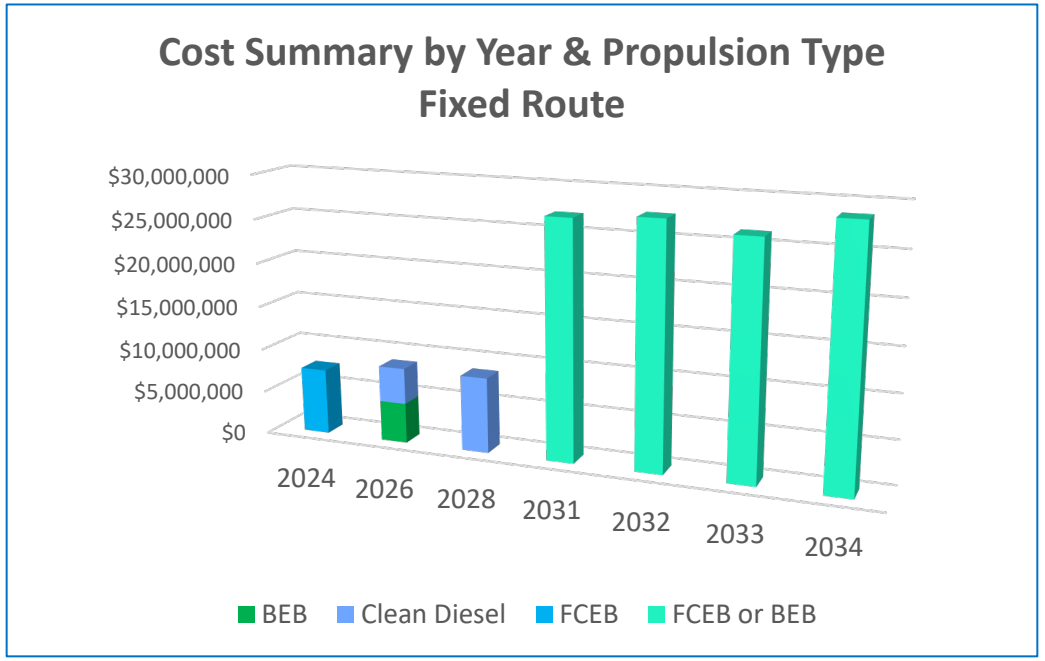
Looking Forward

Fixed Route Fleet Transition Recommendation:

- 2024
  - FCEB (5 buses) – Awarded Grant Projects
- 2026
  - ~~BEB (3 buses and charging)~~
  - Clean Diesel Hybrid (~~5~~ 8 buses)
- 2028
  - Clean Diesel Hybrid replacements (10 buses)
  - Begin Infrastructure Deployment
- 2031 and beyond:
  - ZEB purchases for all replacements – technology and funding TBD



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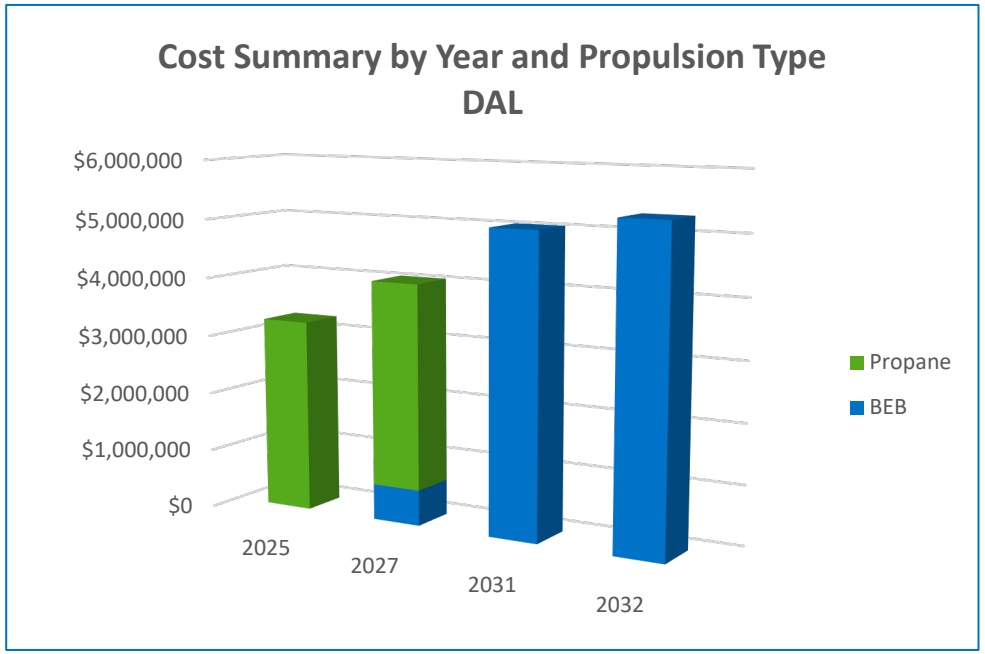
Looking Forward

Dial-A-Lift Fleet Transition Recommendation:

- 2025
  - Propane (12 buses)
- 2027
  - BEB (2 buses) – Grant Awarded !!
  - Propane (12 buses)
- 2028
  - Begin Charging Infrastructure Deployment
- 2031
  - BEB (14 buses) – TBD funding and pilot results
- 2032
  - BEB (14 buses) – TBD funding and pilot results



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Looking Forward

Vanpool and Non-Revenue Fleet Transition Recommendation:

- Monitor WA Zero-Emission Vehicle laws, rules, initiatives
  - Example: WA Zero Emission Vehicles Law = 2035 all light/medium duty vehicle sales 100% ZEV
- Watch the market for feasible vehicle technologies, charging partnerships for vanpool groups, and grant opportunities

Current Project Status

Hydrogen Fuel Cell Bus Demonstration Project:

- Five (5) New Flyer Fuel Cell 40-foot buses - **Delivered**
- On-site gaseous refueling equipment
  - **Equipment on order**
  - **Site design in progress**
- Fleet Shop safety upgrades
  - **Incorporated in current remodel**
- Transport trailers
  - Procurement in progress

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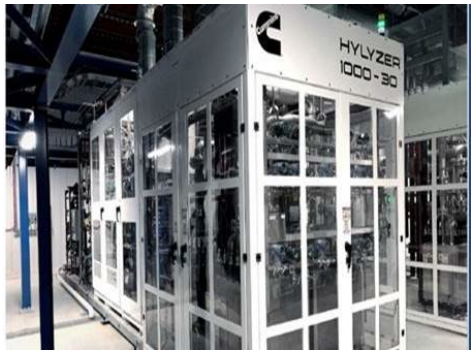
Current Project Status

Planned Hydrogen Fuel Sources:

- Douglas County PUD
  - Hydro-powered Electrolyzer – Wells Dam
- Lewis County Transit
  - Electrolyzer and Dispenser in progress
- Other PNW production projects planned or in progress



Current Project Status

Training and Tooling:

- Over 650 hours of training with Bus Purchase
  - Technicians
  - Operators
  - First Responders

- Over 100 new tools
  - Manufacturer tooling
  - High Voltage tools
  - Safety Equipment

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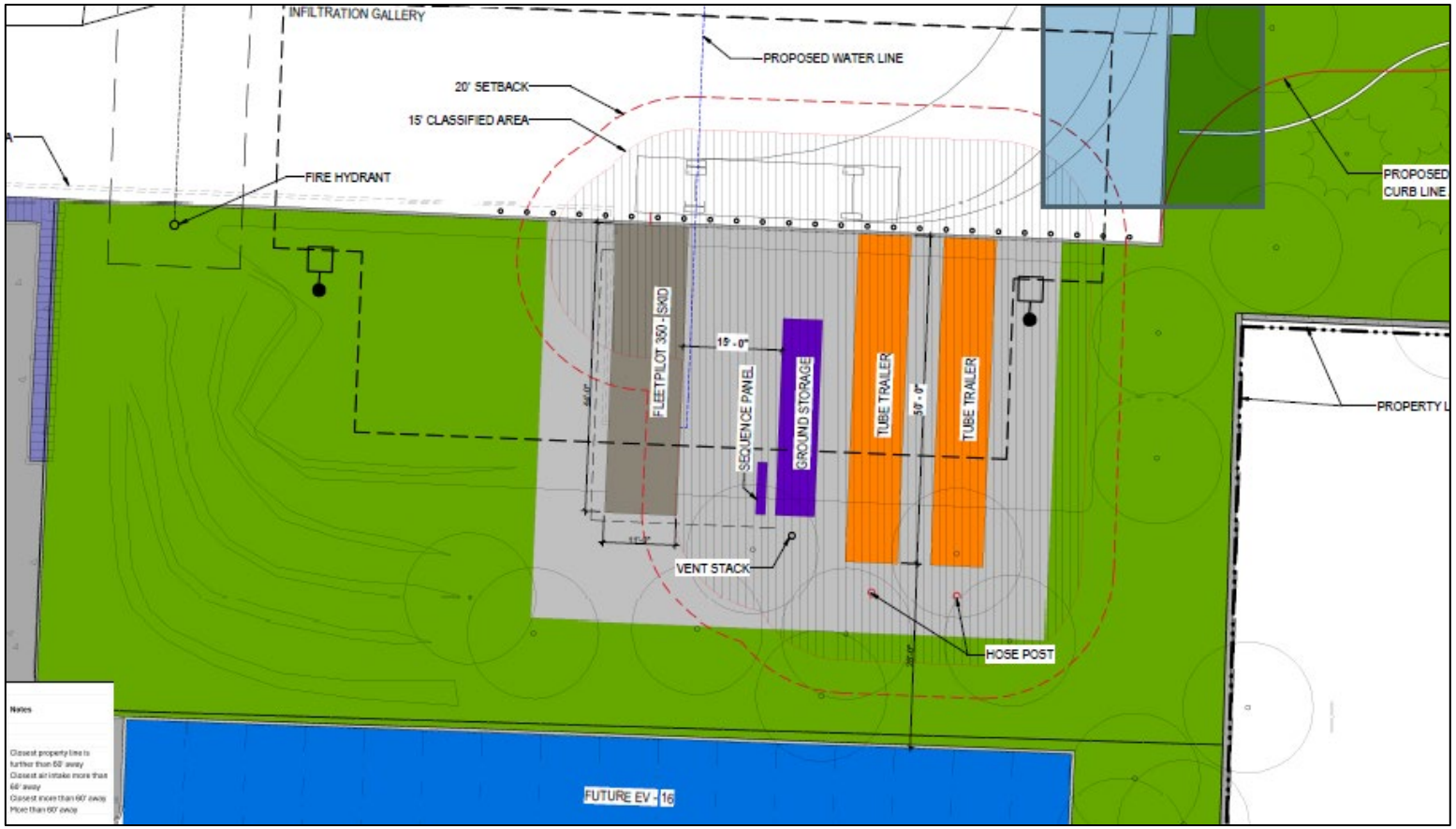
Current Project Status

Challenges:

- Hydrogen Safety and Code familiarity – AHJs
- Supply Chain and Tariffs
- Site design constraints
  - Space availability
  - City Code: Pervious Surfaces and trees



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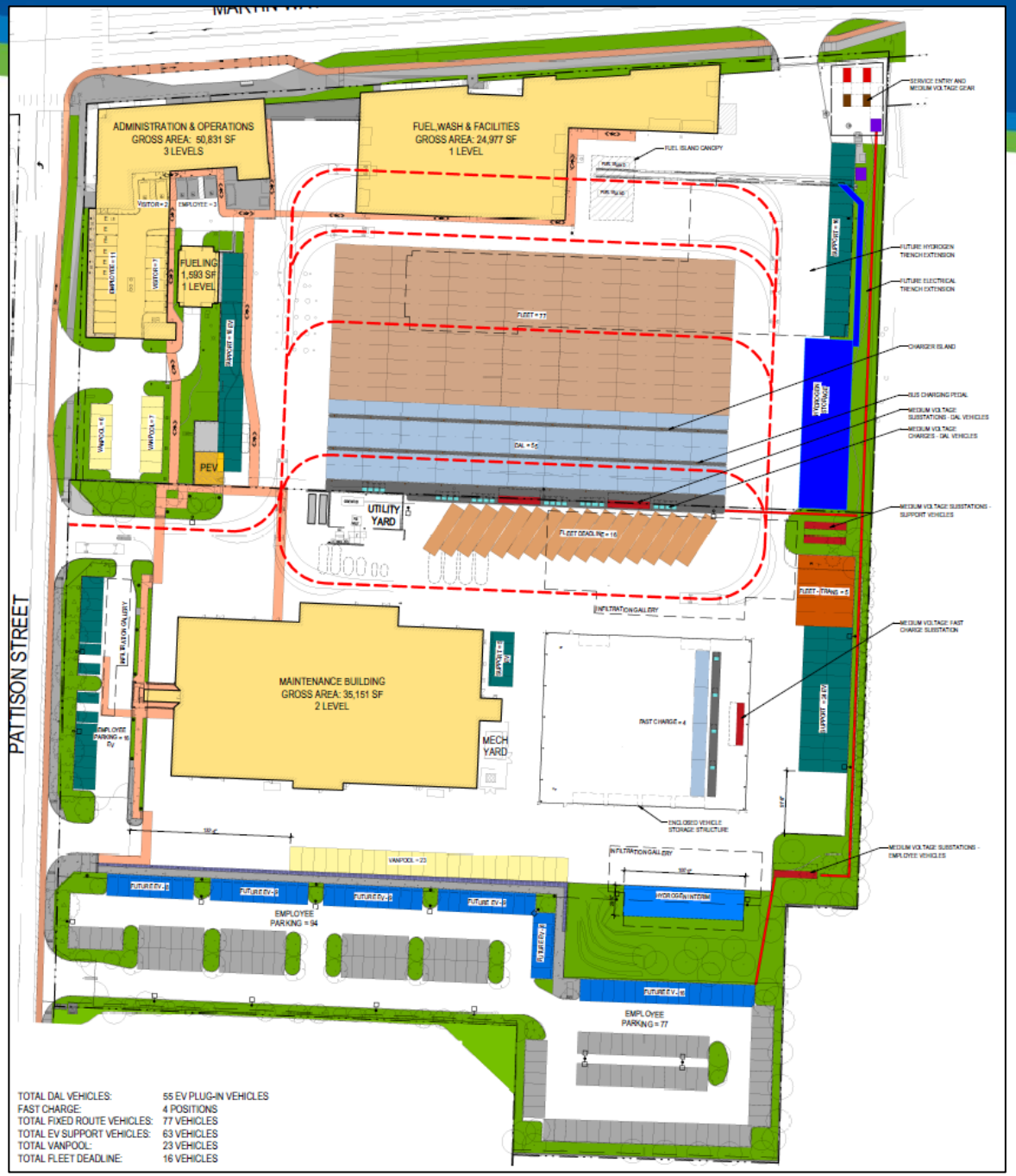
Next Steps

- Continued collaboration with project stakeholders to finalize refueling station design and construction:
  - City of Olympia
  - Stantec
  - Hyfluence
  - FORMA
- Finalize execution of grant funding for BEB DAL vehicles and begin procurement activities
- Continued involvement in PNW and National hydrogen organizations to build and strengthen partnerships

Next Steps (continued)

- Finalize Intercity Zero-emissions Site Master Plan
  - Pattison infrastructure requirements for long-term, full fleet transition by 2050
  - Includes Hydrogen vehicles and fueling
  - Includes Battery Electric vehicles and charging
  - Includes 6MW+ Utility upgrade



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State of the Hydrogen Industry

- Many hydrogen related projects continue:
  - PNW, CA, and across the nation
    - Transit, trucking, industrial uses and sustainable fuel production
- Collaboration amongst project partners:
  - Production and distribution
  - End users
  - Government: State Departments and Policy makers
  - Non-profits

Thank you!

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