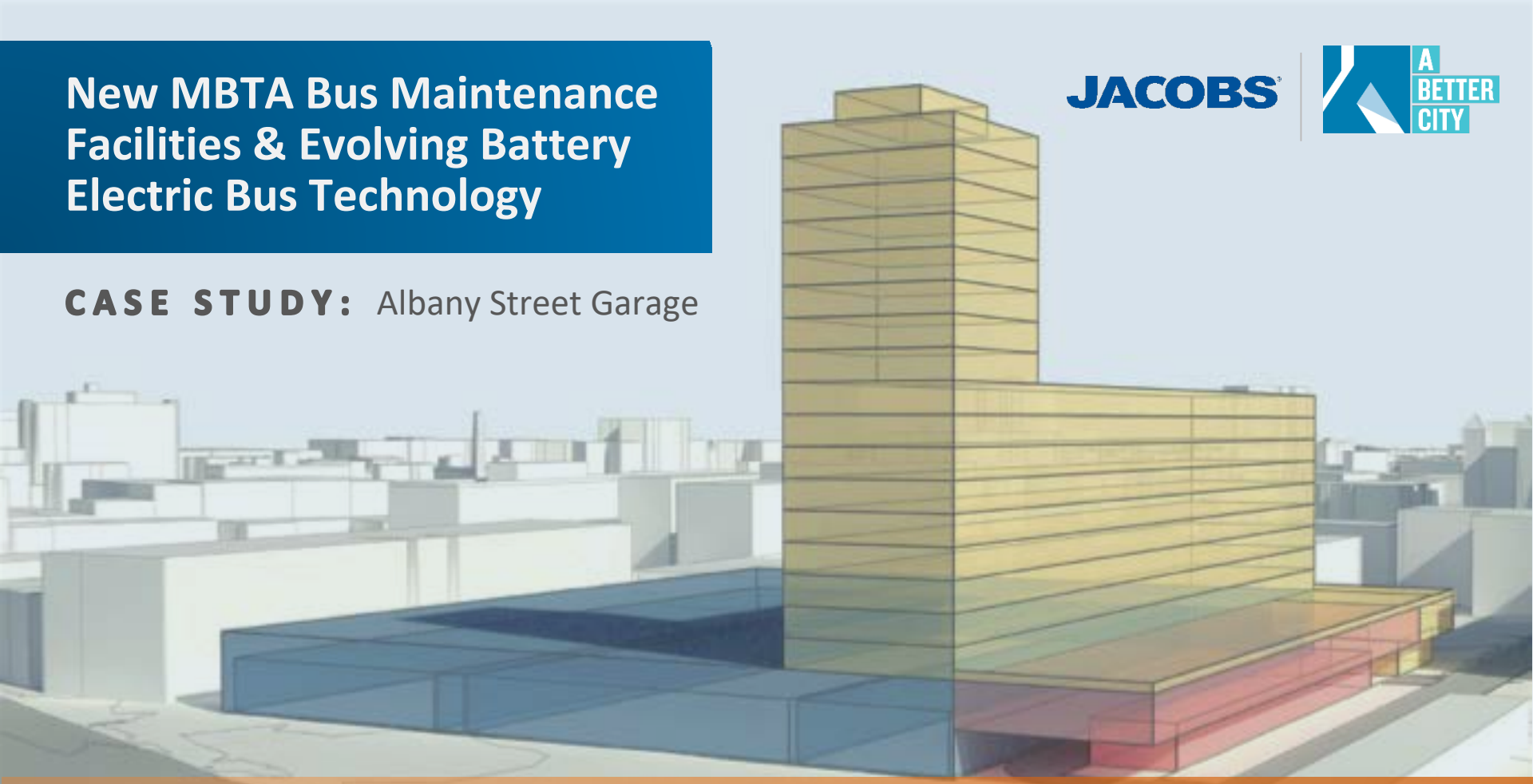
New MBTA Bus Maintenance Facilities & Evolving Battery Electric Bus Technology

CASE STUDY: Albany Street Garage

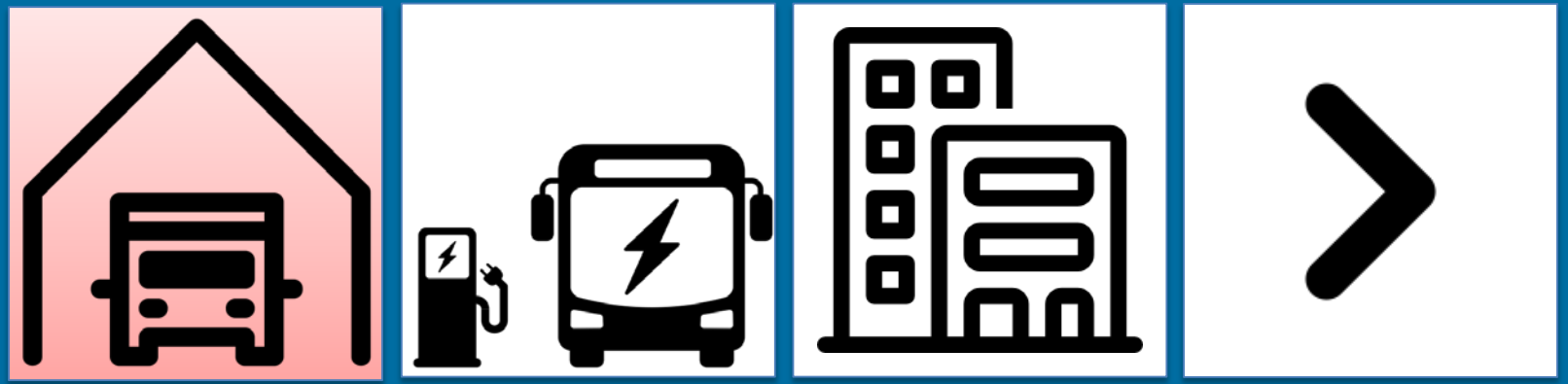


August 7, 2019

TAKEAWAYS

1. Approximately $1 B financial challenge
2. BEB fleets in NE likely in 5-7 years
3. Joint-development benefits may help
   - Cost-effective procurement
   - Better neighborhood fit for facilities, not divest urban sites
   - Decarbonization and climate goals

NEED

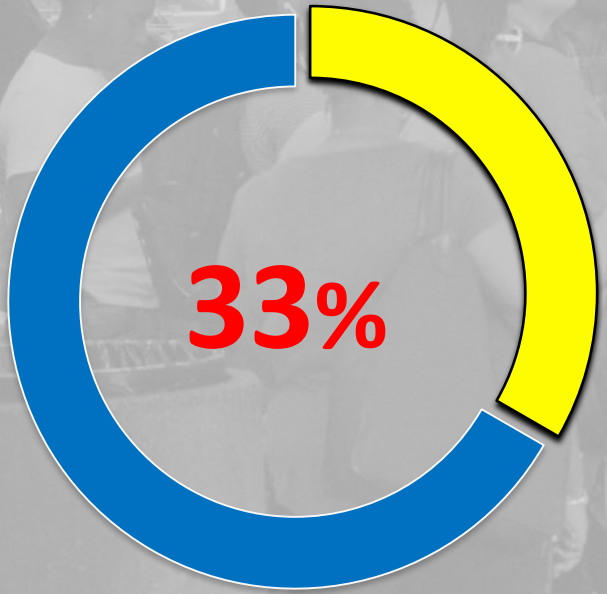


Need BEB Multi-use Next

JACOBS

A BETTER CITY

BUS



$1B FUNDING NEED

	Facility	Age	Capacity	Rating
1.	**Albany**	**76**	116	2.7
2.	Arborway	13	118	3.1
3.	Cabot	42	180	2.8
4.	Charlestown	42	254	2.0
5.	**Fellsway**	**92**	76	2.4
6.	**Lynn**	**81**	90	2.7
7.	North Cambridge	38	28	3.2
8.	**Quincy**	**87**	86	2.4
9.	Southampton	15	98	3.6
	Fleet Average	**49**	1,046	2.8

MBTA, INTEGRATED FLEET & FACILITIES PLAN, DEC. 2017

JACOBS

A BETTER CITY

CHALLENGING LAYOUTS

OUTDOORS & FULL

OBSOLETE

JACOBS | A BETTER CITY

MODERNIZED

JACOBS

A BETTER CITY

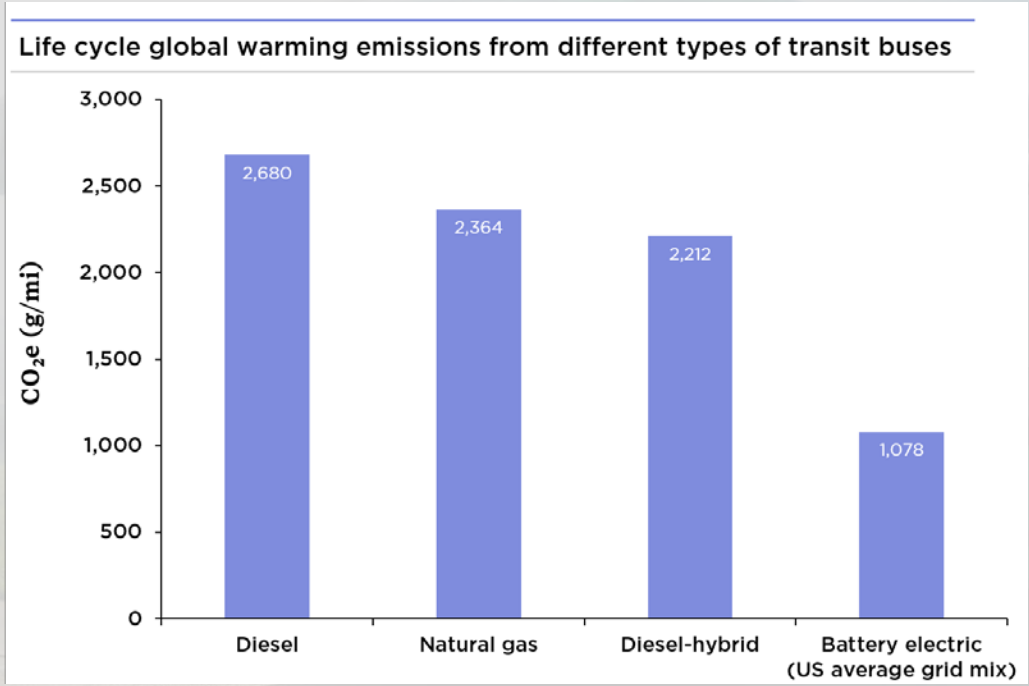
CLIMATE GOALS

- “Achieving the Commonwealth’s [2040 goals] will require the near-complete transition of our vehicle fleet…buses…to electric vehicles.

- “…by 2030, all…buses (as appropriate) purchased with state resources will be ZEVs

Governor’s Commission on the Future of Transportation, Dec. 18, Vol. 1, pp. 64

BEB CO_2 BENEFITS



https://blog.ucsusa.org/jimmy-odea/electric-vs-diesel-vs-natural-gas-which-bus-is-best-for-the-climate

Note: Power plant data as of 2016

JACOBS

A BETTER CITY

BEB NORTH AMERICAN MARKET

JACOBS | A BETTER CITY

BEB $/BUS

Type	Cost ($)	Year	Agency
40' Proterra E2	**950,000**	2014	The City of Seneca
40' Proterra E2	789,000	2015	Foothill Transit
40' Proterra E2	797,882	2016	King County Metro
40' Proterra E2	784,000	2017	King County Metro
40' Proterra E2	**700,000**	2018	DC's National Mall

$/BUS COMPARISON

Type	Cost ($)	Year	Agency
Diesel	553,760	2015	MBTA
CNG	585,990	2015	MBTA
Diesel-Hybrid	**769,000**	2017	King County Metro
Diesel-Hybrid	**736,927**	2018	MBTA
BEB	**784,000**	2017	King County Metro

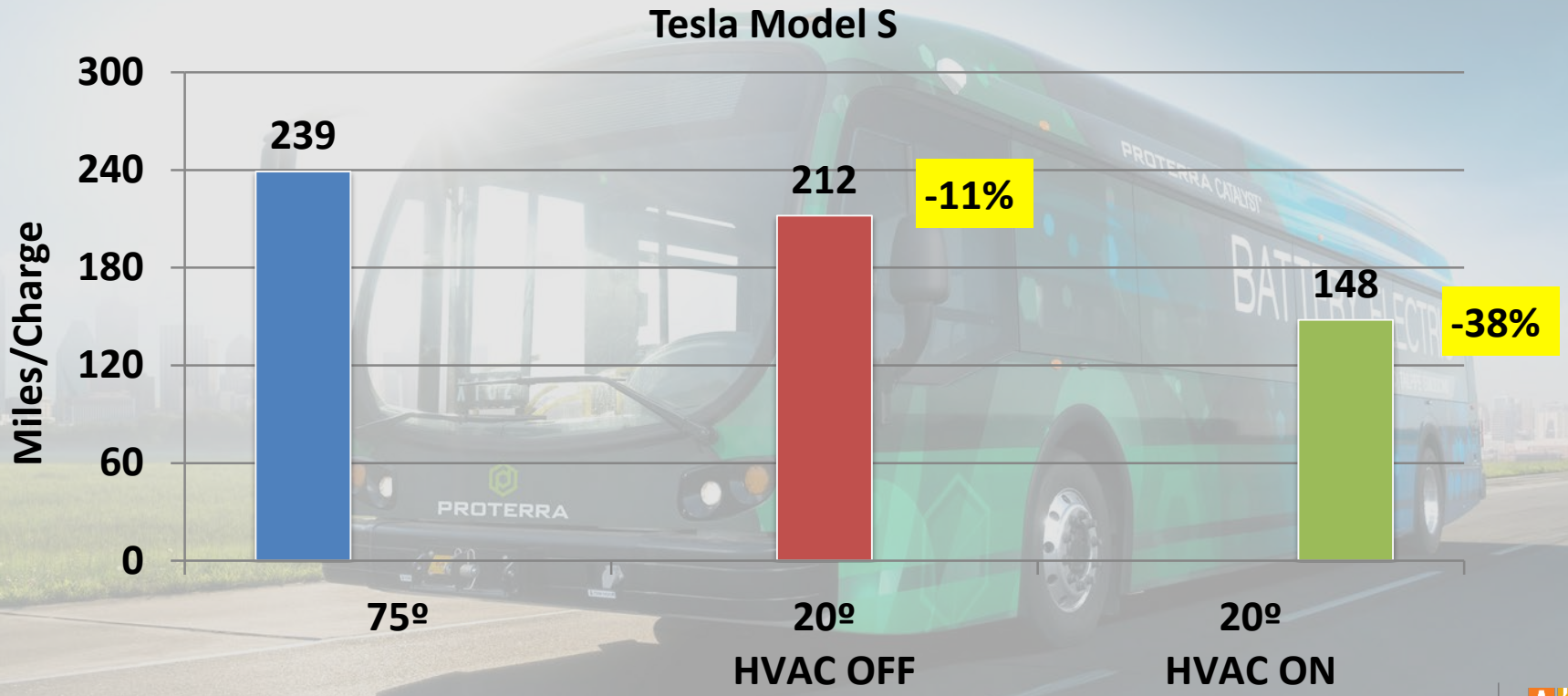
MBTA BEB INITIATIVES

- 5x 60-foot BEBs bought under FTA “Lo-No” grant program
- Support Silver Line service
- Evaluate technology in MBTA service / climate
- 40-foot BEB evaluation program anticipated

JACOBS

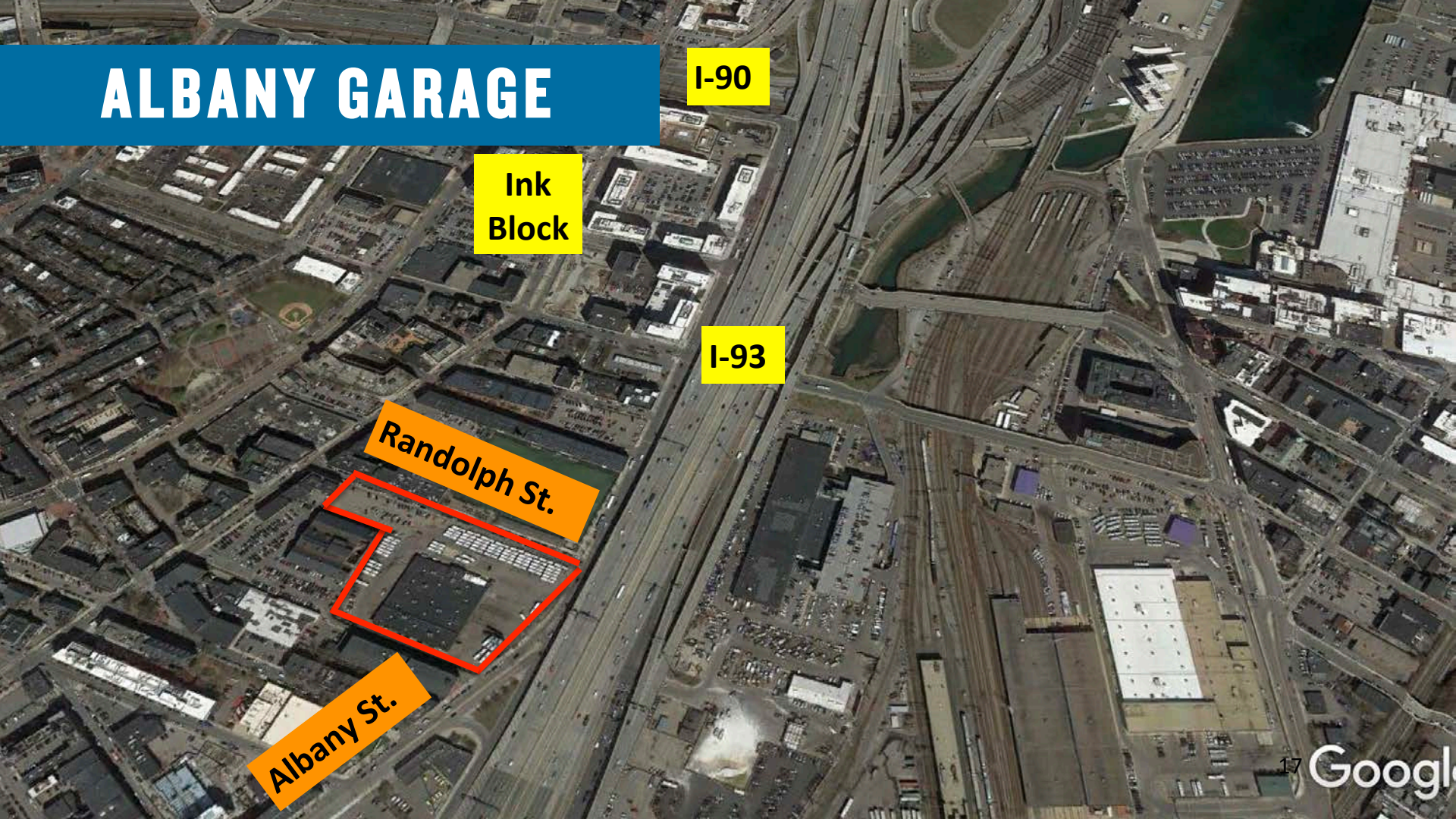
A BETTER CITY

COLD IMPACTS RANGE

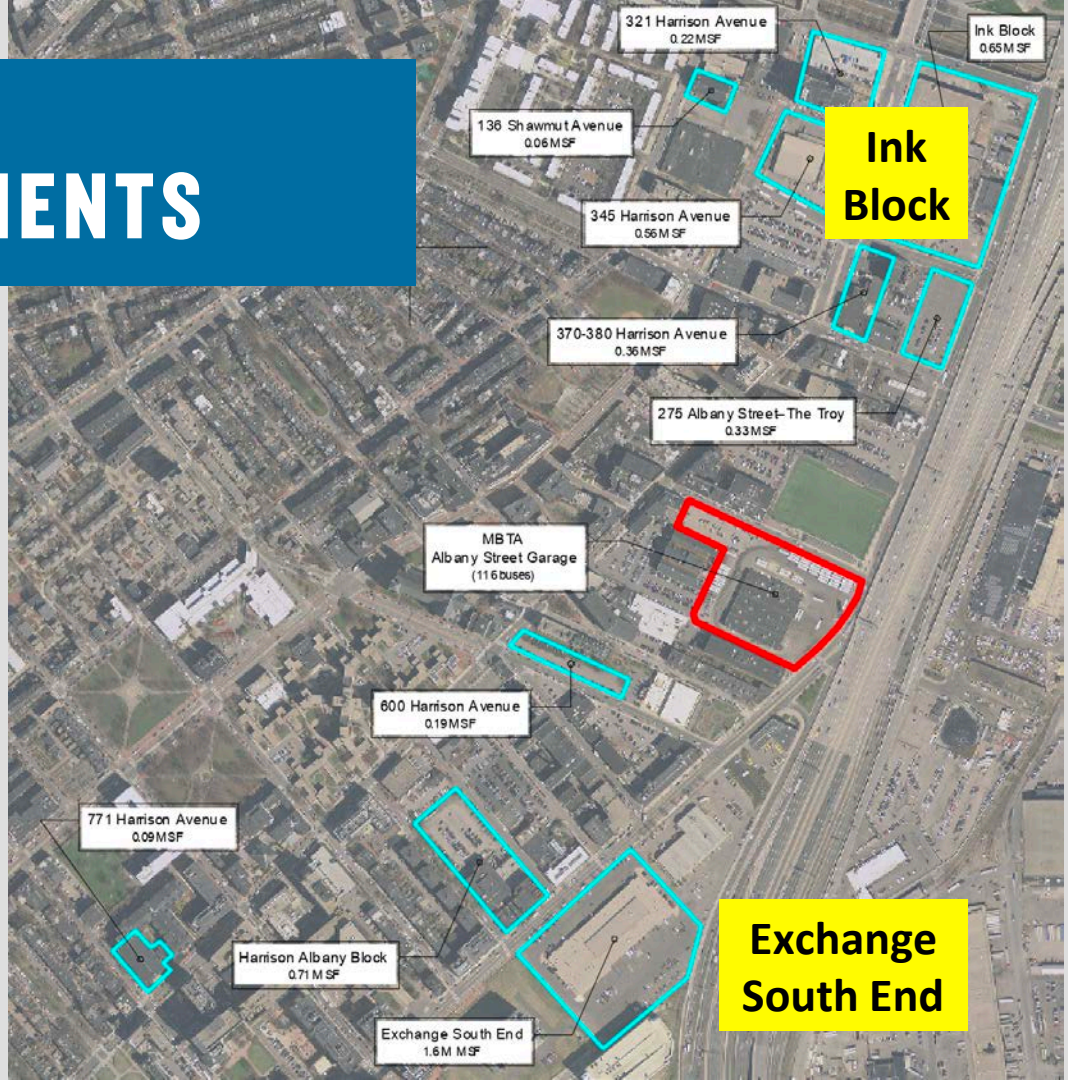


Note: % reductions compared to 75º
AAA-Electric Vehicle Range Testing Report, Feb. 2019

ALBANY GARAGE



MAJOR DEVELOPMENTS

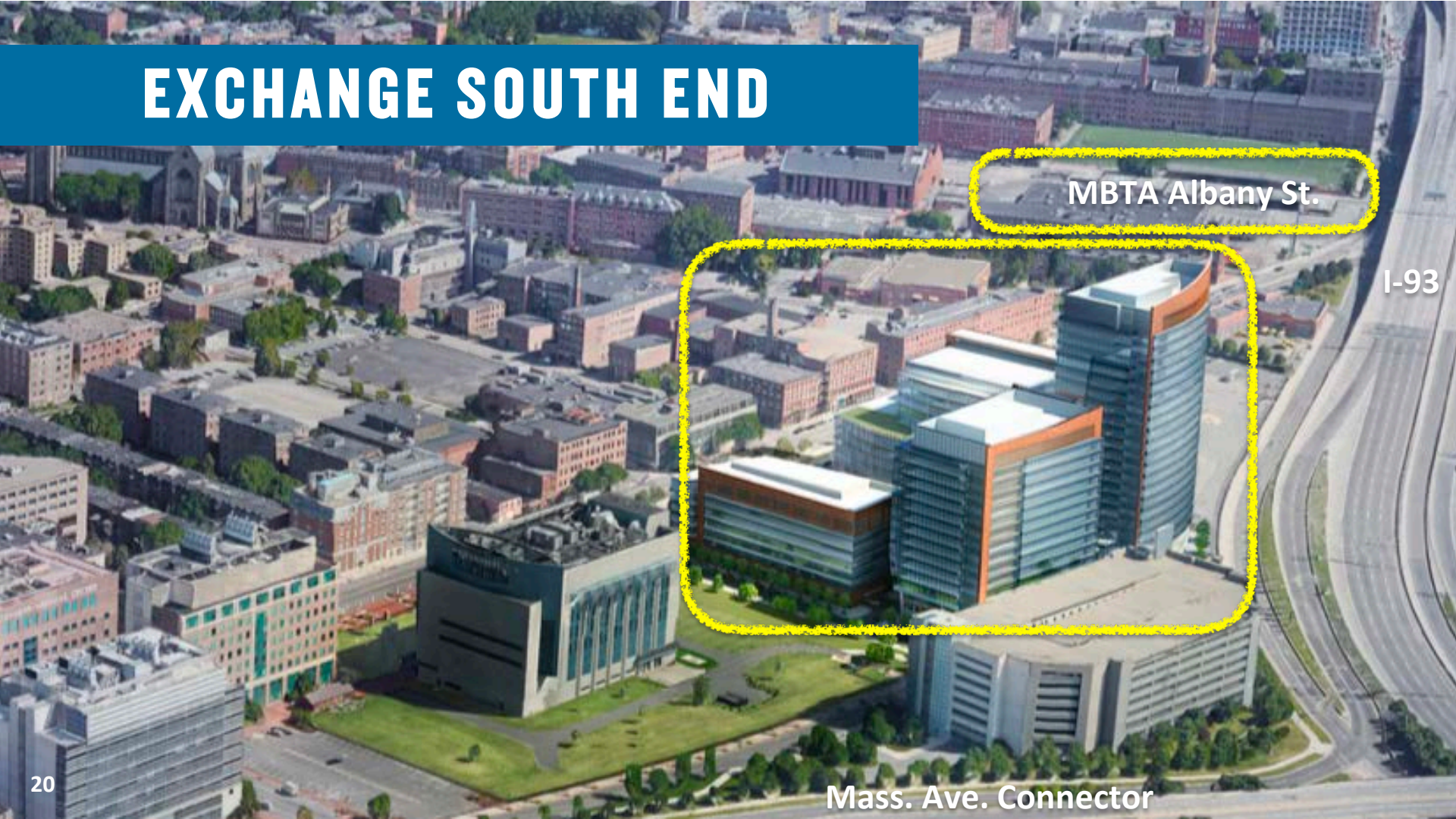


JACOBS | A BETTER CITY

ZONING


MBTA Albany St.
I-93
Albany St.
BOSTON FLOWER EXCHANGE
Mass. Ave. Connector

EXCHANGE SOUTH END



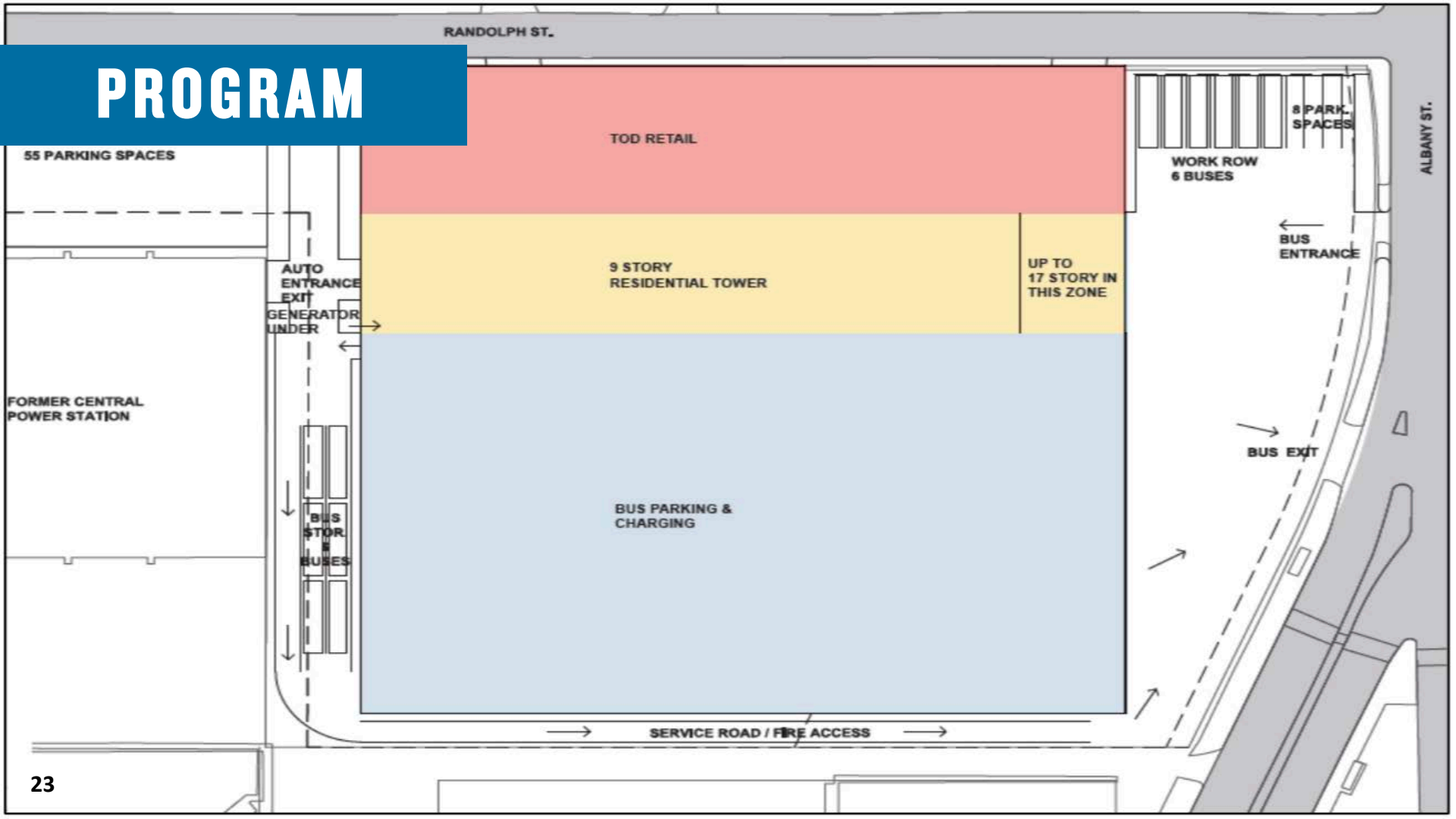
CASE STUDY OVERVIEW

- The Case Study is intended to demonstrate the viability of a concept
- Not specific to the Albany Street Garage
- This model could be adapted to any number of potential locations

KEY BEB CONSIDERATIONS

Issue	Conventional Fleet	BEB Fleet
Maintenance	• Ventilation needed	• Ventilation not needed
Vehicle Range & Cold Weather Performance	• 350+ miles	• 200-400 miles • Cold weather impacts • Indoor storage
Fueling / Charging	• 10 minutes	• 2-5 hours to charge • Strategic parking of buses • Overhead / plug-in / inductive?
Power Infrastructure	• Established fuel supply chain and logistics	• Fleet power requirements under development • Backup generation required for redundancy?
Potential for Joint Development	• Low	• High?

PROGRAM


RANDOLPH ST.
55 PARKING SPACES
TOD RETAIL
8 PARK. SPACES
WORK ROW
6 BUSES
ALBANY ST.
BUS ENTRANCE
AUTO ENTRANCE EXIT
GENERATOR UNDER
9 STORY RESIDENTIAL TOWER
UP TO 17 STORY IN THIS ZONE
FORMER CENTRAL POWER STATION
BUS EXIT
BUS PARKING & CHARGING
BUS STOR E BUSES
SERVICE ROAD / FIRE ACCESS

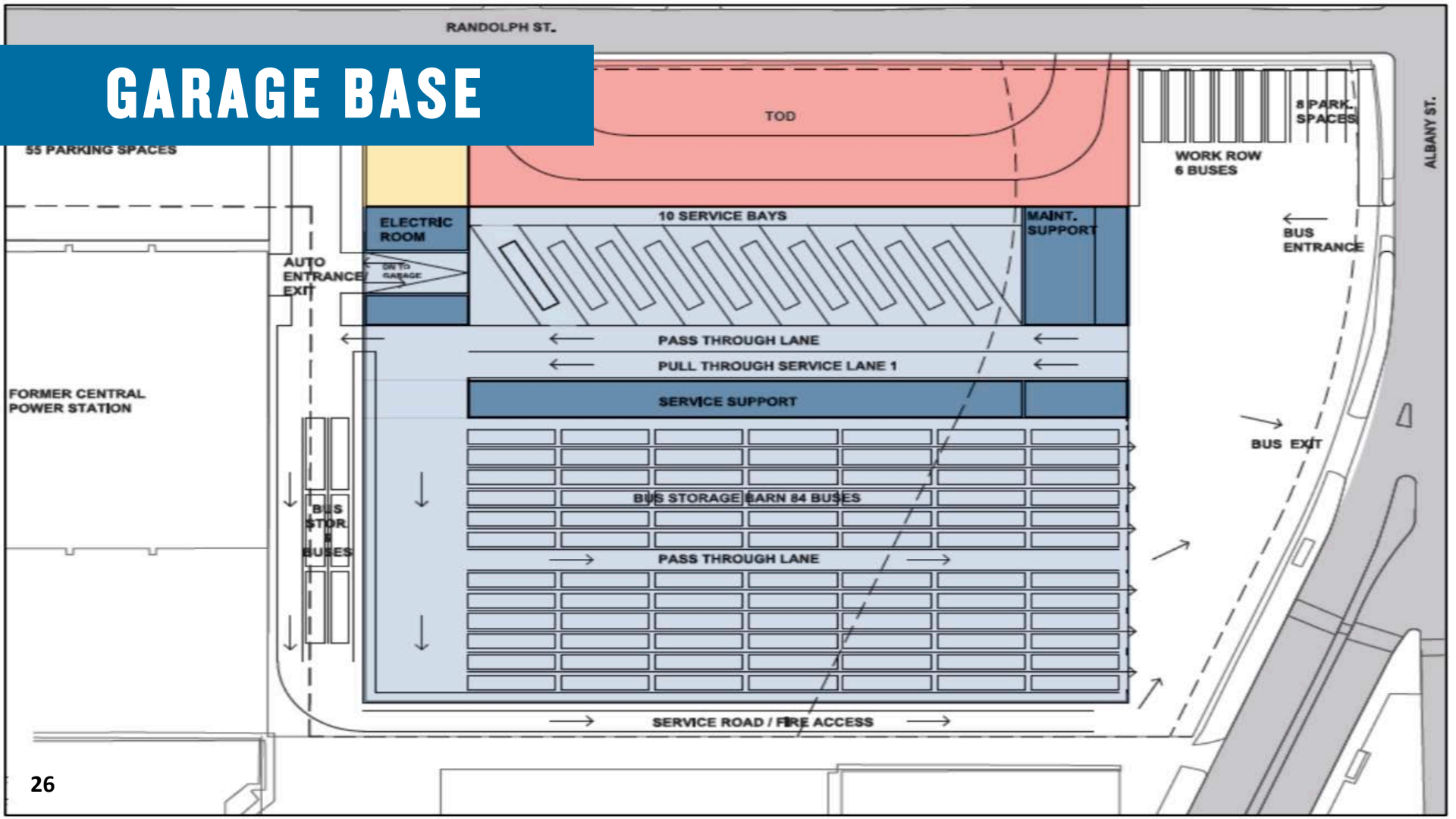
FT² DETAILS

Program	BEB Storage and Maintenance Facility	BEB Facility and TOD Mixed-Use Development
Residential Space	--	226,548 ft²
Retail Space	--	22,766 ft²
Transit Hub	--	12,232 ft²
Bus Maintenance & Support	25,366 ft² (10 bays)	25,366 ft² (10 bays)
Indoor Bus Storage	80,975 ft² (94 buses)	80,975 ft² (94 buses)
Onsite Employee Parking	25,562 ft² (55 cars)	25,562 ft² (55 cars)
Underground Car Parking	63,222 ft2 (68 cars)	63,222 ft2 (68 cars)

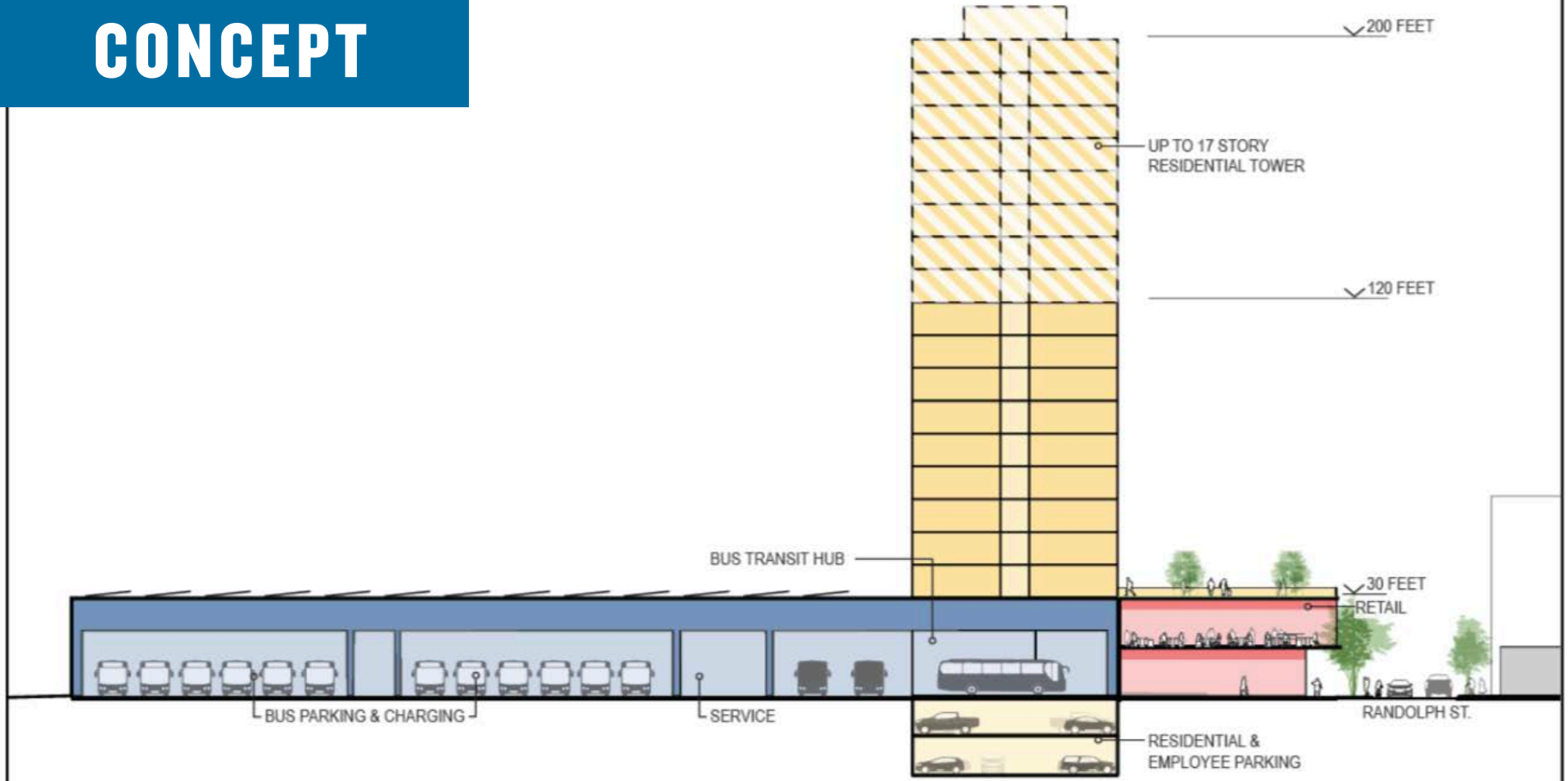
CONCEPTUAL BUDGET

Program	Assumed Cost	BEB Storage and Maintenance Facility	BEB Facility and TOD Mixed-Use Development
Bus Storage	$42,000,000	$42,000,000	$42,000,000
Bus Maintenance	$20,000,000	$20,000,000	$20,000,000
Bus Electrification	$30,000,000	$30,000,000	$30,000,000
Apartment Tower	$255 / square foot		$67,000,000
	Total	**$92,000,000**	**$159,000,000**

GARAGE BASE


RANDOLPH ST.
TOD
8 PARK. SPACES
ALBANY ST.
55 PARKING SPACES
WORK ROW
6 BUSES
ELECTRIC ROOM
10 SERVICE BAYS
MAINT. SUPPORT
BUS ENTRANCE
AUTO ENTRANCE/ EXIT
PASS THROUGH LANE
PULL THROUGH SERVICE LANE 1
SERVICE SUPPORT
FORMER CENTRAL POWER STATION
BUS EXIT
BUS STORAGE BARN 84 BUSES
BUS STOR. 8 BUSES
PASS THROUGH LANE
SERVICE ROAD / FIRE ACCESS

CONCEPT


200 FEET
UP TO 17 STORY
RESIDENTIAL TOWER
120 FEET
BUS TRANSIT HUB
30 FEET
RETAIL
BUS PARKING & CHARGING
SERVICE
RANDOLPH ST.
RESIDENTIAL &
EMPLOYEE PARKING

MULTI-USE CONCEPT

JACOBS | A BETTER CITY

SUMMARY

1. Approximately $1 B financial challenge
2. BEB fleets in NE likely in 5-7 years
3. Joint-development benefits may help:
    - Cost-effective procurement
    - Better neighborhood fit for facilities, not divest urban sites
    - Decarbonization and climate goals


52-1
JACOBS
A BETTER CITY

DISCUSSION