



Heliox - Amsterdam

Z E B & Site Plan Discussion

Zero Emission Buses

15 states will follow California's push to electrify trucks and buses



A big step forward in reducing harmful emissions from diesel engines

By Sean O'Kane | @sokane1 | Jul 14, 2020, 4:04pm EDT

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Image: Proterra

- California
- Connecticut
- Colorado
- Hawaii
- Maine
- Maryland
- Massachusetts
- New Jersey
- New York
- North Carolina
- Oregon
- Pennsylvania
- Rhode Island
- Vermont
- Washington
- Washington D.C.

TRANSIT PROJECTS

Current US ZEB Projects:

AVTA
Anaheim Transportation Network
Elk Grove
Golden Gate Transit
Honolulu
Metro Transit
Mountain Line
OCTA
Riverside Transit Agency
Santa Barbara
Santa Monica
START Bus
TriMet (2 large BEB bases)
UTA

Current Canada ZEB Projects:

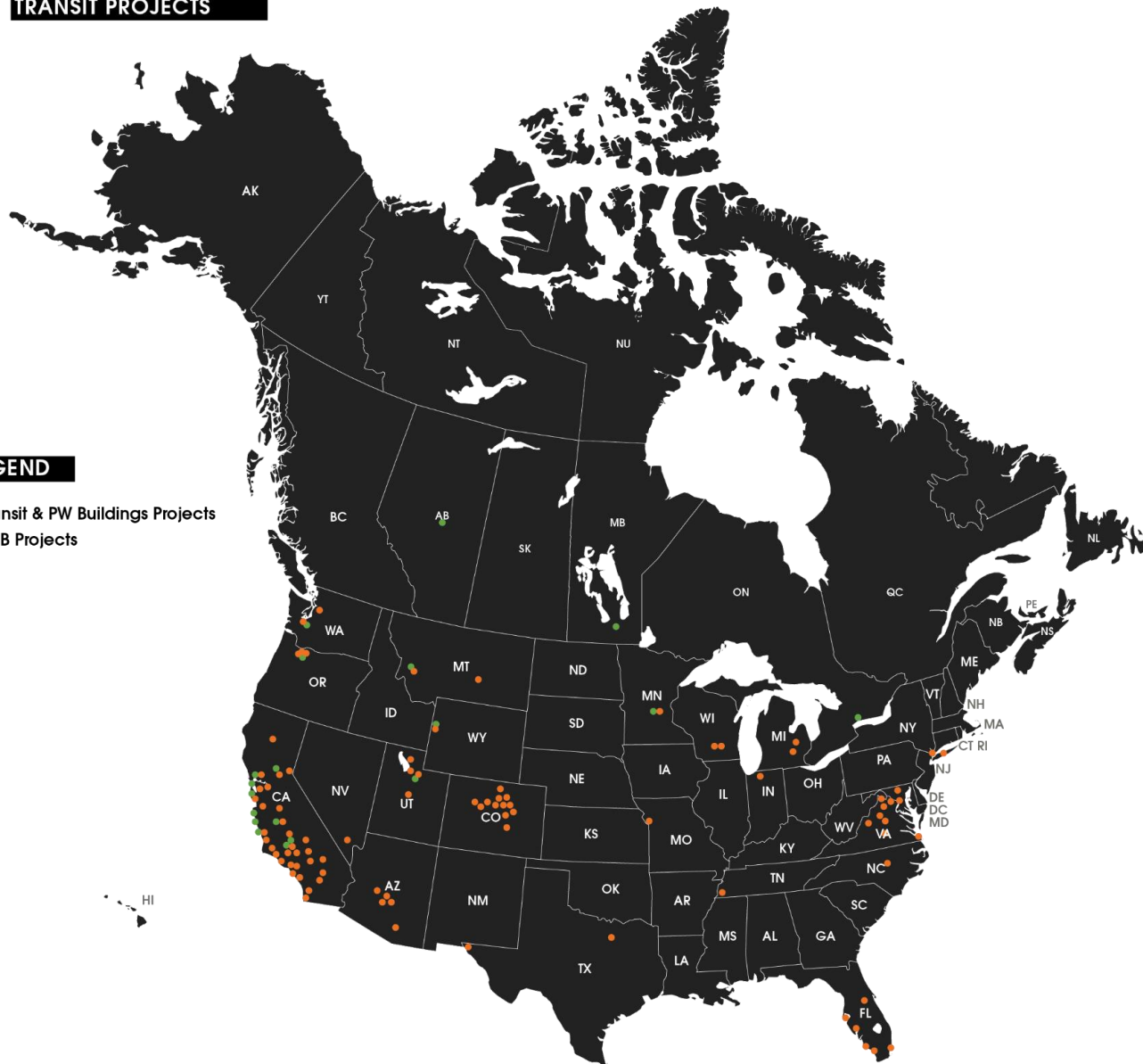
Toronto
Winnipeg
Edmonton
BC Transit
Halifax

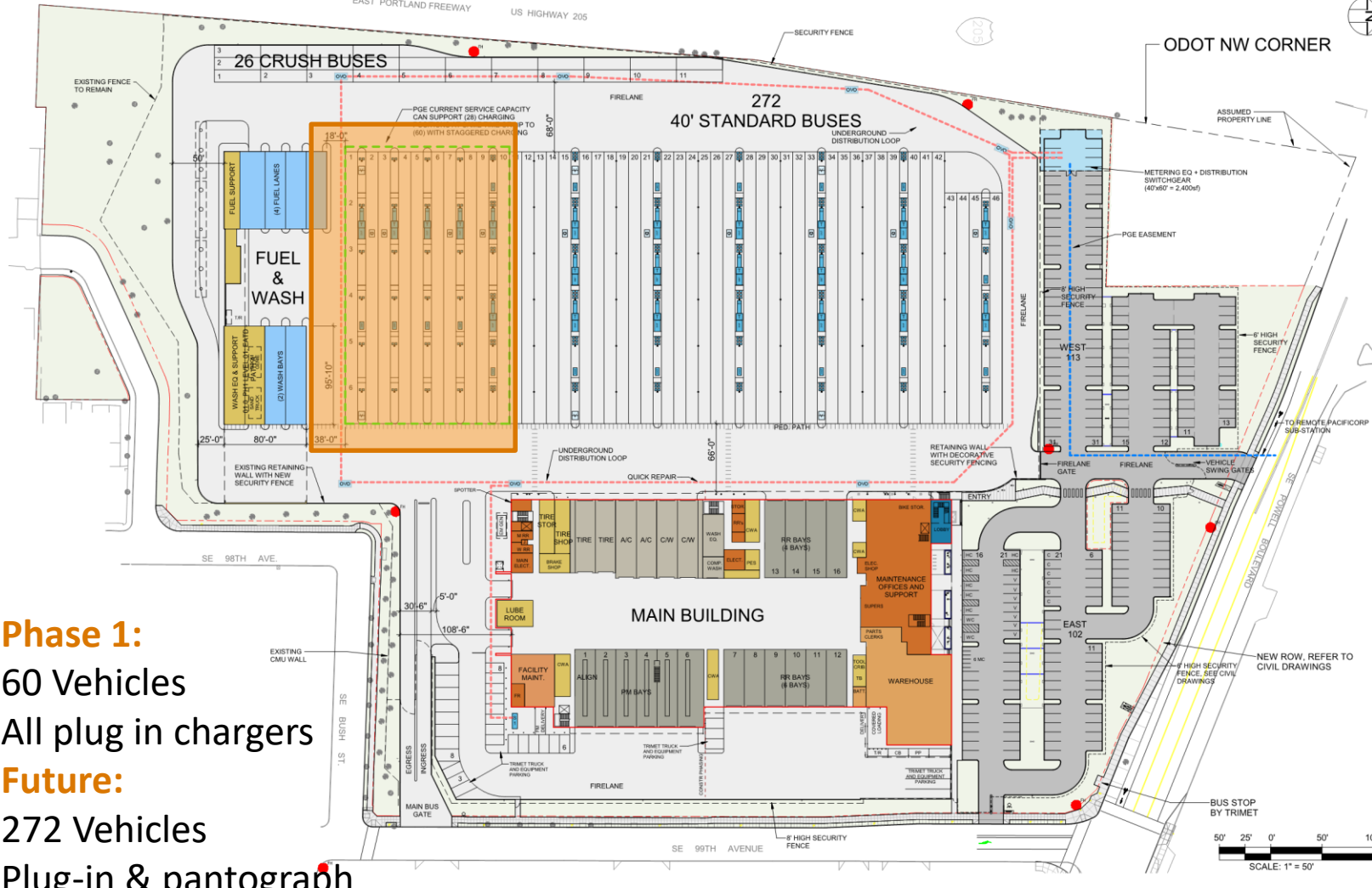
Technical advisor to Canada Infrastructure Bank

Developing a program for 5,000 ZEBs on the roads by 2025

LEGEND

- Transit & PW Buildings Projects
- ZEB Projects

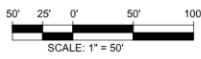




- OPTION 5r1:
AT GRADE PLUG-IN CHARGING (60 BUSES)
AND OVERHEAD ARCH CHARGING (212 BUSES)
- BUSES: 272 ELECTRIC
(+26 CRUSH NON-ELECTRIC STORAGE)
- METERING EQUIPMENT AND DISTRIBUTION SWITCHGEAR: 40'x60' = 2,400sf
- V. VAULT: 8 LOOP VAULTS (2 MANHOLE)
- V. VAULT: 10 IN-TRACK DISTRIBUTION (1 MANHOLE)
- V. VAULT: 6 FEED DISTRIBUTION VAULTS
- T. TRANSFORMER: 23 (PART OF BUS CHARGER SUBSTATION)
- MV, 12.47kV SWITCH: 23 (PART OF BUS CHARGER SUBSTATION)
- DIST. 480v SWITCH: 23 (PART OF BUS CHARGER SUBSTATION) (TYPICALLY SUPPORTING 6 CHARGERS)
- DIST. 480v SWITCH: 18 (TYPICALLY SUPPORTING 6 CHARGERS)
- CHARGING UNITS: 272 (60 AT GRADE, CORD DOES NOT CROSS TRACKS) (212 AT GRADE, FEEDS TO OVERHEAD ARCH STRUCTURE)

Phase 1:
60 Vehicles
All plug in chargers

Future:
272 Vehicles
Plug-in & pantograph



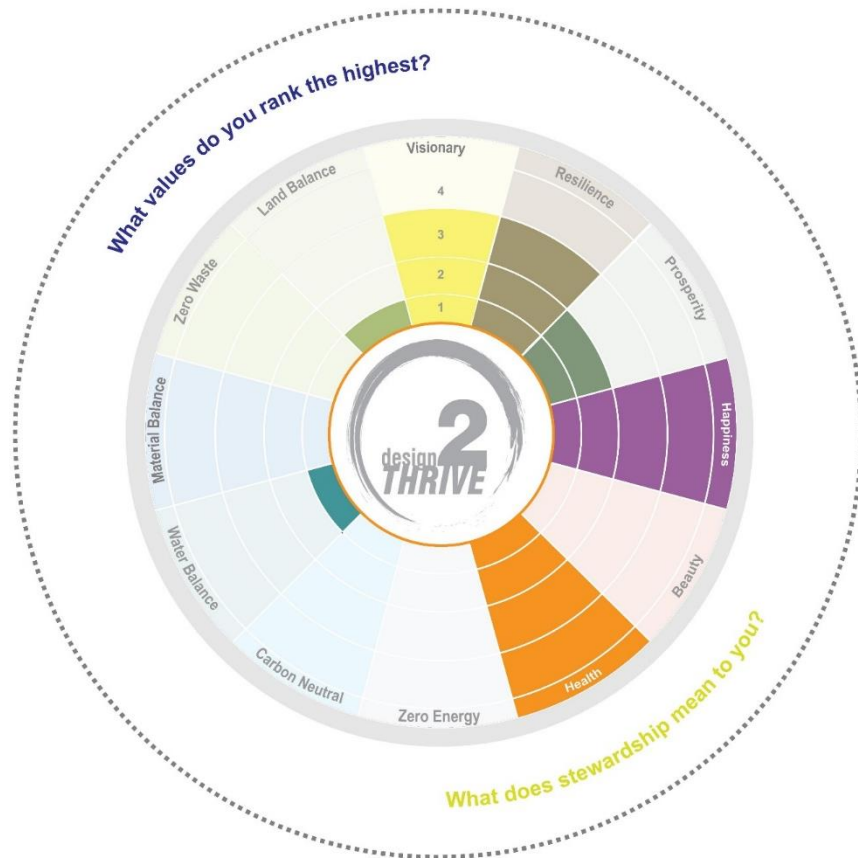
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Phasing Planning Example

TRI-COUNTY METROPOLITAN
TRANSPORTATION DISTRICT OF OREGON
BUS CHARGING OPTION 5r1 - PLUG-IN and OH ARCH CHARGING
POWELL BUS GARAGE REPLACEMENT PROJECT

02/26/19

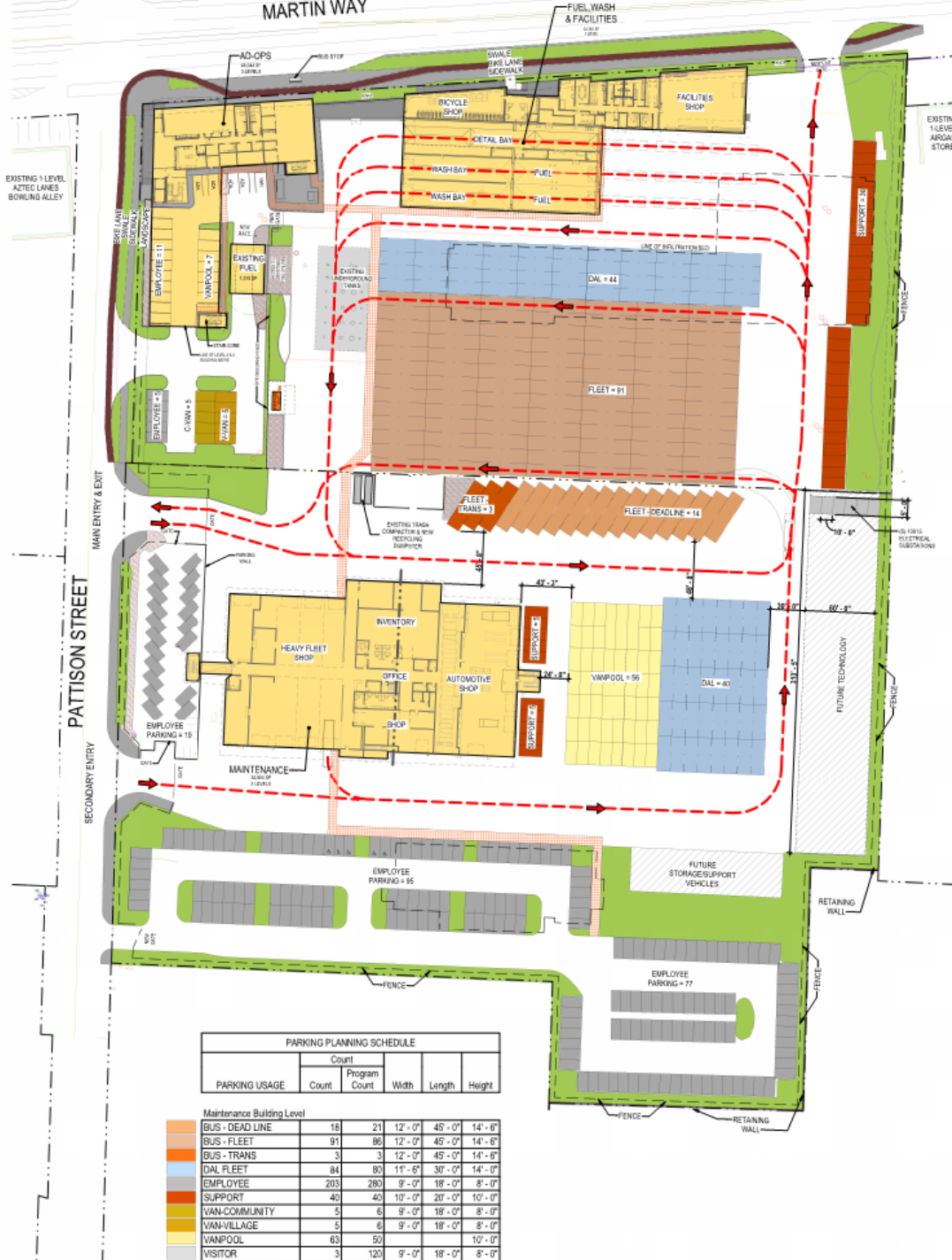
I.T.'s Goals and Objectives



Utilized Stantec's Design 2 Thrive process

With the design team and stakeholders working together, 4 primary goals were developed:

- ✓ Promote employee happiness & inclusivity
- ✓ Make employee health and safety a top priority
- ✓ Embrace resiliency as a characteristic of IT's culture
- ✓ Provide visionary leadership for the future



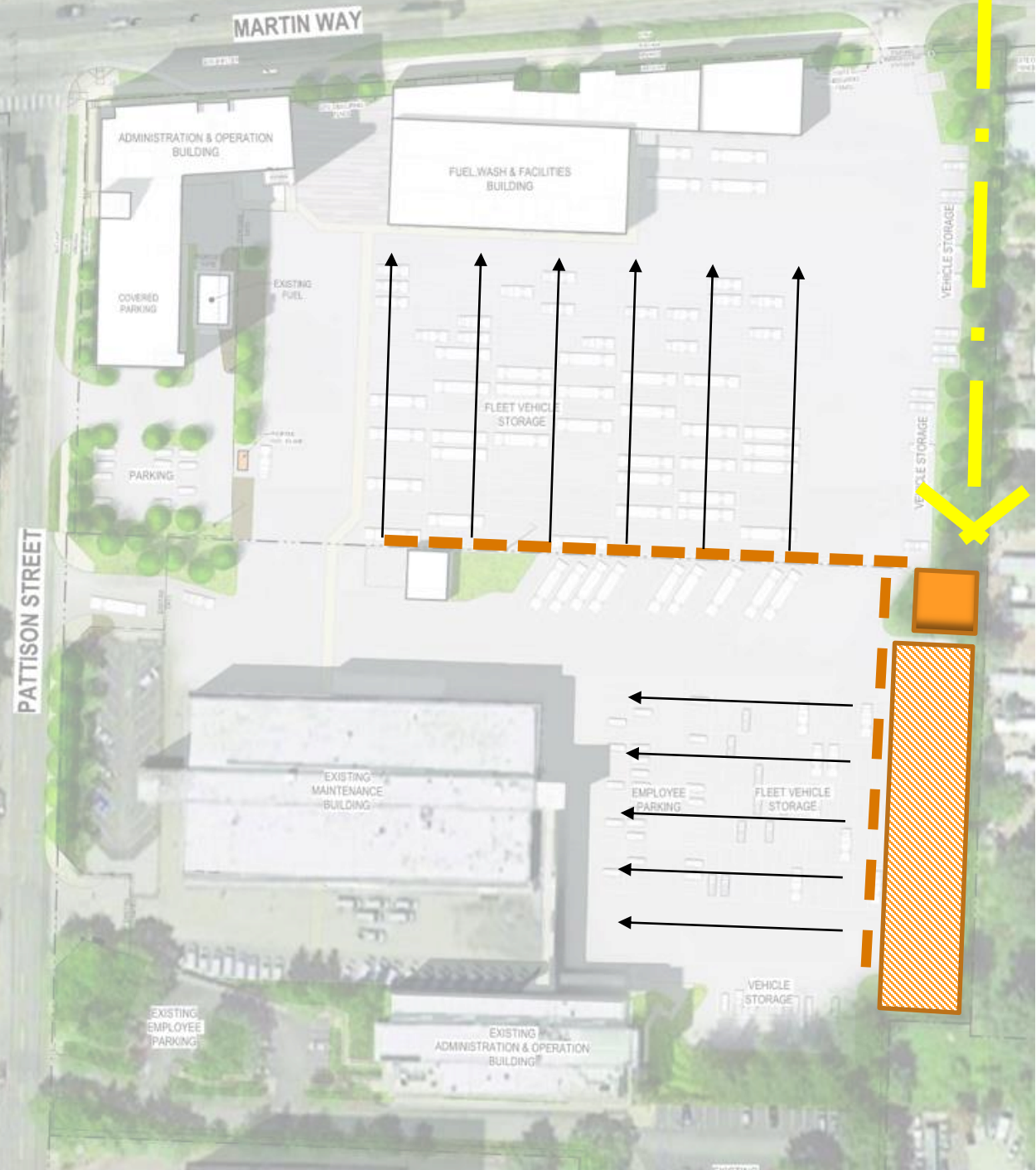
Make employee health and safety a top priority

- Provides substantial transit vehicle growth
- Primarily counter-clockwise circulation
- Existing exit gate repurposed to primary entry and exit location
- Employee parking no longer within the bus yard
- Perimeter site fencing will be provided to secure employee parking (north and south parcels)
- Pedestrian circulation across the site is identified and marked on pavement
- ZEB infrastructure location provided along east property line

VEHICLES	CURRENT	MASTER PLAN
40 ft Fixed-Route	71	108
Dial-A-Lift	44	88
Vanpool	253	74 (275 Total)
Support Vehicles	26	40
Employee & Visitors	107	211

PARKING USAGE	COUNT			Width	Length	Height
	Count	Program Count	Count			
Maintenance Building Level						
BUS - DEAD LINE	18	21	12'-0"	45'-0"	14'-0"	8'-0"
BUS - FLEET	91	86	12'-0"	45'-0"	14'-0"	8'-0"
BUS - TRANS	3	3	12'-0"	45'-0"	14'-0"	8'-0"
DIAL FLEET	84	80	11'-6"	30'-0"	14'-0"	8'-0"
EMPLOYEE	203	280	9'-0"	18'-0"	8'-0"	8'-0"
SUPPORT	40	40	10'-0"	20'-0"	10'-0"	8'-0"
VAN-COMMUNITY	5	6	9'-0"	18'-0"	8'-0"	8'-0"
VAN-VILLAGE	5	6	9'-0"	18'-0"	8'-0"	8'-0"
VANPOOL	63	50	9'-0"	18'-0"	10'-0"	8'-0"
VISITOR	3	120	9'-0"	18'-0"	8'-0"	8'-0"

**SITE PLAN
HIGHLIGHTS**



Power Feed from Martin Way

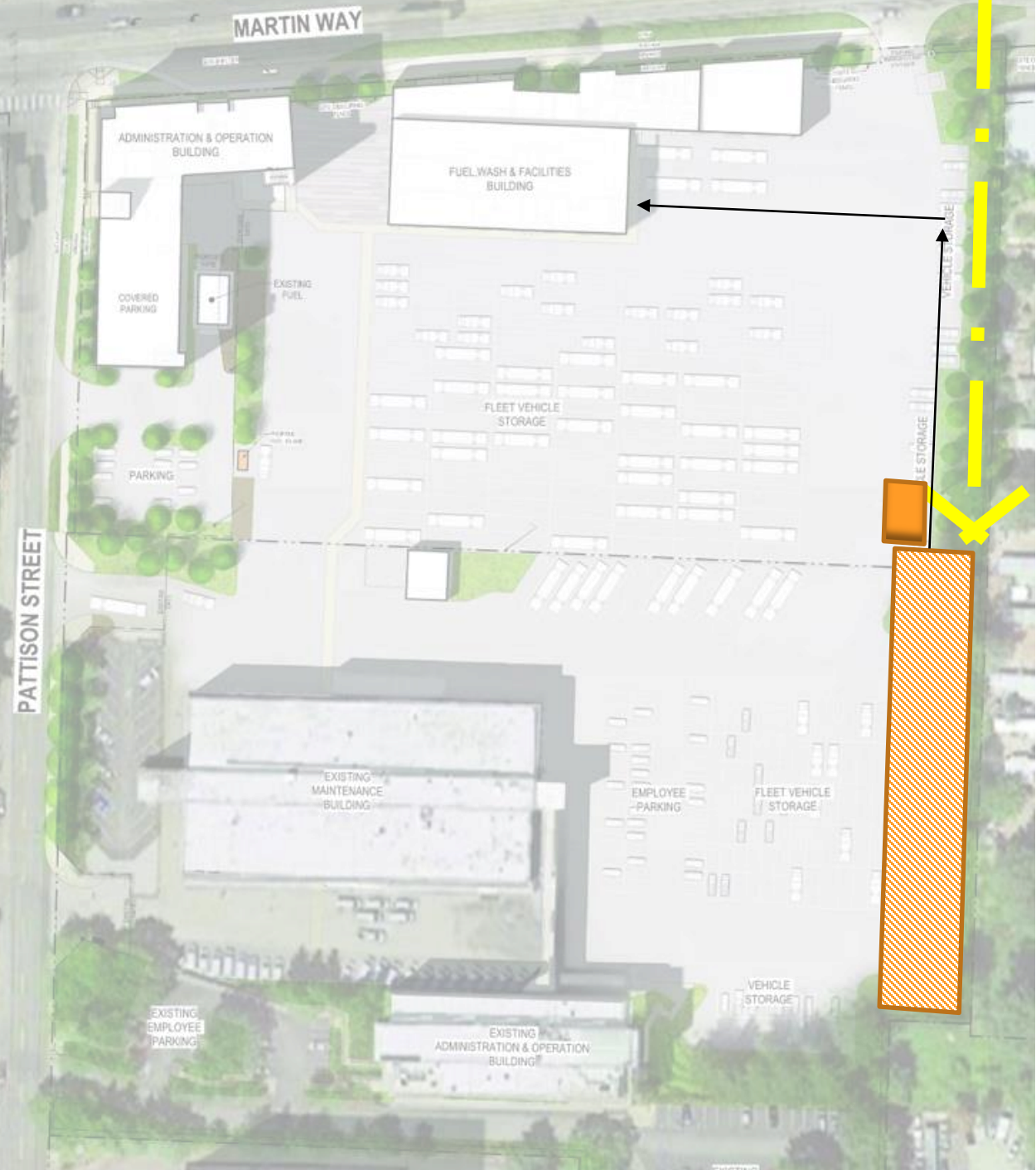
- Power requirements are TBD
- Substation(s) for new gear required
- Most likely required for both Battery and Hydrogen infrastructure
- Space is allocated along east edge of property

Battery Electric Buses

- Most likely feed exist. Bus Storage with overhead charging, but could also feed underground
- Potential loss of some vehicle parking for structure and infrastructure (overhead and/or at grade charging)

Cost Impacts

- Additional phases of construction
- Will affect Bus Storage parking to construct
- Will trigger south parcel storm water improvements (if not already constructed)
- Potentially add an Energy Management Building on site



Power Feed from Martin Way

- Power requirements are TBD
- Substation(s) for new gear required
- Most likely required for both Battery and Hydrogen infrastructure
- Space is allocated along east edge of property

Hydrogen Buses

- Source of hydrogen is TBD (delivered or created on site)
- Hydrogen tanks and (potentially) electrolyzer
- Connected into Fueling lanes or stand alone

Cost Impacts

- Additional phases of construction
- Will affect Bus Storage parking to construct
- Will trigger south parcel storm water improvements (if not already constructed)
- Will potentially impact current Fuel and Wash building design depending on preferred system(s) selected

**HYDROGEN
INFRASTRUCTURE SITE
PLANNING**