Innovative Clean Transit (ICT) Plan Update

SamTrans Board of Directors

November 1, 2023

Amended 10-30-2023

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AGENDA

1. Background
2. 2023 ICT Plan Update
3. On-going Efforts
4. Progress
5. Next Steps

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Innovative Clean Transit (ICT) Rollout Plan

December 2, 2020

Background

2018: California Air Resources Board (CARB) adopted ICT Regulation

- Requires transit providers to transition fleet to 100% Zero Emission (ZE) by 2040
- Requires 100% of fleet purchases to be ZE by 2029

2020: SamTrans ICT Plan approved by Board

- Battery electric buses (BEBs) only
- Includes diesel bus purchases
- Complete ZE transition in 2038

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SAN MATEO COUNTY TRANSIT DISTRICT

SAMTRANS INNOVATIVE CLEAN TRANSIT ROLLOUT PLAN

NOVEMBER 2023
DRAFT

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2023 ICT Plan Update

Mar-2023: Board Workshop

- ZE Technology Review: BEBS vs. Hydrogen Fuel Cell Electric Buses (FCEBs)
- Life Cycle Cost Analysis: BEBs vs. FCEBs

Nov-2023: Update aligns with Mar-2023 Board Workshop

- FCEBS in addition to BEBs
- Eliminates diesel bus purchases
- Enhanced analysis on equity & workforce
- Complete ZE transition in 2034

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Existing Conditions – **North Base**

Photo Credit: Craig Howell

Location

- 301 N Access Rd South San Francisco

Size

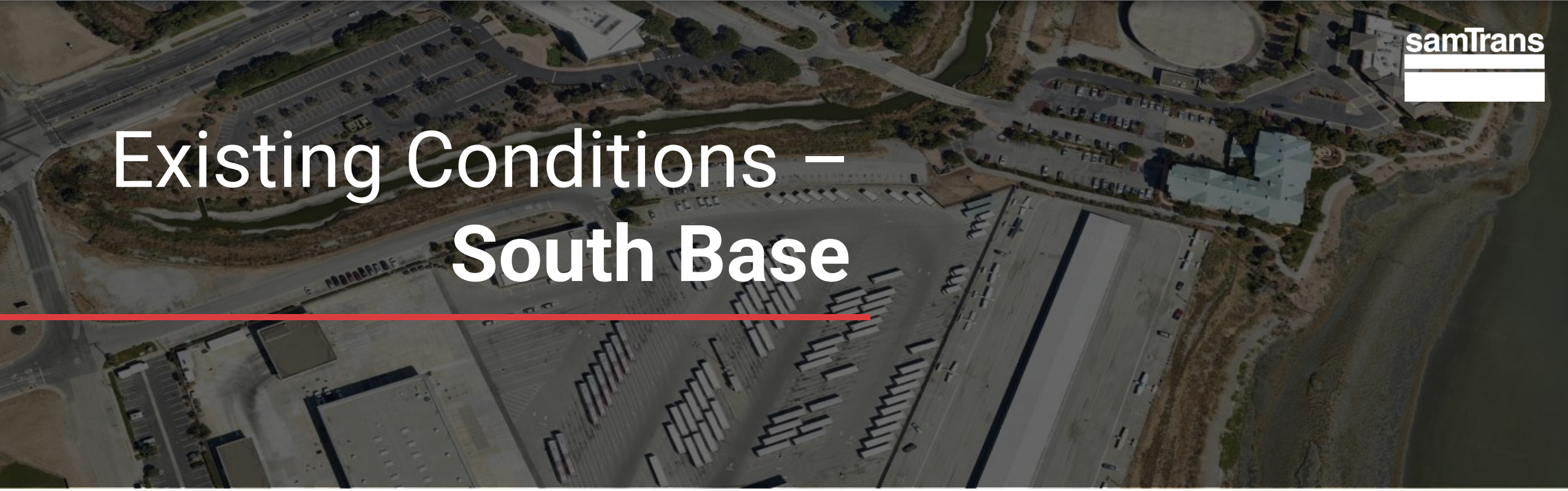
- 27 acres

Vehicles

- Accommodates 175 buses

Zero-Emission Infrastructure Status

- **10 Interim Chargers** commissioned
- 1 Hydrogen Mobile Refueler (early 2024)
- 4 indoor FCEB maintenance bays (early 2024)



Existing Conditions – **South Base**

Location

- 501 Pico Boulevard
  San Carlos

Size

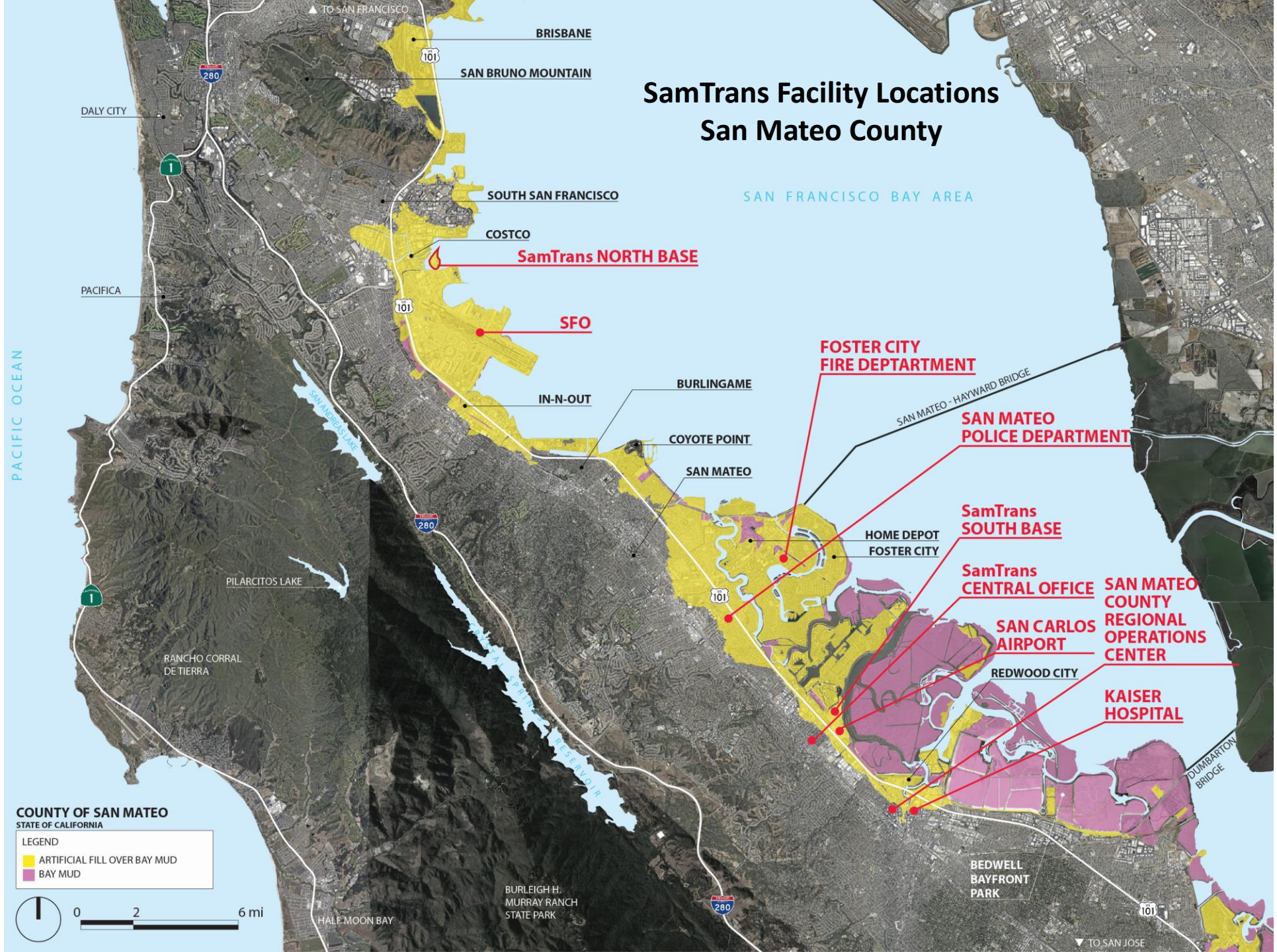
- 13 acres

Vehicles

- Accommodates 147 buses

Zero-Emission Infrastructure Status

- 10 Interim Chargers under construction (late 2024)
- 37 Permanent BEB Chargers (late 2026)


SamTrans Facility Locations
San Mateo County
SAN FRANCISCO BAY AREA
PACIFIC OCEAN
TO SAN FRANCISCO
BRISBANE
SAN BRUNO MOUNTAIN
DALY CITY
SOUTH SAN FRANCISCO
COSTCO
SamTrans NORTH BASE
PACIFICA
SFO
FOSTER CITY
FIRE DEPTARTMENT
SAN MATEO - HAYWARD BRIDGE
SAN MATEO
POLICE DEPARTMENT
BURLINGAME
IN-N-OUT
COYOTE POINT
SAN MATEO
SamTrans
SOUTH BASE
HOME DEPOT
FOSTER CITY
SamTrans
CENTRAL OFFICE
SAN MATEO
COUNTY
REGIONAL
OPERATIONS
CENTER
SAN CARLOS
AIRPORT
REDWOOD CITY
KAISER
HOSPITAL
PILARCITOS LAKE
RANCHO CORRAL
DE TIERRA
DUMBARTON
BRIDGE
BEDWELL
BAYFRONT
PARK
BURLEIGH H.
MURRAY RANCH
STATE PARK
HALF MOON BAY
TO SAN JOSE
COUNTY OF SAN MATEO
STATE OF CALIFORNIA
LEGEND
ARTIFICIAL FILL OVER BAY MUD
BAY MUD
0
2
6 mi

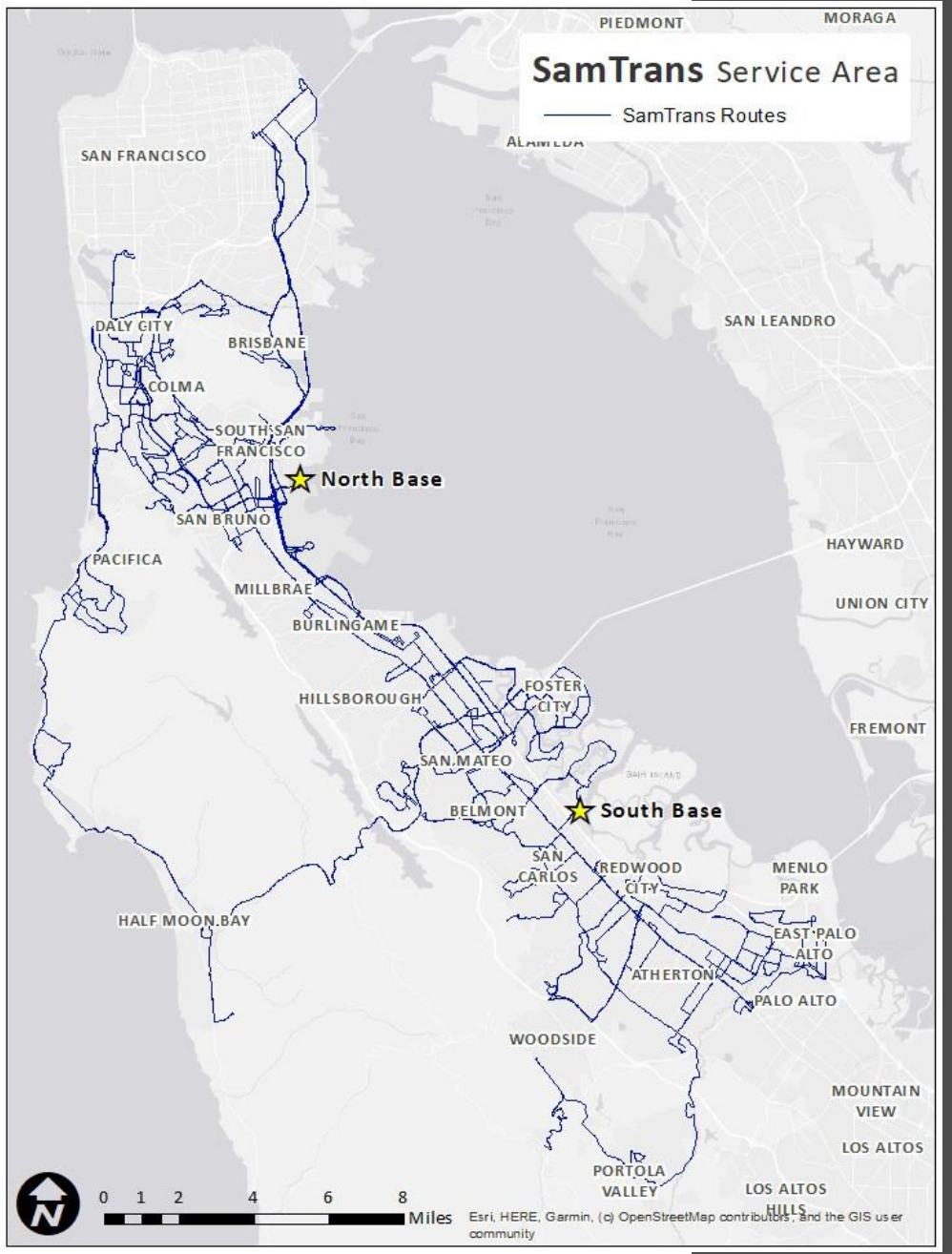
Existing Conditions

Fixed Route Service

446 square miles
service area

Over **10 million**
trips (pre-COVID)

67 Routes
Local | Community |
Express/Limited |
School-oriented | Owl |
& Special Routes

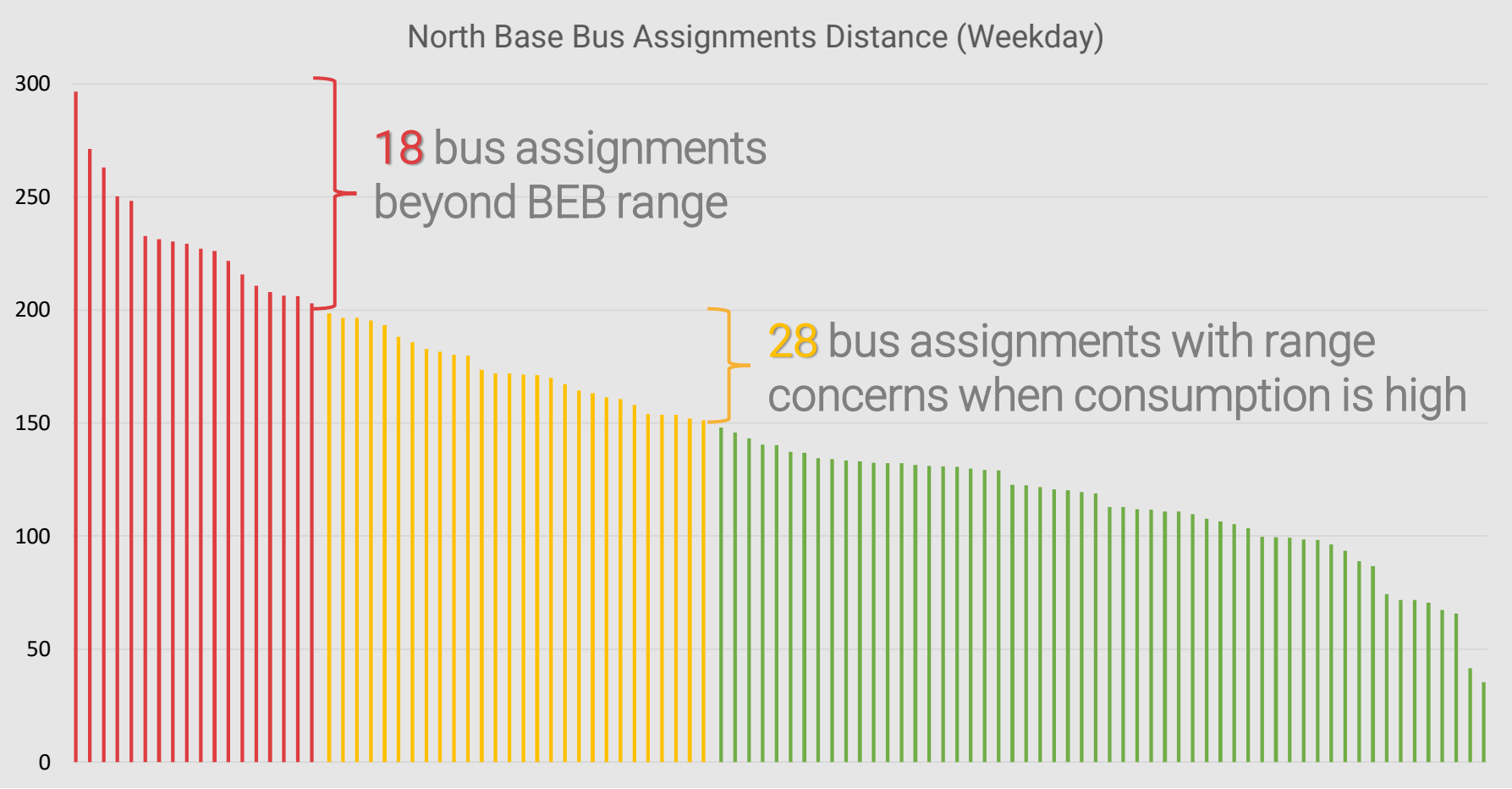


Existing Conditions

Fixed Route Service (North Base)

- BEB Travel Range: ~150 miles – 200 miles
- FCEB Travel Range: ~300 miles

Assumed 40' bus with 440 kWh, energy consumption at 2.02 kWh/mile – 3 kWh/mile.



- 18% - 45% of bus assignments may have range concerns if only using BEBs
- All bus assignments can be completed by FCEBs

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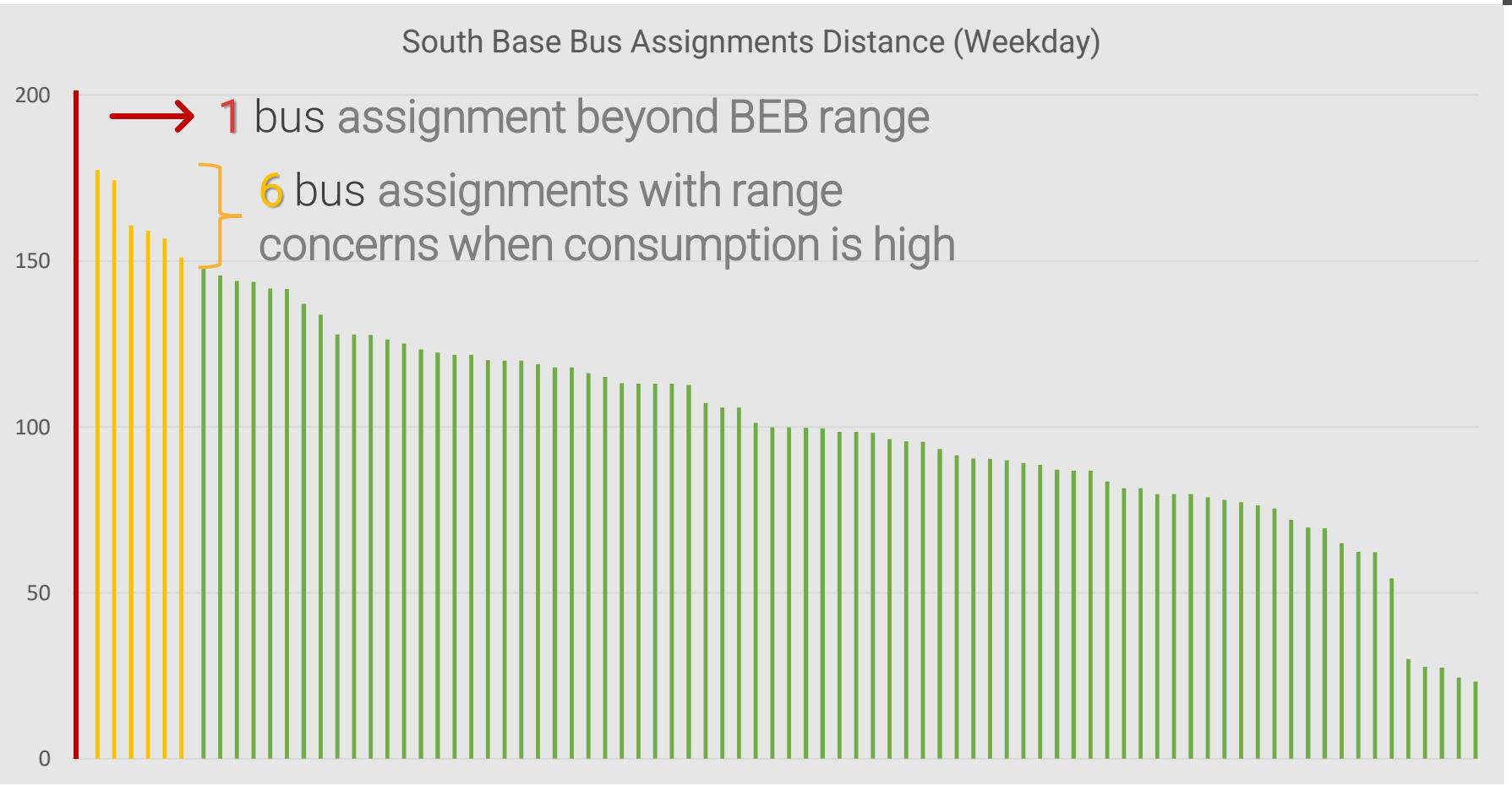
Existing Conditions

Fixed Route Service (South Base)

- BEB Travel Range: ~150 miles – 200 miles
- FCEB Travel Range: ~300 miles

Assumed 40' bus with 440 kWh, energy consumption at 2.02 kWh/mile – 3 kWh/mile.



- Fewer bus assignments than North Base
- Most bus assignments are shorter than 150 miles
- 1% - 8% of bus assignments may have range concerns if only using BEBs

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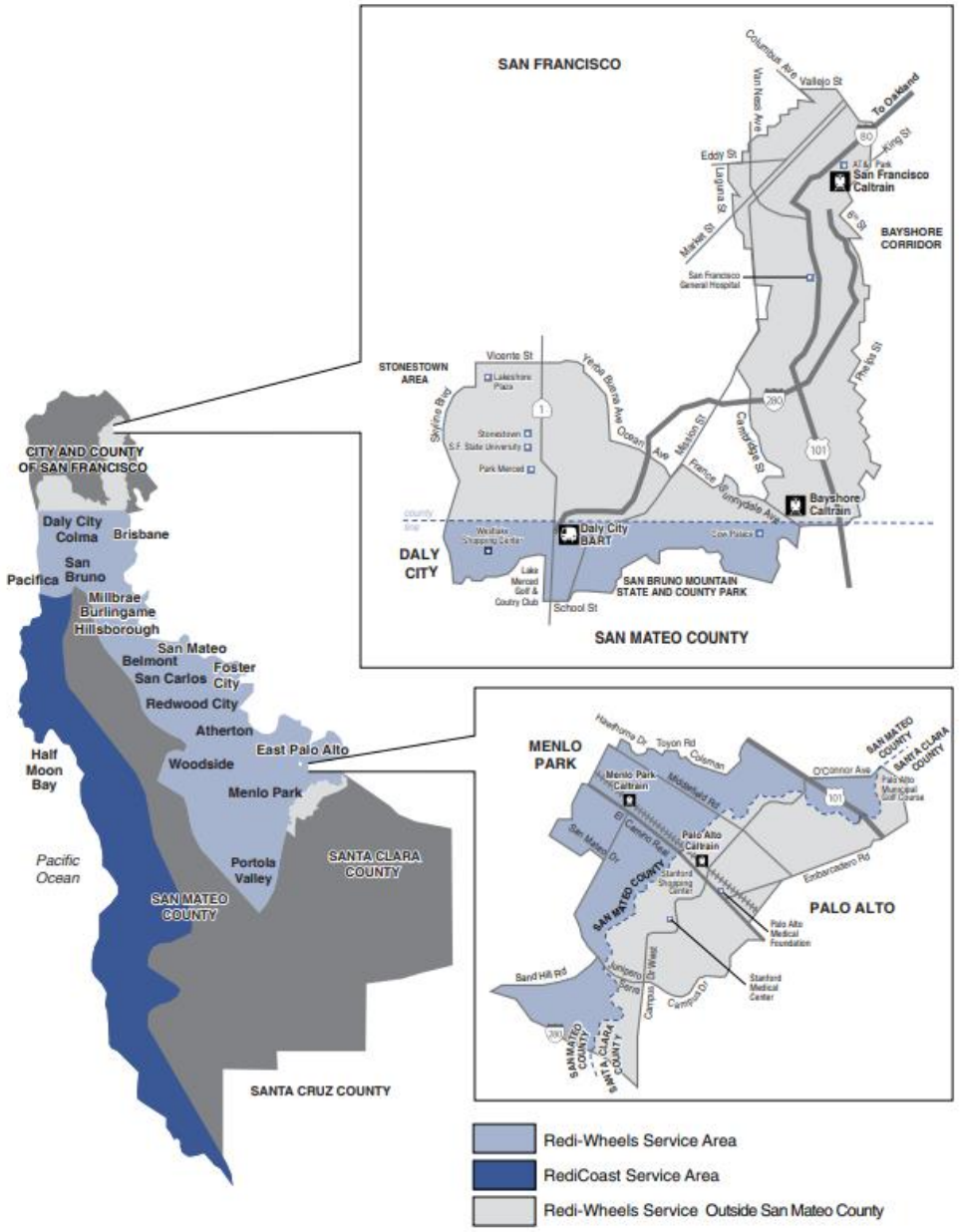

Existing Conditions
Paratransit Service

70 Vehicles
To be replaced by ZEVs starting 2026

Shared Ride, Curb-to-Curb Service
Optional door-to-door

Over 344K
trips (pre-COVID)

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2023 ICT Plan Update

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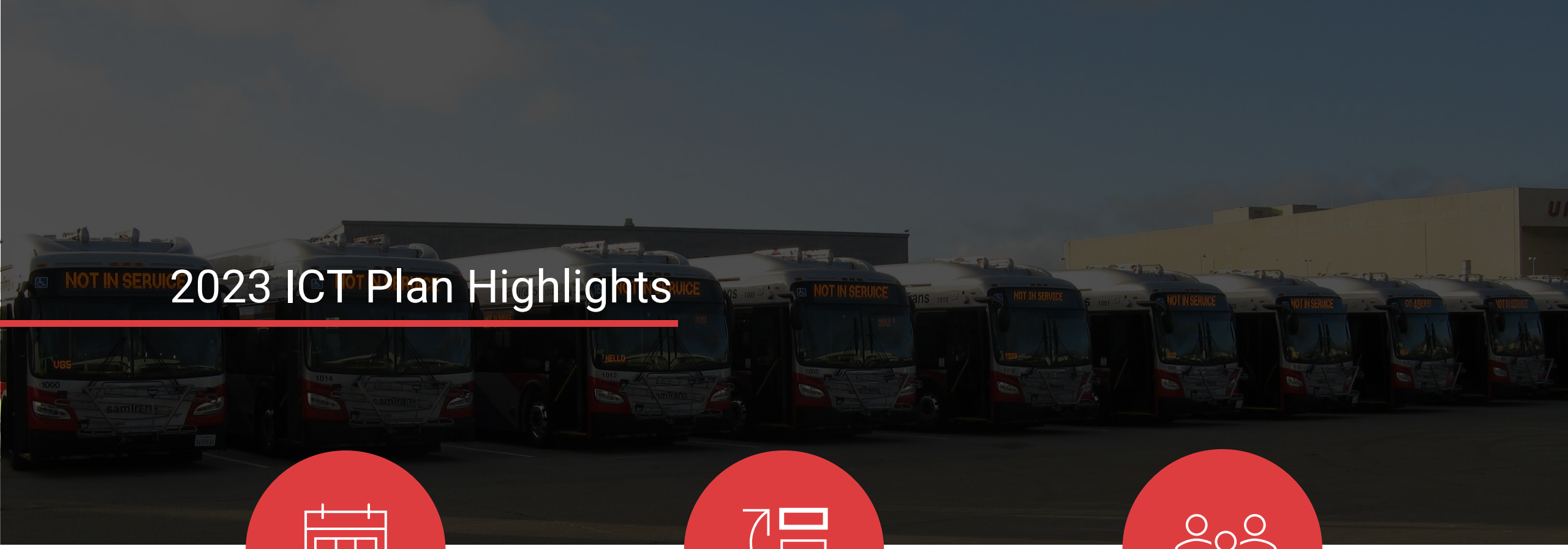

2023 ICT Plan Highlights

Updated transition timeline achieving **full ZE fleet in 2034** – 4 years ahead of the 2020 Rollout Plan timeline

Updated **technology** evaluations and review of the zero-emission **market**

Closer review of the **equity** impact and **workforce** development implications

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FCEBs vs. BEBs

ZE Technology Comparison

		Fuel Cell Electric Bus (FCEB)	Battery Electric Bus (BEB)
Market	Number of Manufacturers		✓
Operations	Advertised Range	✓	
	Fueling Time	✓	
	Resilience	✓	
Costs	Maintenance		✓
	Energy/Fuel		✓
Facility	Infrastructure	✓	
Climate	GHG Reduction		✓

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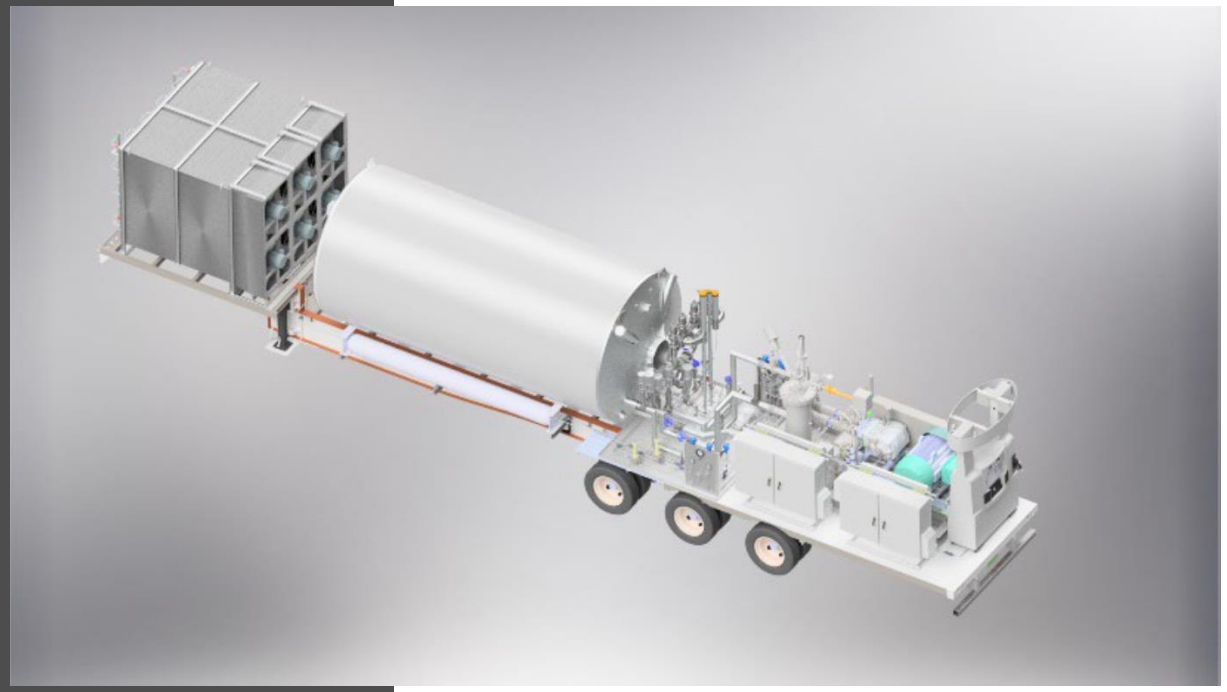
FCEB Demonstration



Mobile Hydrogen Refueler

- June 2022: Board approved purchase of 10 FCEBs for North Base as part of a Demonstration Program
- May 2023: Board approved purchase of a mobile hydrogen refueler & award of a 2-year hydrogen supply contract for the 10 FCEBs
- May 2023: Board approved contract to modify 4 maintenance bays at North Base to enable indoor maintenance of FCEBs

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2023 ICT Plan

Lifecycle Costs – North Base

- FCEBs have lower infrastructure costs
- BEBs have lower energy costs
- 12-year lifecycle cost savings of FCEB fleet estimated at $94 M

CAPITAL & OPERATING COSTS (12-year Lifecycle)		
Item	**BEB Option**	**FCEB Option**
Number of Buses	185	162
Buses	$252,393,157	$247,008,174
Infrastructure	$144,950,000	$36,150,000
Maintenance	$40,492,886	$50,686,882
Energy (Electricity & Hydrogen)	$41,096,703	$51,129,786
Lifecycle Cost Total (NB)	$478,932,746	**$384,974,842**

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2023 ICT Plan

Fleet Procurement Plan

Procurement Year	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
FCEBs (No. Base)	**0**	**10**	**20**	**88**	**26**	**0**	**0**	**0**	**0**	**0**	**0**	**31**
BEBs (So. Base)	**7**	**30**	**0**									
ZEBs (So. Base)*				**0**	**36**	**0**	**0**	**0**	**50**	**0**	**0**	**24**

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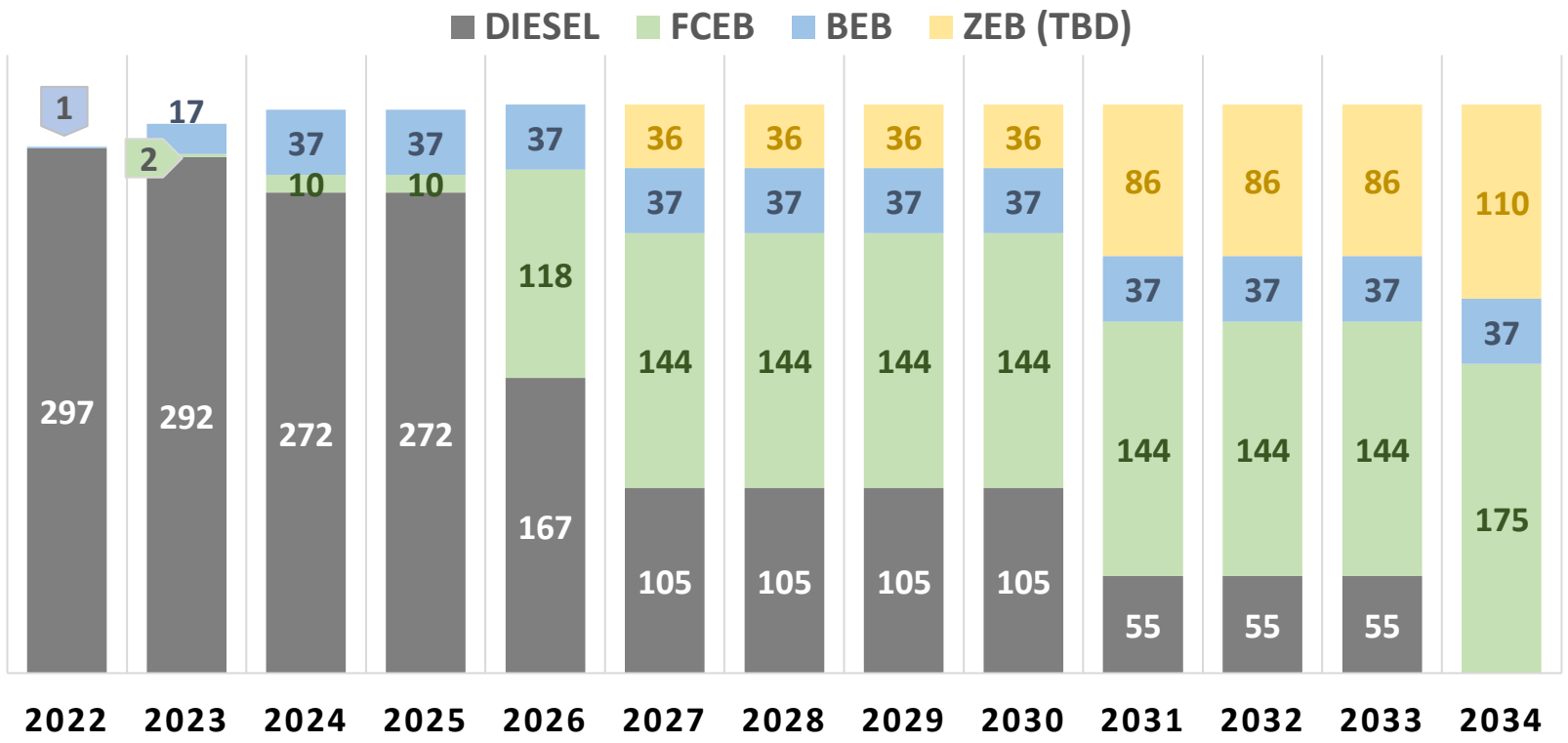
* Defer decision on type of ZEB for remaining So. Base fleet until 2024

2023 ICT Plan

Fleet Replacement Plan



2023 6% ZEB

2026 48% ZEB

2034 100% ZEB

2023 ICT Plan

Infrastructure

Hydrogen Storage & Fueling Station

- Hydrogen Storage & Fueling Station at North Base
- Additional Modifications to North Base Maintenance Building
- Additional Permanent BEB Chargers and/or Hydrogen Fueling Station at South Base, depending on decision for remaining fleet

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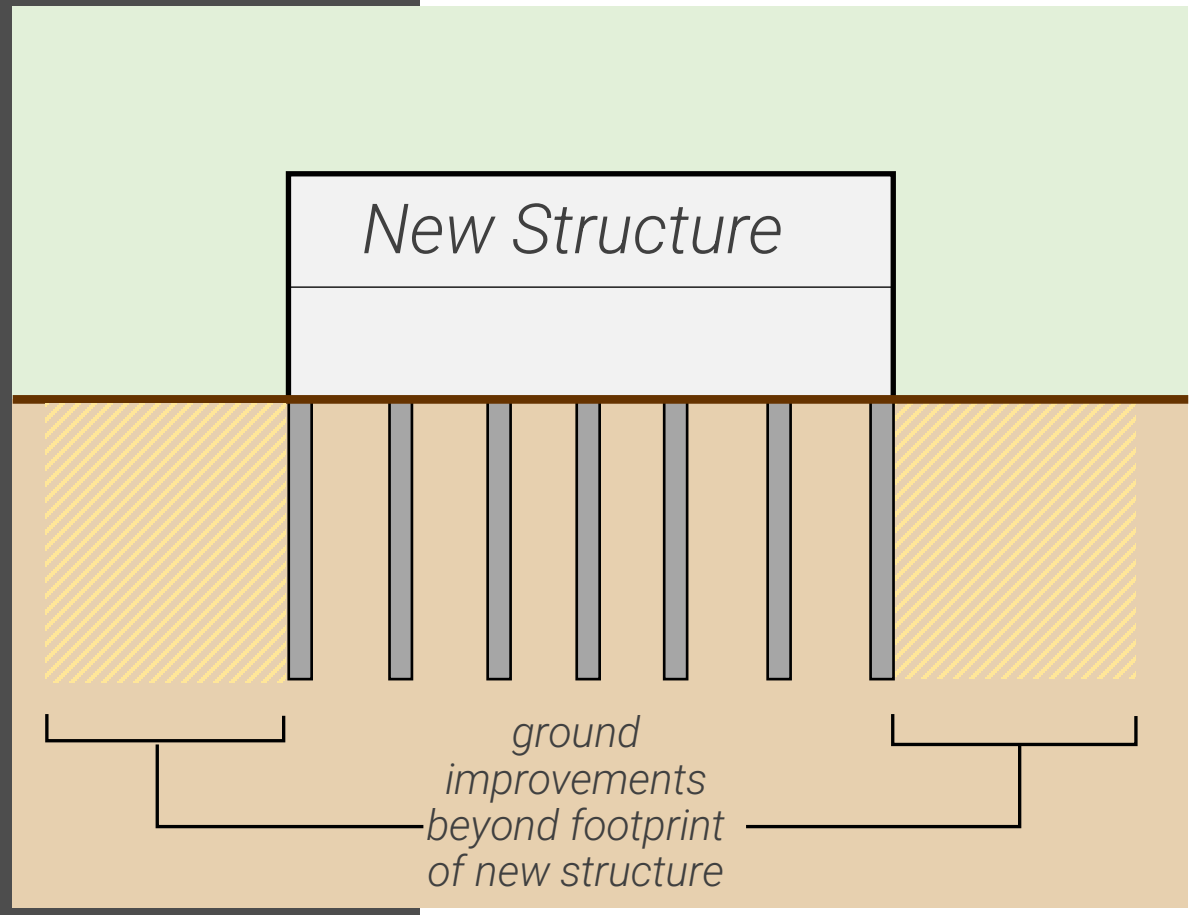
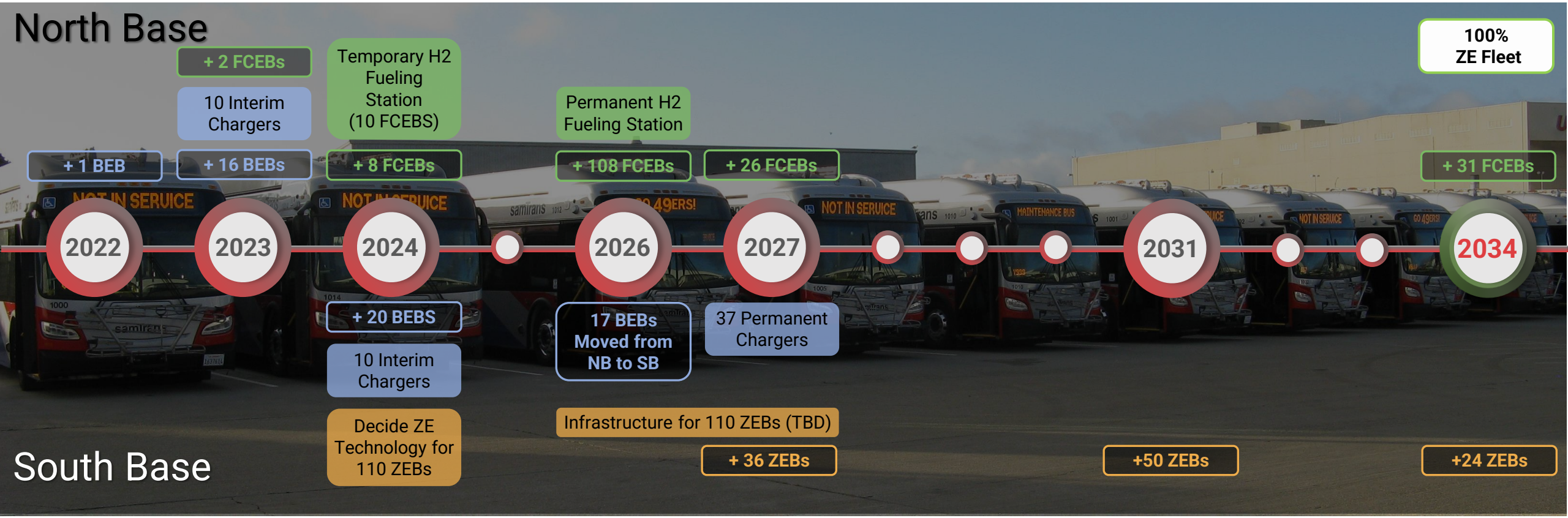
Soils & Foundations



- Add materials to strengthen soil
- Install deep foundations to reduce settlement potential
- Place ground improvements beyond the building's footprint to confine soil
- Engage an independent third-party geotechnical engineer to review foundation design

2023 ICT Plan

Path to Zero Emissions



2023 ICT Plan

Cost Estimates & Funding

Item	Year of Expenditure	Estimate (in $M)	Grants and Incentives
Zero Emission Buses (ZEBs)			
FCEBs	FY24	$ 162.3	$123.9M (FTA & State grants) + HVIP[2]+ ARCHES[3]
FCEBs	FY25 - FY32	$ 135.3	FTA (70% - 80% of Cost) + State Incentives
ZEBs (TBD)[1]	FY25 - FY32	$ 198.4	FTA (70% - 80% of Cost) + State Incentives
Paratransit	FY25 - FY32	$ 35.0	FTA (70% - 80% of Cost) + State Incentives
Total - ZEBs		$ 531.0	
ZEB Infrastructure			
No. Base - FCEB	FY24 - FY26	$ 36.2	ARCHES[3] Grant (amount pending)
So. Base - BEB	FY24 - FY27	$ 37.5	$28.12M in Federal & State grants
So. Base - ZEB (TBD)[1]	FY26 - FY31	$ 93.6	Apply for Competitive Grants
Total - ZEB Infrastructure		$ 167.3	

[1] Cost Estimates assume remaining ZEBs are BEBs

[2] HVIP - CA Hybrid & Zero Emission Truck & Bus Voucher Incentives

[3] ARCHES - Alliance for Renewable Clean Hydrogen Energy Systems (D.O.E. Hydrogen Hub Grant Recipient)

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2023 ICT Plan

Equity Analysis

Equity Priority Areas

- Low-income households
- Racial and ethnic minorities
- Zero-car households

Goal: Prioritize service in Equity Priority Areas

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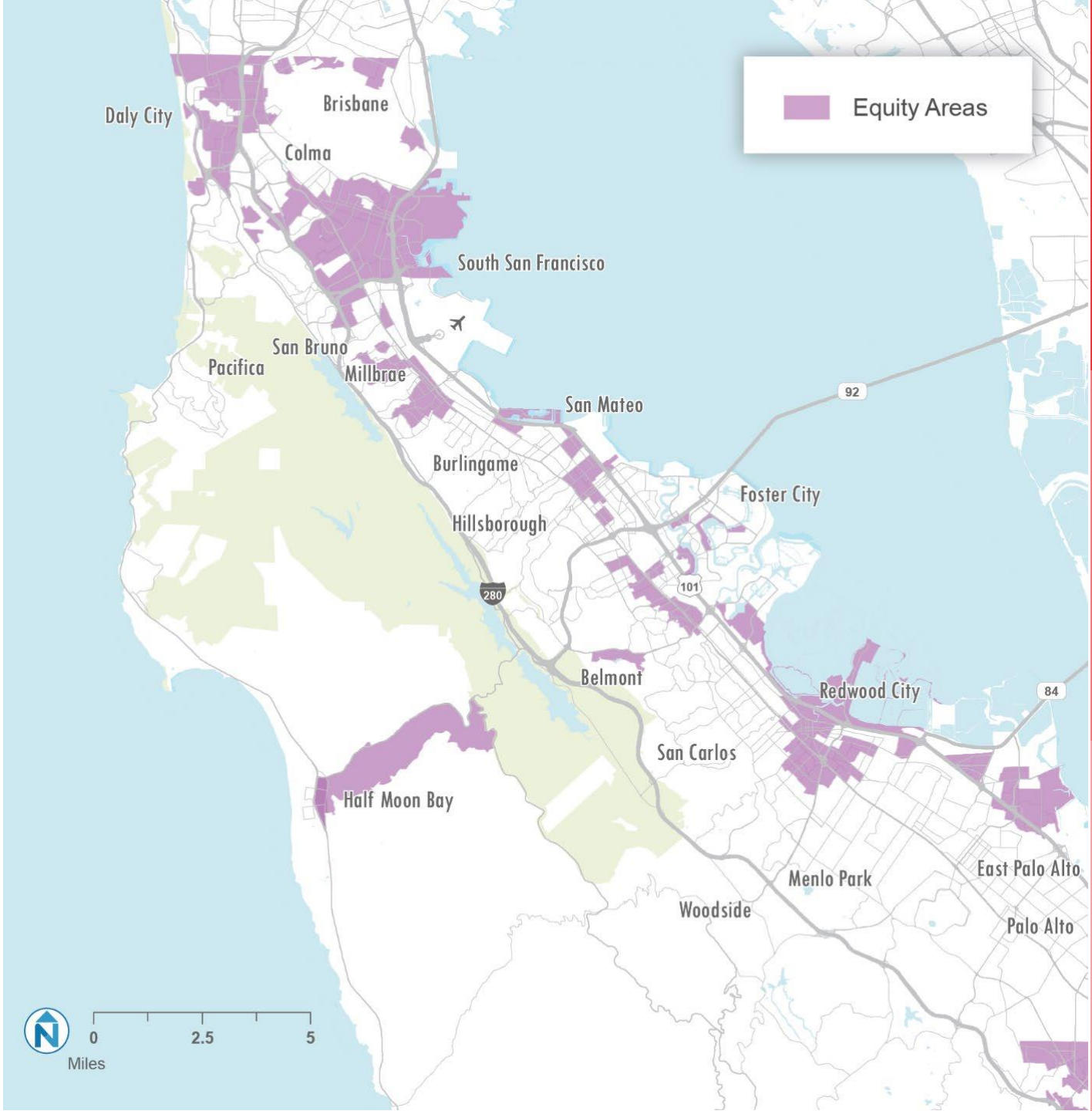


Improve Air Quality

Reduce Ambient Noise

Reduce Pollution

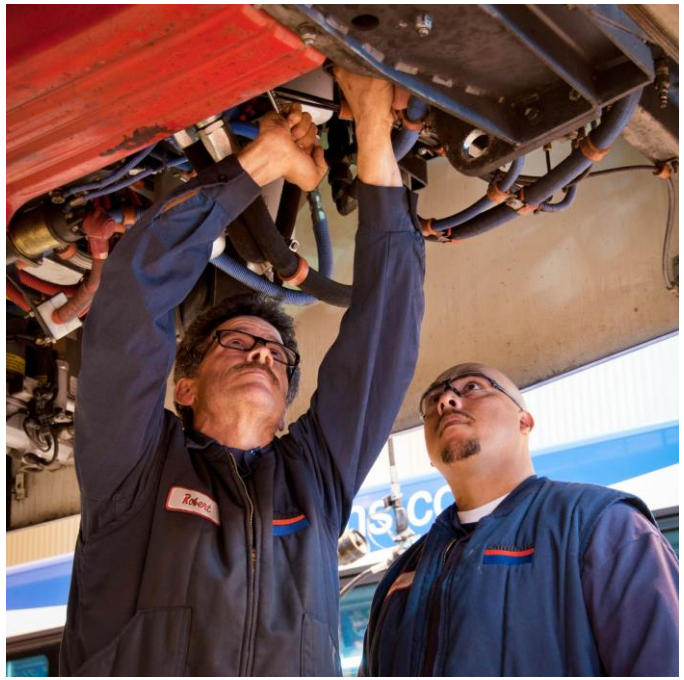
2023 ICT Plan

Workforce Training

Similar job duties/descriptions.
New skills!

- Training
- Skills gap assessment
- Re-skilling modules

SamTrans commits to training staff!



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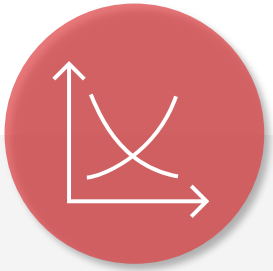
2023 ICT Plan

Considerations & Challenges

Significant Supply Chain & Production Delays



BEB Market Fluctuations & Limited FCEB Options

New Protocols for Emergency, Safety, and Resiliency Management

Material Sourcing & End-of-Life Sustainability

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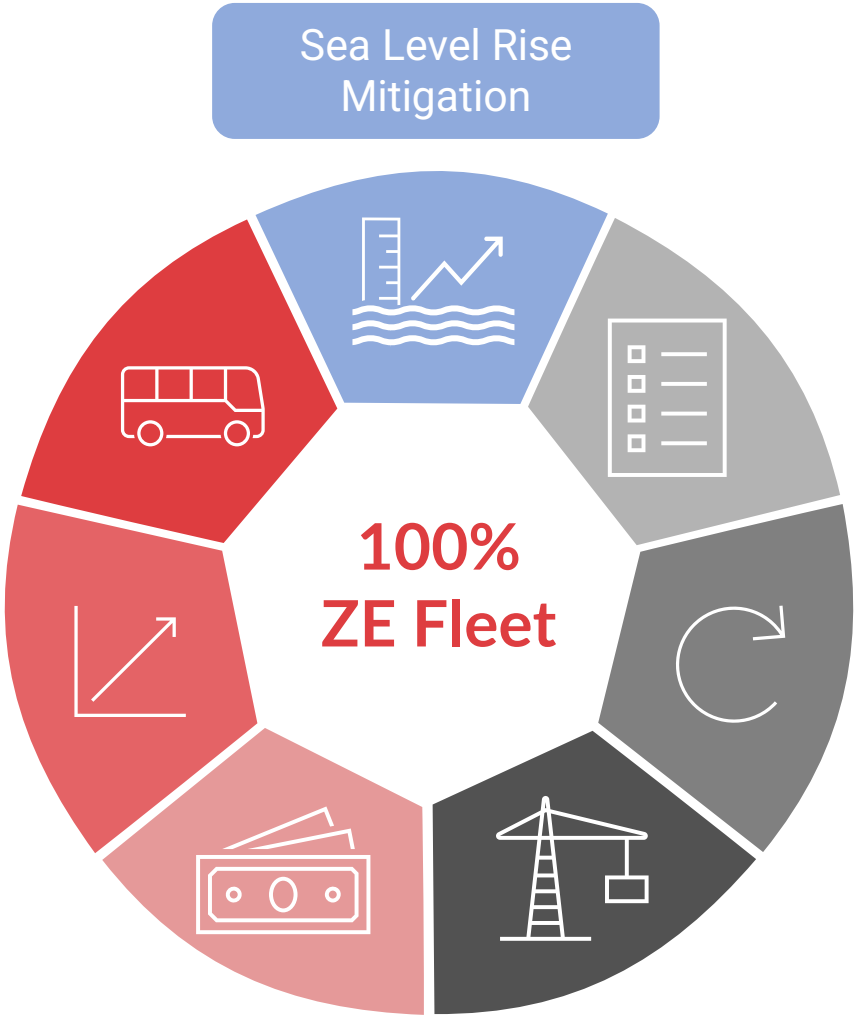
Ongoing Efforts

- BEB & FCEB Real-World Data Collection
- Continued Monitoring of the Market
- Funding Applications



- Periodic Review of Plan
- ICT Regulation Annual Fleet Update
- Facility Upgrades and Vehicle Procurements

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Progress

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Progress

17 BEBs delivered to No. Base
10 BEBs in revenue service

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Progress

1 FCEB delivered to North Base

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Progress

North Base Facility Modifications for 10 FCEBS

General Work Activities

Lighting relocation

Electrical Work

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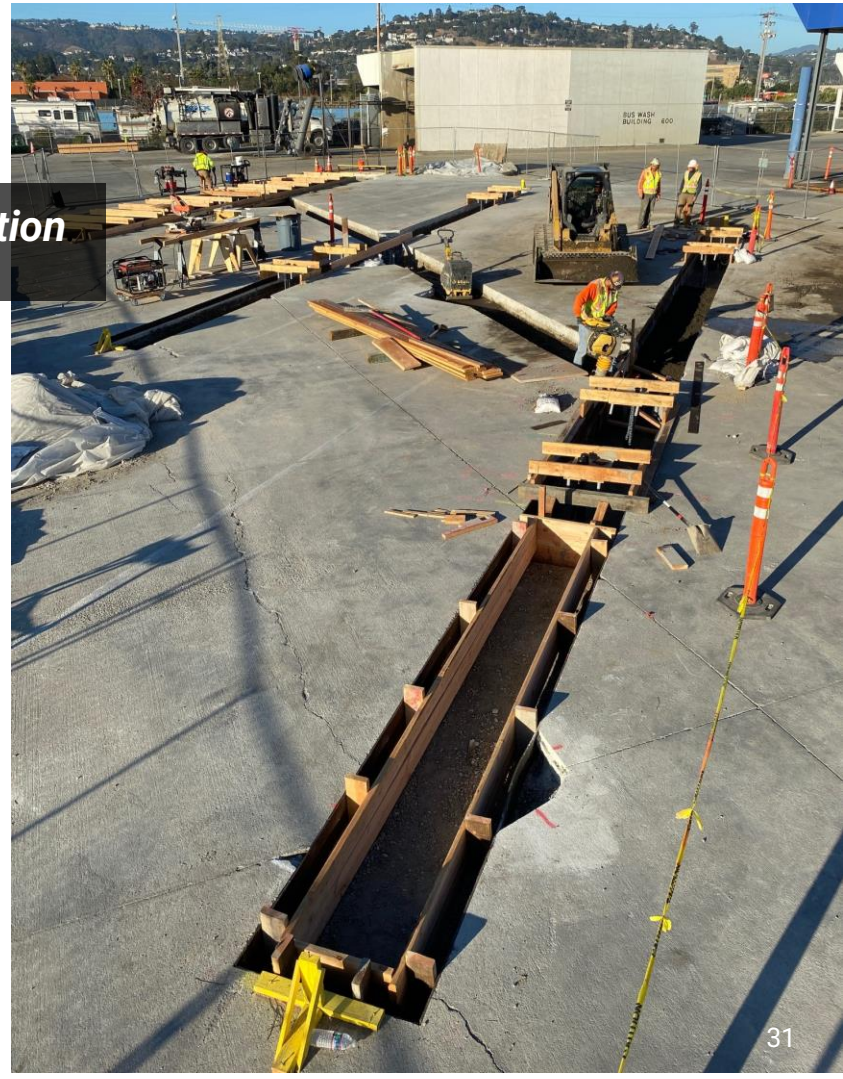
Progress

South Base Installation of 10 Depot Chargers

Construction of Charger Pads.

Conduit installation



NEXT STEPS

- **Seek Board Approval of Updated ICT Rollout Plan at December 2023 BOD Meeting**
- **Submit Updated ICT Plan to California Air Resources Board**
- **Seek Board Approval for Purchase of up to 108 FCEBs at December 2023 BOD Meeting**

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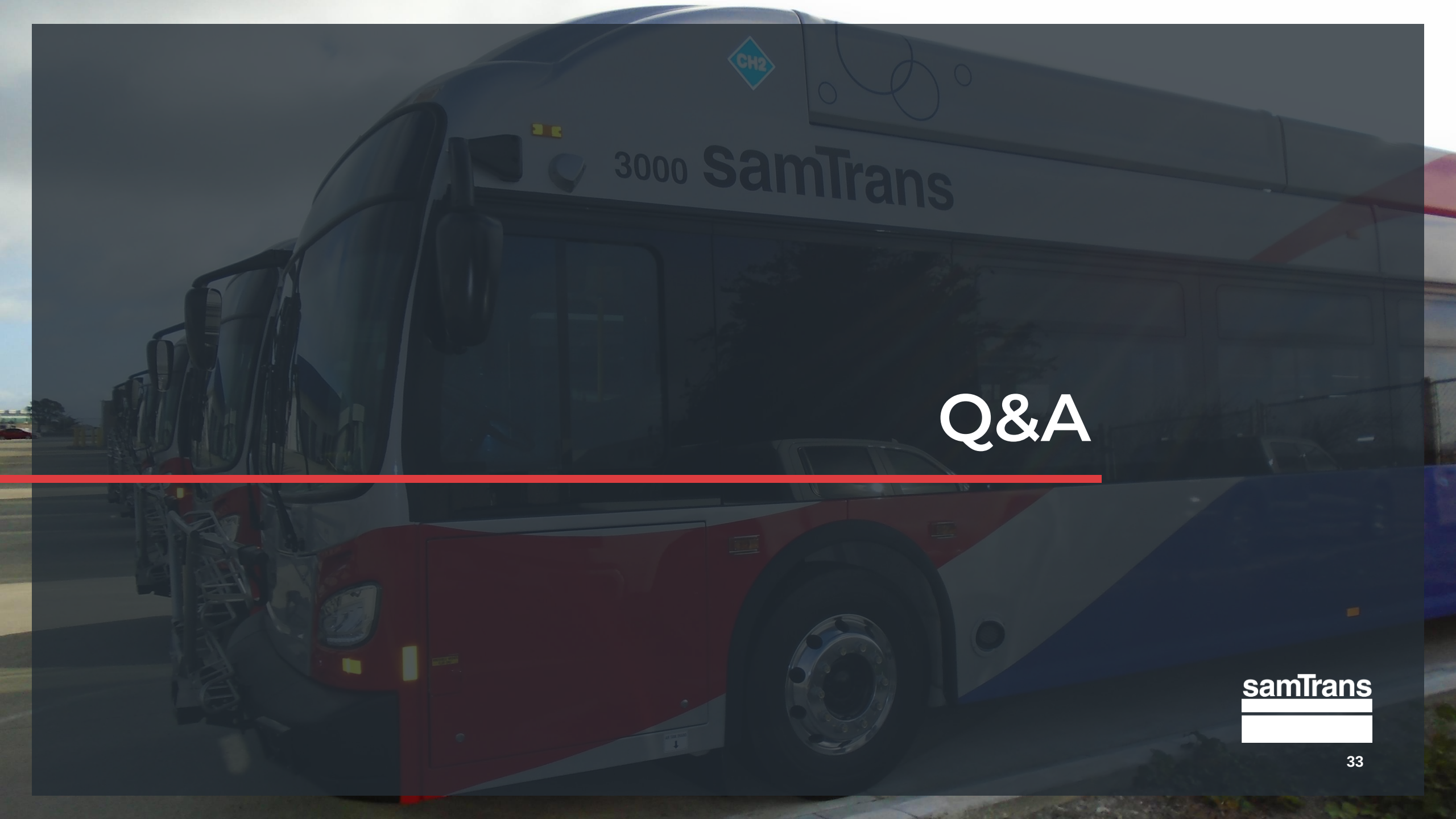

Q&A

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