

## ETS Fleet Storage and Maintenance Facility Project - Executive Summary

### Table of Contents

<b>ETS Fleet Storage and Maintenance Facility Strategy - Executive Summary</b>	<b>1</b>
<b>Introduction</b>	<b>2</b>
<b>Project Methodology</b>	<b>2</b>
<b>Current State</b>	<b>3</b>
Existing Facilities Overview	3
Facility Details	3
Current Revenue Fleet	4
<b>Future Requirements</b>	<b>5</b>
Fleet Growth Projections	5
Strategic Alignment	5
Strategy Overview	6
Key Drivers	6
Scenarios	6
Recommended Scenario	8
Strategy	8
Strategy Projects	9
2021-2026 • New Southeast Garage • New Build	9
2021-2024 • Davies Facility • Expansion	10
2021-2024 • Ellerslie Facility • Expansion	10
2024-2032 • New Northwest Garage • New Build	11
2025-2028 • Richard Paterson Garage • Expansion / Site works	12
2025-2028 • Thomas Ferrier Garage • Demolition / Site Works / Expansion	12
2026-2027 • Centennial Garage • Expansion / E-Bus Infrastructure	13
2026-2027 • Kathleen Andrews Transit Garage • E-Bus Infrastructure	13
<b>Implementation Timeline</b>	<b>15</b>
<b>Preliminary Cost Estimates</b>	<b>15</b>
Estimated Project Costs	15
<b>Additional Considerations</b>	<b>16</b>

### Introduction

Edmonton Transit Service fleet storage and maintenance facilities are operating at full capacity. Both conventional and paratransit fleets cannot grow and respond to increased service demands in the future without significant investment in the design and construction of new and expanded facilities. Additionally, achieving greenhouse gas emissions targets by 2030 and beyond through fleet electrification cannot be realized within existing facilities. A long-term strategy has been developed to address these challenges.

The Edmonton Transit Service Fleet Storage and Maintenance Facility Strategy (“the Strategy”) is designed to guide the renewal and development of existing and future Edmonton Transit Service fleet storage and maintenance facilities, addressing growth, capacity and electrification needs of the fleet through 2040.

The Strategy recommends the construction of two new operations and maintenance garages to integrate a fully electrified bus fleet located in the southeast and northwest quadrants of the city. The strategy also recommends a series of progressive upgrades, renewals and expansion to existing facilities to accommodate growth, capacity and electrification.

The land for the South East Garage is required to achieve the target of 2027; planning and design would commence and continue through the 2023-2026 budget cycle to support advancing the delivery activities.

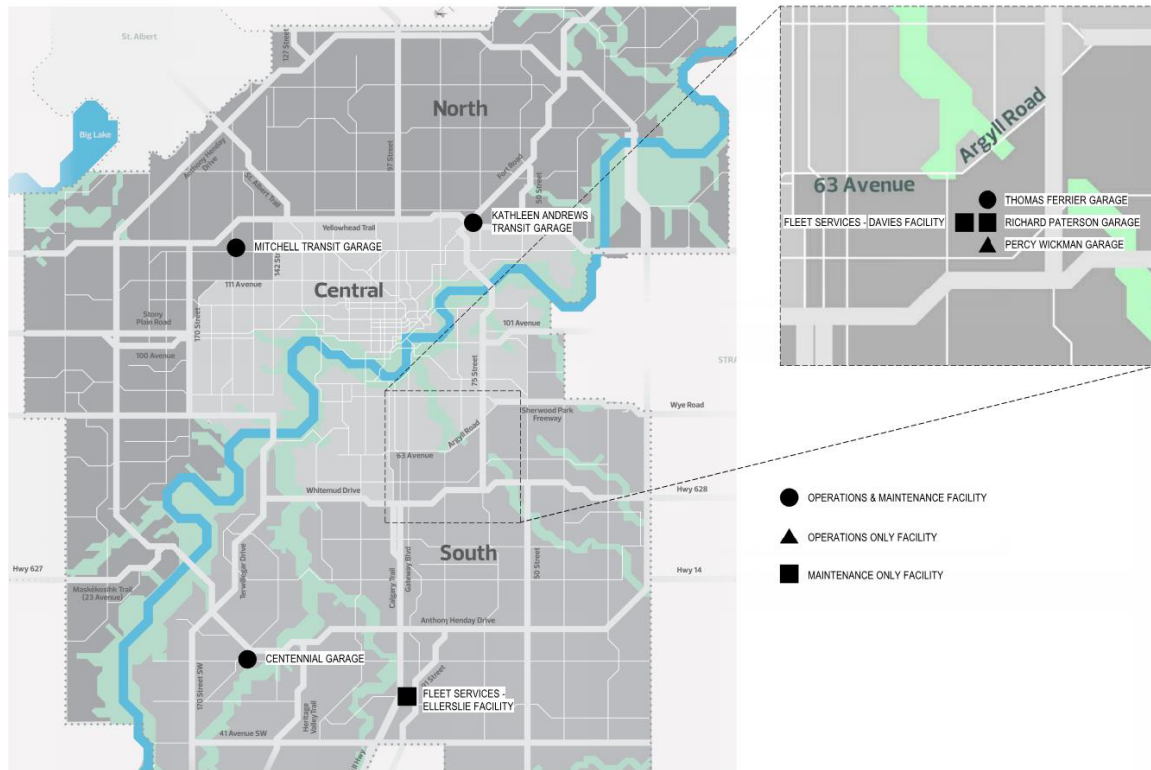
### Project Methodology

The project followed the following process in the development of the Strategy:

- Assessed and documented the current state;
- Defined future requirements;
- Considered Electric Bus infrastructure requirements;
- Developed and evaluated scenarios and layout options to accommodate projected fleet growth and fleet mix through 2040; and
- Developed recommendations and next steps.

Current State

Existing Facilities Overview



Facility Details

Edmonton currently has four fleet storage and maintenance facilities that house the conventional transit mixed fleet of 962 buses (as of June 2020).

- Mitchell Transit Garage
- Kathleen Andrews Transit Garage
- Thomas Ferrier Garage
- Centennial Garage

Additional facilities support the operations of ETS:

- The Richard Paterson Garage provides heavy maintenance for the conventional transit fleet.
- Ellerslie Facility is home to the body shop. This space is part of the larger facility, which includes spaces dedicated to municipal fleet services.
- Percy Wickman Garage is home to the city's paratransit (DATS) operation. The fleet of 93 DATS buses is stored here.
- Davies Facility is where municipal fleet services provide DATS Fleet maintenance services.

**Current Revenue Fleet**

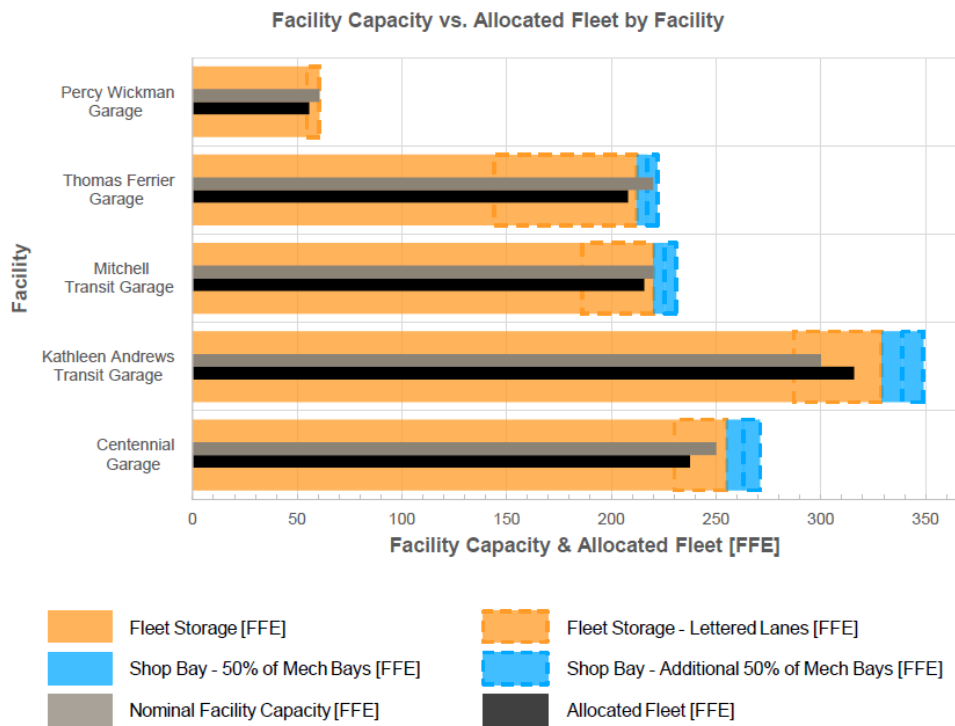
The charts that follow describe how the fleet is allocated across facilities (as of June 2020).

Bus Type	Conventional Transit				Paratransit
	Centennial Garage	Kathleen Andrews Transit Garage	Mitchell Transit Garage	Thomas Ferrier Garage	Percy Wickman Garage
60' Diesel	21	34	-	-	-
40' Diesel	196	235	197	190	-
40' E-Bus	10	30 <sup>1</sup>	-	-	-
30' Diesel	-	-	25	24	-
25' DATS Gasoline	-	-	-	-	93 <sup>2</sup>
<b>Total Fleet by Facility</b>	<b>227</b>	<b>299</b>	<b>222</b>	<b>214</b>	<b>93</b>
<b>Total Fleet by Service Type</b>	<b>962</b>				<b>93</b>
<b>Total Fleet [Count]</b>	<b>1,055</b>				

<sup>1</sup>On order as of June 2020.

<sup>2</sup>Four DATS Ford E450 are damaged, out of service, and excluded from this value. Some service is contracted to third parties, including upwards of seventy-five contracted vehicles, ten vehicles for hire, five Leduc County paratransit buses, and five to six St. Albert Transit paratransit buses.

The figure that follows compares facility capacity to the allocated fleet.



The orange bar represents the total fleet storage space within each garage. The blue bar represents the total area within the maintenance areas. The grey bar represents the nominal capacity or the number representing the maximum storage capacity for each garage. The black is the actual fleet currently allocated to each garage.

The figure shows that the allocated fleet is near the top of each garage's total available storage area. In some cases, the assigned fleet is close to dipping into the shop areas, which is not ideal. The current fleet occupies the total available storage within each garage, and the fleet cannot grow without expanding the storage and maintenance facilities to accommodate the growth.

### Future Requirements

#### Fleet Growth Projections

The ETS Fleet has not grown since 2013 aside from the recent addition of the Heritage Valley shuttle. A new garage in 2027 would be the first opportunity to expand the fleet in the last 13 years.

The Bus Network Redesign resets the foundation of the network and supports efficiency efforts utilizing the resources available. Preparing for growth to support our future city is the next step. This can be accomplished by ensuring that fleet storage and maintenance facilities are positioned to respond to an expanding fleet.

To meet The City Plan's objectives of the associated Mass Transit Network, the Bus Network Redesign and Greenhouse Gas Reduction targets, the ETS fleet needs to grow and transition from diesel to electric buses over the next 20 years (and beyond). Early projections to achieve the Mass Transit Network for a population of 1.25 million could require approximately 130 growth buses to support The City Plan's goals.

#### Strategic Alignment

The Strategy aligns with several transformational initiatives and is foundational to delivering on The City Plan and the four strategic goals of ConnectEdmonton. It is critical to support the new Bus Network's goals and the Mass Transit Network envisioned in The City Pan.

The Strategy supports building a green transit service and addressing growth requirements for our future city. The Strategy aligns with the Energy Transition Strategy and the current Greenhouse Gas Management Plan by providing a pathway to integrate an electric fleet in the future. Transitioning to a zero-emission transit fleet is a core objective of this work and currently calls for up to 440 electric buses (E-bus) to replace diesel buses by 2030.

### Strategy Overview

#### Key Drivers

The current fleet occupies the total available storage within each garage. It cannot grow or add the required electrified fleet without significantly impacting operations and maintenance services in existing garages. Electric bus maintenance and charging stations require different infrastructure, including significant substation and distribution system upgrades that cannot be retrofitted into the existing occupied facilities when all current garages are required to be fully operational to maintain services across the transit network.

Sufficient facility storage capacity must be available before any fleet expansion or transition can occur.

Other key drivers of the Strategy are:

- A. **Growth.** New facilities are required to add buses to the fleet and transition from diesel (and gasoline) to electric. Other facilities must be expanded and upgraded to increase capacity to accommodate the growth and fleet changes.
- B. **Efficiency.** As the fleet grows and changes, parts storage and distribution is a necessary support to the growing fleet. This growth includes exploring a 'north-south parts storage and distribution hub' concept, the current use and repurposing the existing parts hub space within Richard Paterson Garage, and tire storage and distribution across all facilities.
- C. **Training Spaces** for drivers, transit fleet maintenance and the public via the Mobility Choices Training program are also needed.
- D. **Fleet Allocation** must be met to accommodate 30' and 60' diesel bus operations and maintenance at multiple locations.
- E. Additional drivers or issues include:
  - a. Finding a permanent home for the Heritage Fleet;
  - b. Allocating space to accommodate displaced outdoor storage compounds (i.e. Richard Paterson Garage - Edmonton Police Service and Heavy Maintenance Staging); and
  - c. Demolition of the Thomas Ferrier Garage tents, which are at the end of their lifecycle.

### Scenarios

Two scenarios were explored that respond to the key drivers described previously to guide the renewal and development of existing and future ETS fleet storage and maintenance facilities.

**Scenario 1** presented a decentralized model as follows:

- Two new operation and maintenance garages with room to store a larger number of articulated buses, maximizing the number of 60' shop bays to create flexibility to absorb future fleet mix changes (particularly, an increase in articulated buses).
- Ellerslie Facility is expanded to increase body shop capacity.
- The Richard Paterson Garage is to be expanded to increase heavy maintenance capacity, including the addition of sixty-foot shop bays.
- Davies Facility is retained 'as is' and continues servicing the DATS fleet, with incremental maintenance. DATS storage needs to be allocated to the new operation and maintenance garages.
- Changes to Thomas Ferrier Garage are required to accommodate changes at other sites and facilities. This work considers a facility expansion to accommodate the "Mobility Choices Training Program" and site reconfiguration to support bus driver training and relocation of the Heritage Fleet to a new operations and maintenance garage.
- Upgrade Centennial Garage's E-Bus charging capacity to support up to 40 E-Buses.
- Upgrade Kathleen Andrews Transit Garage E-Bus charging capacity to support up to 43 E-Buses.

**Scenario 2** is presented as a centralized model and varies from Scenario 1 as follows:

- DATS operations and maintenance are consolidated at a single facility as follows:
  - Expand Richard Paterson Garage as a consolidated DATS operations and maintenance facility, replacing existing Percy Wickman Garage and Davies Facility spaces.
  - Conventional transit bodyshop and heavy maintenance are consolidated at Ellerslie Facility.
  - Expand Ellerslie Facility for additional body shop capacity and accommodate the Richard Paterson Garage heavy maintenance operation.

- Build two new operations and maintenance garages; upgrade Thomas Ferrier Garage, Centennial and Kathleen Andrews upgrades as described in Scenario 1.

### **Recommended Scenario**

The preferred path forward was identified through a cross-organizational stakeholder evaluation of two scenarios, conducted and documented using a process called Multiple Account Evaluation which systematically evaluated the relative advantages and disadvantages of the options or scenarios presented.

The evaluation process resulted in the adoption of a third scenario - Scenario 3 (Hybrid) - which captures the benefits of decentralization and mitigates some of the issues driving a centralized model. The following section provides a detailed description of the hybrid scenario, including individual descriptions of the work required at each location.

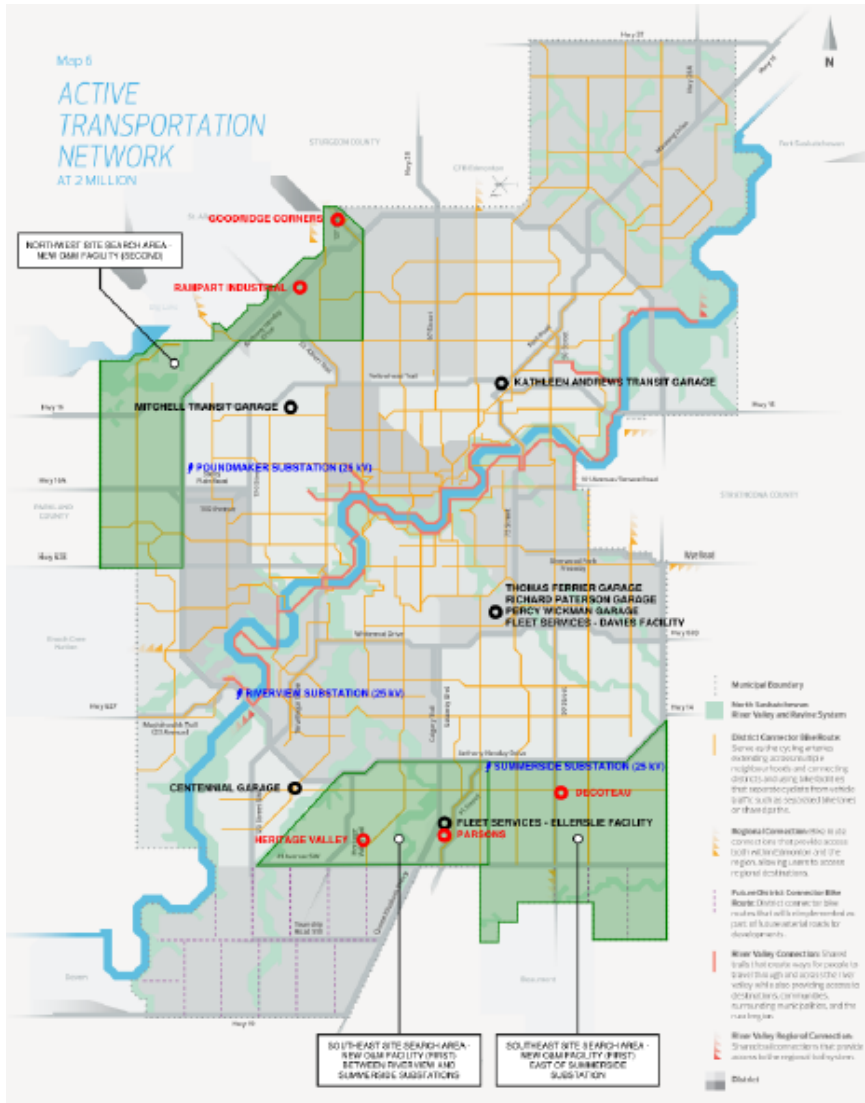
### **Strategy (Recommended Scenario 3)**

The strategy, resulting from the hybrid scenario, recommends constructing two new operation and maintenance garages to integrate a fully electrified bus fleet located in the southeast and northwest quadrants of the city. This strategy will include a progressive series of upgrades, renewals and expansion projects within select existing facilities to accommodate growth, capacity and electrification.

This strategy's success requires facility development to stay ahead of fleet growth, capacity, and electrification requirements, creating flexibility, opportunity, and efficiency across the facility and bus network.

The areas highlighted in green on the map below indicate proposed locations for the new operation and maintenance garages to align with existing facilities and network connections.

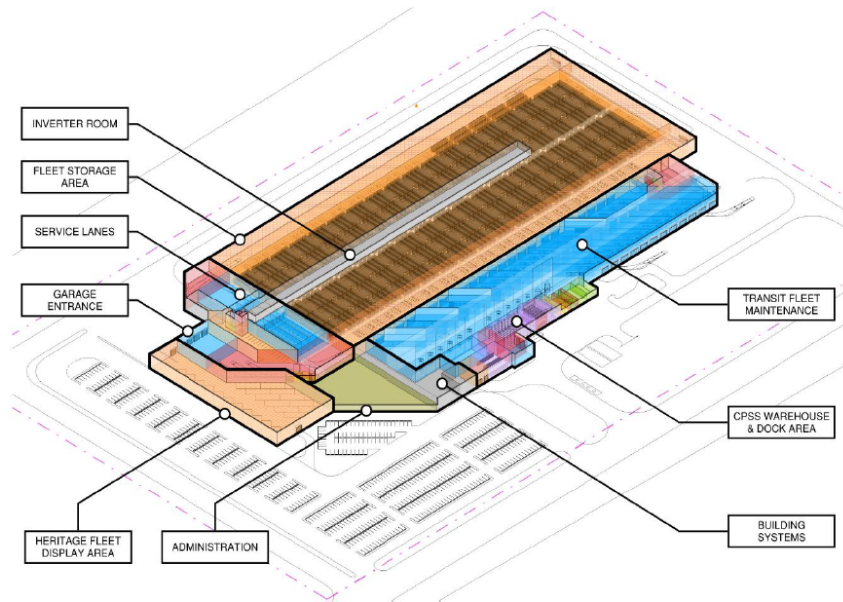




## Strategy Projects

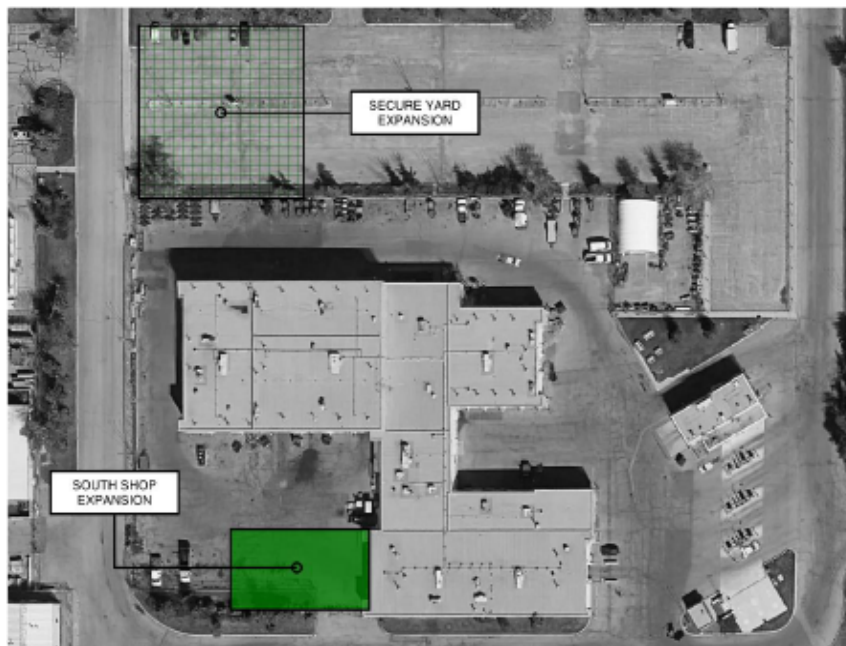
### 2021-2026 • New Southeast Garage • New Build

New emissions neutral operations & maintenance facility accommodating the equivalent of 430 forty-foot bus equivalents (FFE); Fleet transitions to electric over time; Includes space for Heritage fleet; located in Southeast Edmonton.



**2021-2024 • Davies Facility • Expansion**

Existing facility; South shop expansion including six DATS Service bays and expansion of secure yard into the existing parking area.



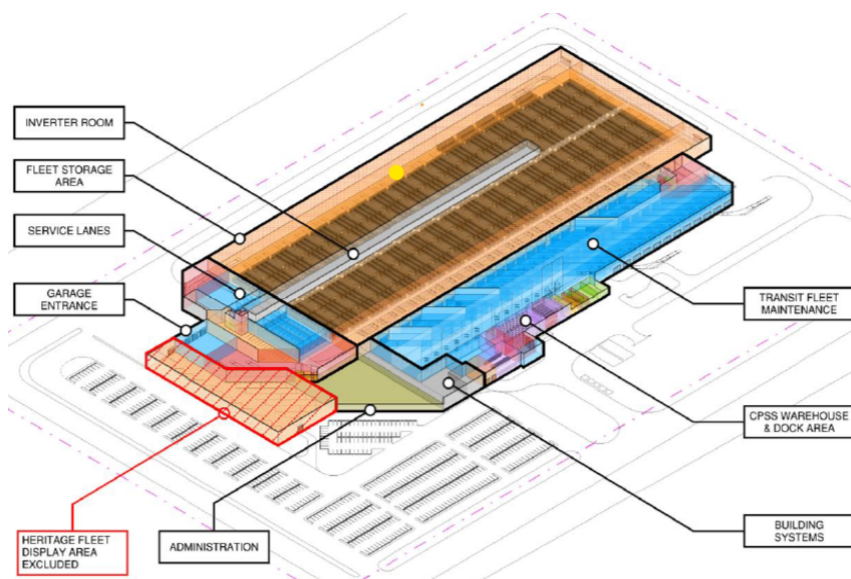
**2021-2024 • Eilerslie Facility • Expansion**

Existing facility; Body shop expansion includes four articulated bus body bays, three articulated bus paint/prep booths, one wash bay, and parking expansion.



**2024-2032 • New Northwest Garage • New Build**

New emissions neutral operations & maintenance facility accommodating the equivalent of 430 forty-foot bus equivalents (FFE) (i.e. Electric buses) located in Northwest Edmonton.



**2025-2028 • Richard Paterson Garage • Expansion / Site works**

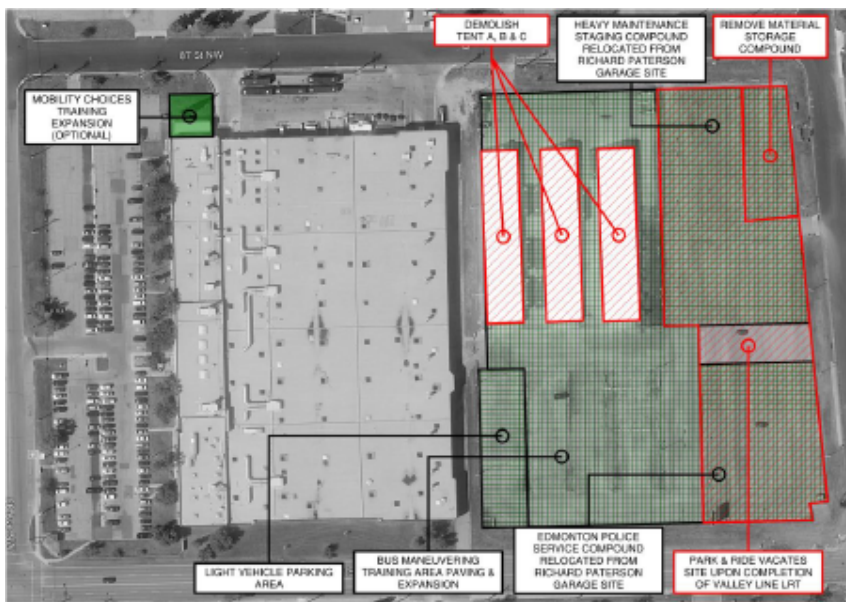
This existing facility will include heavy maintenance shop expansion to eight mechanical bays, one chassis dyno bay, and one wash bay. The work consists of selective demolition and reconstruction of bays one to eight with increased clear

height, increased bay length, and in-ground hoists. Existing compounds (i.e. EPS and Maintenance Staging) will be relocated to the Thomas Ferrier Garage site and replaced with an expanded light vehicle parking area.



**2025-2028 • Thomas Ferrier Garage • Demolition / Site Works / Expansion**

Demolish tents; New site for EPS and maintenance staging compounds; Driver Training area paved and expanded; Mobility Choices Training Program expansion (optional - may be located at the first NEW Garage).

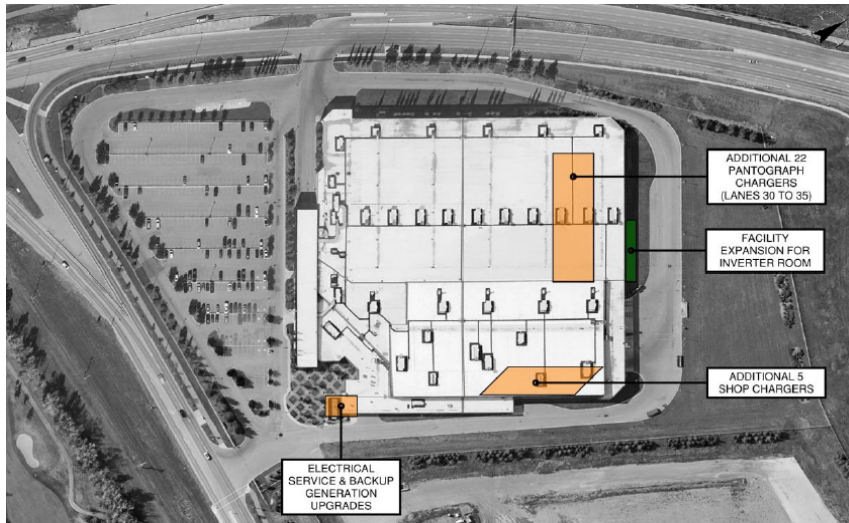


**2026-2027 • Centennial Garage • Expansion / E-Bus Infrastructure**

Existing facility; Expansion of the inverter room; Increased electric bus charging infrastructure from four to 26 pantograph chargers and increase from one to six

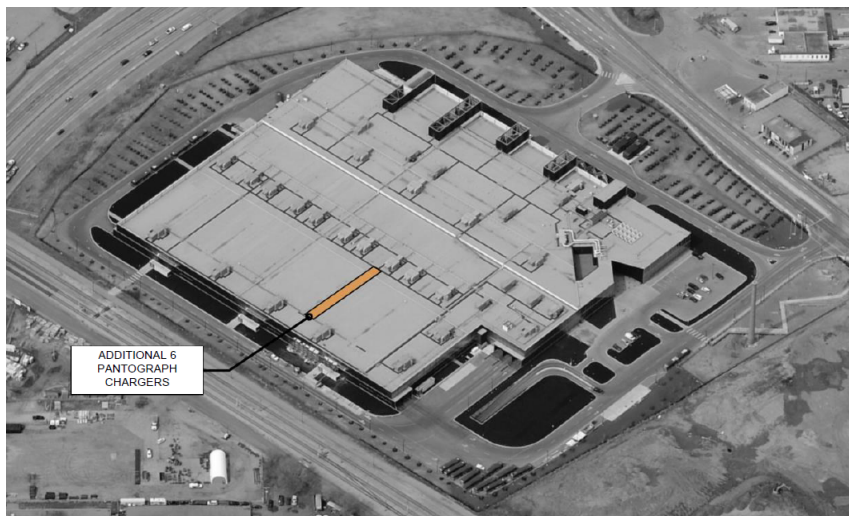


shop chargers to support a maximum of 40 E-Buses.



**2026-2027 • Kathleen Andrews Transit Garage • E-Bus Infrastructure**

Existing facility; Increase from 22 to 28 chargers to support a maximum of 43 E-Buses.



### Implementation Timeline

Attachment 2 provides a high-level overview of the project timelines (i.e. program, design and construction) and shows when and how a facility's capacity is impacted, triggering fleet growth and electrification opportunities. This timeline assumes that funding is available for continuous project development and delivery.

Given current facility capacities, fleet growth is flat until the end of 2026. Based on the timeline, fleet growth can begin in 2027 with conventional and DATS growth buses allocated to the New Southeast Operations and Maintenance Garage. The overall fleet is redistributed and balanced between all garages.

Upon occupancy of the New Northwest Operations and Maintenance garage at the end of 2032, the fleet can again be redistributed and balanced between six operations and maintenance garages, with additional conventional and DATS fleet growth distributed equally to the new facilities.

This timeline supports meeting the Mass Transit Network projections for a population of 1.25 million and supporting The City Plan and the City Operations GHG Management Plan goals.

### Preliminary Cost Estimates

The order of magnitude costs of the Strategy implementation is summarized below by facility and capital budget cycle. Per the PDDM, this is the Strategy and only to PPDM Checkpoint 1; the costs described below are defined as Class 5 and have an expected degree of accuracy of -30% to +50%.

### Estimated Project Costs

	Order of Magnitude Costs (\$'000)					
	2019-2022	2023-2026	2027-2030	2031-2034	Future Years	TOTAL
New Southeast O&M	57,000	410,000	165,000	-	-	632,000
Davies Facility	300	6,000	-	-	-	6,300
Ellerslie Facility	700	21,000	-	-	-	21,700
New Northwest O&M	-	57,000	230,000	250,000	95,000	632,000
Richard Paterson Garage	-	1,000	34,000	-	-	35,000
Thomas Ferrier Garage	-	500	5,000	-	-	5,500
Centennial Garage	-	500	21,000	-	-	21,500

## Attachment 1

Kathleen Andrews	-	3,000	3,000	-	-	6,000
TOTAL	58,000	499,000	458,000	250,000	95,000	1,360,000

\*Calculations do not include contingency and escalation costs.

The estimates include costs for the facility infrastructure and the electric bus infrastructure, such as the increased capacity of the electrical systems and charging stations. There remain some costs that are *unknowns*. These are excluded from the above and will be defined as more information becomes available in later phases of each project. Exclusions include:

- EPCOR Distribution/Transmission costs
- Cost of contaminated soil removal and hazardous material (e.g. asbestos, lead, PCB, etc.) removal
- Fleet or additional equipment

The Strategy does not include the cost of buses, or the operating impacts of capital. These costs are developed as part of the planning and design for each individual facility.

### Additional Considerations

It is critical to interpret the strategy's information and analysis at a point in time and could require adjustments, refinements, or potentially significant changes during implementation. These include, but are not limited to:

- Timeline adjustments and construction phasing plan to align capital expenditures with growth projections.
- Further development of the initial concepts presented in the report will be refined during the functional programming, schematic design, design development and construction documentation process, per the Project Development and Delivery Model (PDDM), per Capital Project Governance Policy C591.
- Ongoing refinement of the cost estimate at key project milestones to tighten the accuracy range as design definition increases and serve as a tool to drive cost versus value decisions made during the design process (i.e. value engineering).
- Refinement of the type, scale and design of infrastructure as more experience is gained with operation and maintenance of the initial E-Bus fleet, particularly the maintenance requirements (i.e. time-utilization of the maintenance bays) and charging requirements (optimization of the charging infrastructure from a capital cost and operational cost perspective).

The strategy is recommended to be revisited as part of annual planning activities for

all branches involved in this study.

- Ongoing monitoring of fleet projections and corresponding realignment of the Strategy on an annual basis is recommended.
- Monitor the current and long term potential impacts of the COVID-19 pandemic related to infrastructure needs, facility planning, and capital planning.

### **Electric Buses**

The Strategy assumes all future E-Bus fleet growth will be based on the current Proterra model. This means that all programming will be based using the dimensions, charging equipment, and operational basis of the Proterra model. (note: Proterra is the manufacturer of the Electric Bus the City has chosen to purchase buses from). This assumption should be closely monitored and adapted as the Strategy is implemented.

The introduction of other fleet types such as Hydrogen fuel-cell electric buses or electric articulated buses is possible. However, infrastructure planning must be monitored and adjusted to respond to changes to fleet growth, capacity and electrification targets.