Safety and Operations Committee

Information Item III-B

September 23, 2021

Metrobus Fleet Plan

Washington Metropolitan Area Transit Authority

Board Action/Information Summary

○ Action ◉ Information	MEAD Number: 202295	Resolution: ○ Yes ◉ No

TITLE:

Metrobus Fleet Management Plan Update

PRESENTATION SUMMARY:

This presentation includes information about the anticipated long-term vehicle counts of the Metrobus fleet, the share of articulated buses in the fleet, the propulsion technology of the fleet, current and programmed operating division capacity, and bus procurement plans, including of zero-emission vehicles.

PURPOSE:

The purpose of this presentation is to provide an informational update to the Board on the proposed Metrobus fleet strategy and the updated draft of the Metrobus Fleet Management Plan. Metro regularly updates its Metrobus Fleet Management Plan to align anticipated service levels, fleet needs, facility requirements, and upcoming bus procurements. Fleet plans are also regularly submitted to the Federal Transit Administration (FTA) for review.

DESCRIPTION:

Please see the potentially interested parties list provided as an attachment to this document.

Metro regularly procures, overhauls, and decommissions buses as a part of normal ongoing bus operations. Every year, new vehicles enter the fleet as older vehicles are retired at the end of their useful life. The next Metrobus procurement will be initiated in FY2022 with deliveries beginning in FY2024. The draft Metrobus Fleet Management Plan includes proposed procurement timing and fleet composition and outlines a schedule for the purchase of buses by propulsion technology through 2038.

Key Highlights:

- Metro plans to maintain a bus fleet of approximately 1,593 buses. Fleet vehicle count is driven primarily by anticipated service levels.
- While near-term ridership demand remains uncertain, eventual recovery to pre- pandemic levels is anticipated. As of July 2021, bus ridership has already recovered 60%.

- Metro plans to expand the size of its articulated bus fleet from the current 4% to 12% by 2028. This will enable Metro to respond to crowding and service standards and is consistent with previous bus garage storage and maintenance capacity investments. It is also in line with articulated fleet shares at peer transit agencies.
- Metro expects to adopt a spare ratio of 19.5%, updated from the current 18.5%, to support upcoming bus technology transitions, the increase in articulated buses, reduced garage and fleet flexibility, and increased capital program support needs (e.g., Platform Improvement Project). The proposed spare ratio remains within FTA guidelines.

Background and History:

Metro maintains a fleet of over 1,500 buses at ten operating divisions located throughout the region. This fleet consists of a mix of diesel, compressed natural gas, and diesel-electric hybrid buses, as well as one electric bus.

The Metrobus Fleet Management Plan is regularly updated to reflect current and future fleet operations, forecast anticipated ridership and network demand, detail upcoming bus procurement and retirement plans, and discuss systemwide maintenance and facility needs.

Discussion:

In considering the future of the Metrobus fleet, staff determine anticipated future service levels, fleet vehicle count, fleet composition and maintenance facility and operational needs. Typically, 100 new buses are procured per fiscal year, while another 100 buses are overhauled at their midlife. The proposed draft fleet strategy would maintain this approach while increasing the number of articulated buses in the fleet.

Metro plans to maintain a steady-state bus fleet of approximately 1,593 vehicles. Of these vehicles, 1,270 vehicles are operated in maximum scheduled service – the busiest time on the busiest day. This count includes buses scheduled for daily service (Peak Vehicle Requirement), strategic and headway management buses to ensure service reliability, and elevator shuttle buses to offer connecting service when rail station elevators are out of order.

An additional 248 of these buses are spares. Spare buses are buses not scheduled for daily service, which are used to support maintenance requirements, midlife overhauls, and other training needs and special projects. This would represent a 19.5% spare ratio, which is within FTA guidelines that spare ratios should not exceed 20.0%.

Finally, 75 of these vehicles would be within the Ready Reserve fleet – older vehicles suitable for passenger service, deployed to accommodate approved temporary service changes, replace buses removed from service for sub-fleet failures, or in case of emergency or special events. The Ready Reserve fleet

enables improved continuity of service, especially as new propulsion technologies are deployed in the coming years.

In June of 2021, Metro's Board of Directors directed a phased conversion of propulsion technology for the Metrobus fleet. Under this plan, only lower-emission and electric buses will be purchased beginning in FY2024. By FY2030, only electric or other zero- emission buses will be procured with the entire Metrobus fleet to be made up of zero- emission vehicles by FY2045. The updated Metrobus Fleet Management Plan is consistent with these Board-adopted zero-emission vehicle goals.

Metrobus facilities are not currently configured to support an electric bus fleet. Capital investment in facility conversion and other electric bus support infrastructure will be required to begin the conversion of the fleet. Facility requirements include charging equipment, garage configuration changes, support and coordination with electric utilities, parts and material storage and other operational and safety considerations. Metro will continue to coordinate with regional electric utilities, jurisdiction and transit providers as it advances future fleet and facility plans.

FUNDING IMPACT:

This is an information item.

TIMELINE:

Previous Actions	June 2021: Adoption of Sustainability Vision and Principles and Zero Emission Vehicle Goals
Anticipated actions after presentation	Q2 FY2022: Staff submission of draft Metrobus Fleet Management Plan for review and adoption by Metro Board of Directors. FY2022: Submission of updated Metrobus Fleet Management Plan for FTA review. FY2022: Initiation of next bus procurement contract. FY2023: Conclusion of current bus procurement contract. FY2024: First deliveries of buses under next bus procurement contract.

Potentially Interested Parties List
Metrobus Fleet Management Plan

Currently under contract:

- AECOM
- BAE Systems Controls, Inc.
- Center for Transportation and the Environment
- CH2M HILL, Inc.
- Clark Construction Group, LLC
- CRW Parts, Inc.
- Cummins, Inc.
- Dartco Transmission Sales & Service, Inc.
- Direct Machinery Outlet, Inc.
- Genfare
- Gillig Corporation
- Hensel Phelps Construction Co.
- James River Petroleum (JRP)
- Johnson & Towers Baltimore, Inc.
- Laird Plastics, Inc.
- Lytx, Inc.
- Modine Manufacturing Company
- Needles Eye
- Neopart Transit, LLC
- New Flyer of America, Inc.
- Northeastern Bus Rebuilders, Inc.
- P & H Auto-Electric, Inc.
- RAM Industrial Services, Inc.
- The Aftermarket Parts Company, LLC
- Tri-state Battery & Auto Elec., Inc.
- WSP

Other potentially interested parties:

- A123 Systems
- Baltimore Gas & Electric Company –an Exelon Company
- BYD Motors, Inc.
- Daimler
- Dominion Energy, Inc.
- ElDorado National
- Leclanché
- Microvast Power Solutions, Inc.
- Novabus
- Pepco – an Exelon Company
- Proterra
- Van Hool
- Washington Gas – a WGL Company
- XALT Energy

Metrobus Fleet Management Plan Update

Safety and Operations Committee
September 23, 2021

Agenda

- Context and Key Considerations
- Metrobus Fleet Plan Strategy
- Next Steps

Context

- Updated periodically to align anticipated service levels, fleet needs, facility requirements, and bus procurements

- Fleet plan will be submitted to FTA after Board adoption

- Updated Metrobus Fleet Management Plan, consistent with Board-adopted zero-emission vehicle goals

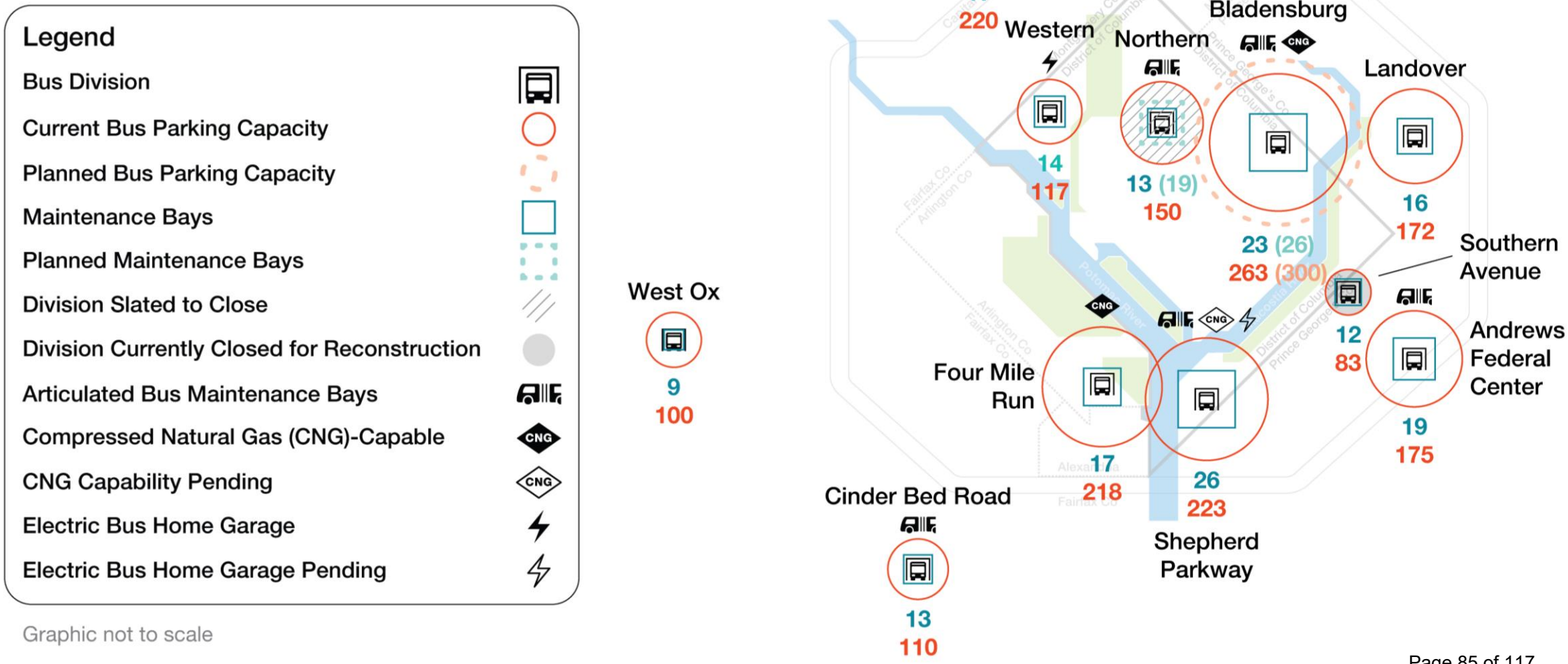
Metrobus Fleet Management Plan Key Considerations

1. **What level of service** does Metro expect to supply in the future?
2. **How many buses** should Metro operate to meet demand and service requirements?
3. **What types of buses** should Metro operate?
4. **How will Metro's maintenance facilities and operations** meet evolving fleet needs?

Context

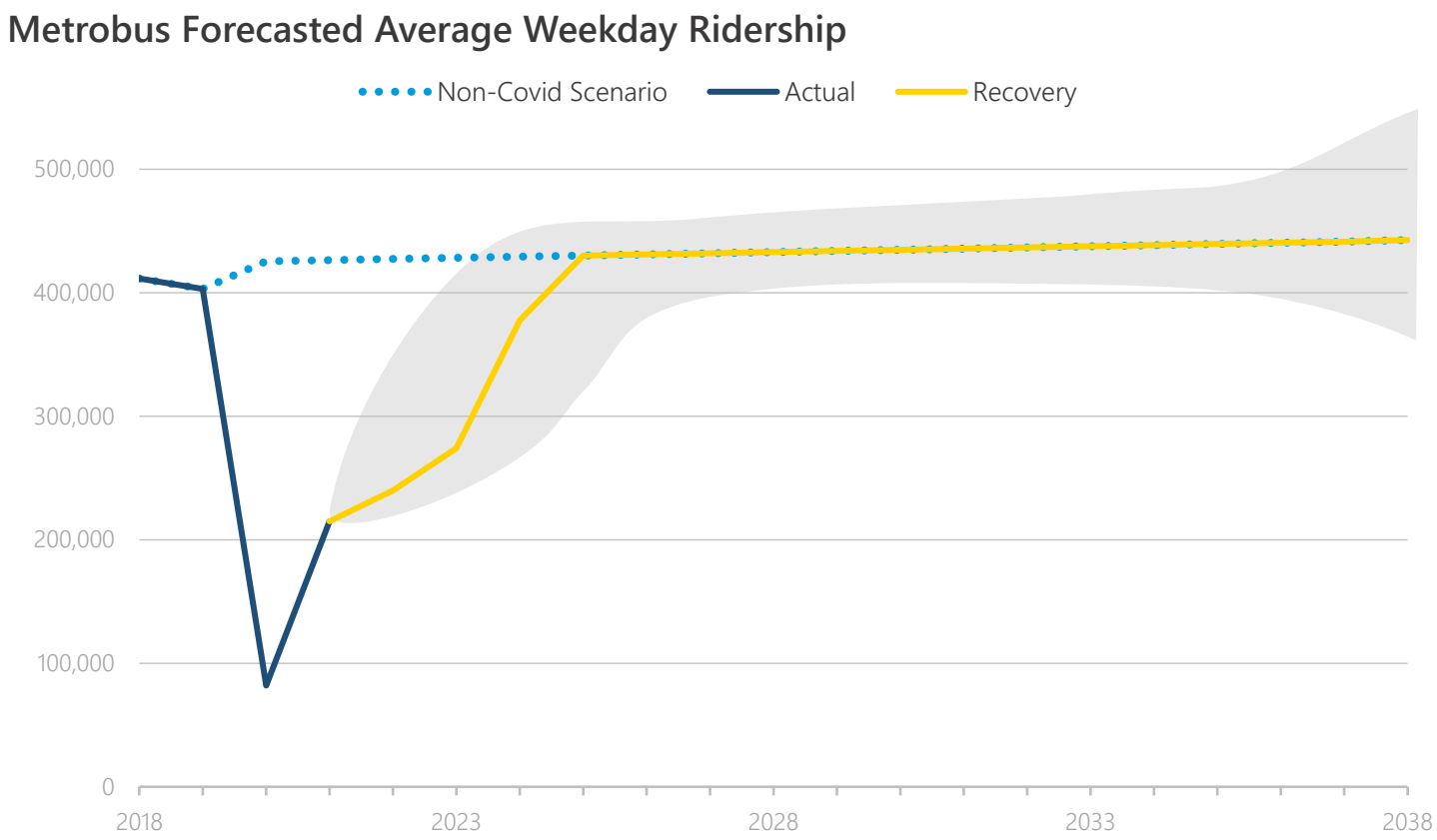
- Uncertainty of ridership and travel patterns in context of Covid-19
- Reconstruction of Bladensburg and Northern bus garages, addition of CNG fueling at Shepherd Parkway
- Bus Transformation Project recommendations and upcoming network redesign
- Regional targets for zero-emission bus fleets
- Current procurement contract has 2 years remaining. Next 5-year procurement will launch in FY2022 with deliveries beginning in FY2024.

Facility Capacity Overview, Current and Programmed



Anticipated Ridership Recovery

- Bus ridership is returning, already at 60% of pre-pandemic levels
- Some uncertainty in timing of near-term ridership recovery, anticipated eventual full recovery from Covid-19 pandemic
- Ridership forecast integrates National Capital Region Transportation Planning Board (TPB) regional forecasts for land use, population, and employment growth
- Estimates to be re-visited in coming years, updated to reflect ridership trends



Projected Fleet Level

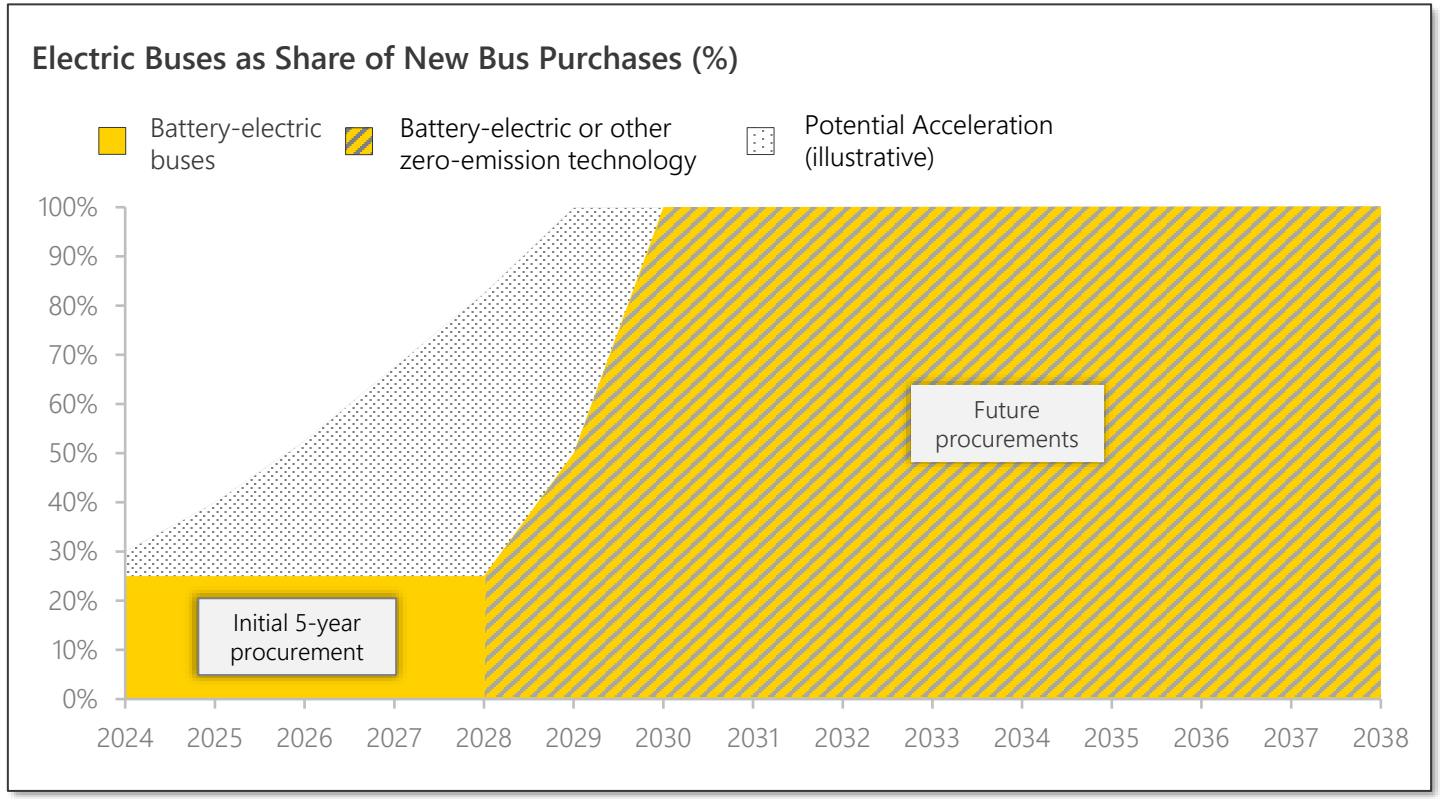
- Fleet size driven primarily by anticipated service levels

- Maintain fleet size of **1,593 buses**; required to sustain return to pre-pandemic service levels and accommodate existing and anticipated crowding over time
  - **1,270** vehicles operated in maximum service
  - **248** spare vehicles, which support maintenance requirements, midlife overhauls, and other training needs and special projects
  - **75** Ready Reserve vehicles, older vehicles suitable for use as needed, enable improved continuity of service especially as Metro begins deploying new propulsion technologies in coming years

- Projection does not assume significant service expansions or reductions; estimates to be re-visited in coming years as appropriate

Bus purpose	Buses
Vehicles Operated in Maximum Service	1,270
Spares	248
Ready Reserve	75
Total Fleet	**1,593**

Metrobus Propulsion Technology Strategy



- Bus Fleet Strategy contemplates **phased approach** to electric bus adoption
  - Purchase only **lower-emission and electric buses** in next bus procurement
  - Transition to **100% zero-emission bus purchases by 2030**
  - Fleet **100% zero-emission by 2045**

- Strategy weighs flexibility and adaptability with the potential for faster adoption of electric or other zero-emission buses if:
  - 1-for-1 replacement is possible sooner
  - More funding is available
  - Facility capacity and infrastructure improvements are realized more quickly

Articulated Bus Procurement Strategy

- Expand 60-foot articulated buses as a share of the active Metrobus fleet – from 4% to 12% (180 buses)
- Enables Metro to respond to crowding and service standards, including routes with anticipated ridership demand growth, without an increase in overall fleet size
- Consistent with previous bus garage storage and maintenance capacity investments
- In line with articulated fleet shares at peer transit agencies

Peer Agency	% Articulated
King County Metro	55%
New York City Transit	19%
Chicago Transit Authority	16%
Los Angeles County Metropolitan Transit Authority	16%
Southeastern Pennsylvania Transit Authority	13%
Miami Dade Transit	11%
Massachusetts Bay Transit Authority	10%
Maryland Mass Transit Administration	7%
Washington Metropolitan Area Transit Authority	**4%**
Metro Atlanta Rapid Transit Authority	3%

Note: Standard length buses are 40 feet long.

Metrobus Fleet Plan Strategy Summary

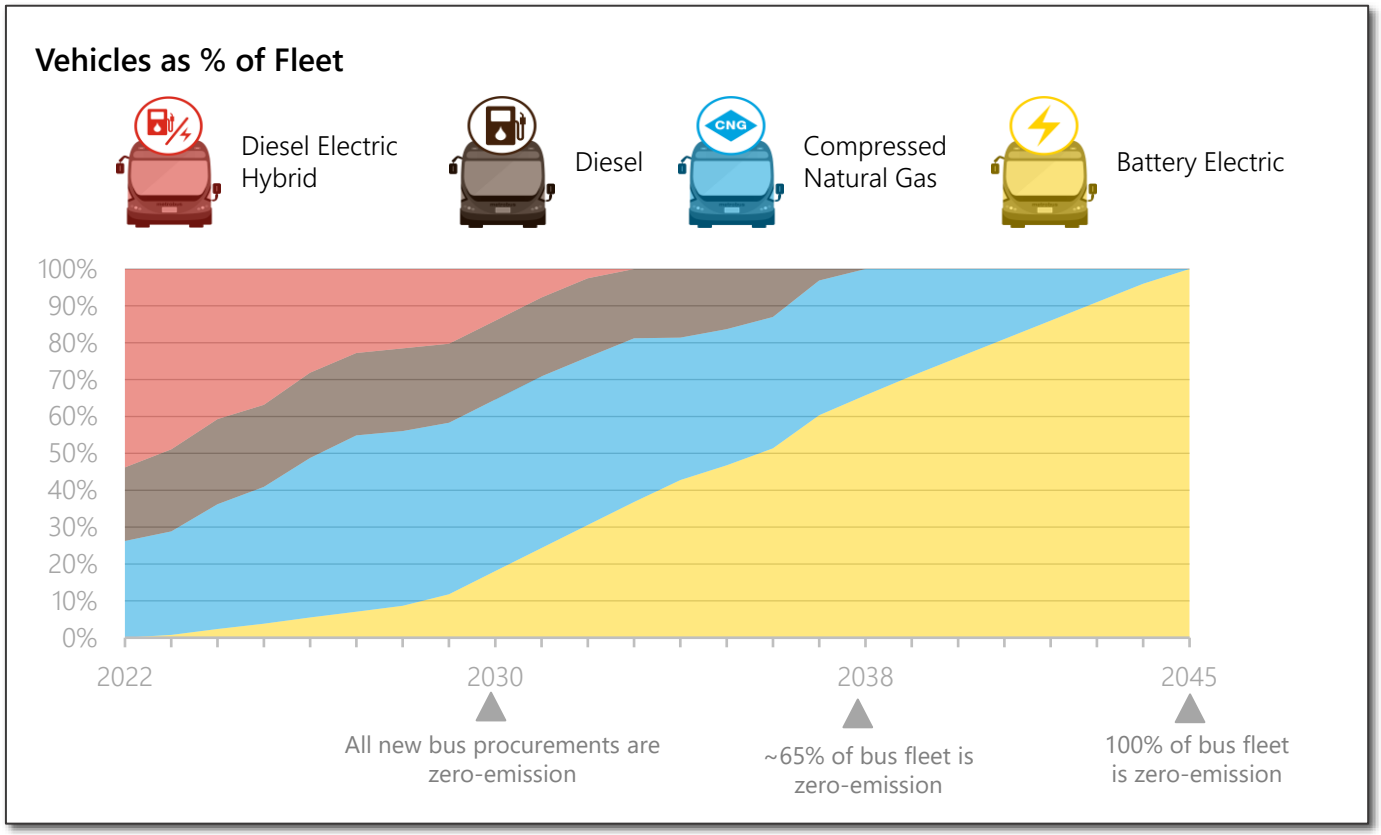
- Maintain fleet size of approximately **1,593 buses**, procuring 100 new vehicles per year
- **Begin adoption of electric buses,** starting with next bus procurement, and transition new bus procurements to 100% electric or other zero-emission technologies by 2030, fleet fully zero-emission by 2045
- Grow **articulated buses** as share of fleet from current **4% to 12%**, or 180 buses, to address crowding and improve capacity on high ridership corridors
- **Spare ratio of 19.5%,** updated from current 18.5%, to support bus technology transition, increase in articulated buses, reduced garage and fleet flexibility, and increased capital program support needs (e.g., Platform Improvement Project). Proposed spare ratio remains within FTA guidelines.

Next Steps

- Metro Board of Directors to review draft Metrobus Fleet Management Plan for adoption in Q2 of FY2022
- Upcoming bus procurement contract to be initiated in FY2022, with deliveries to begin in FY2024
- Electric bus facilities investment plan development

Appendix

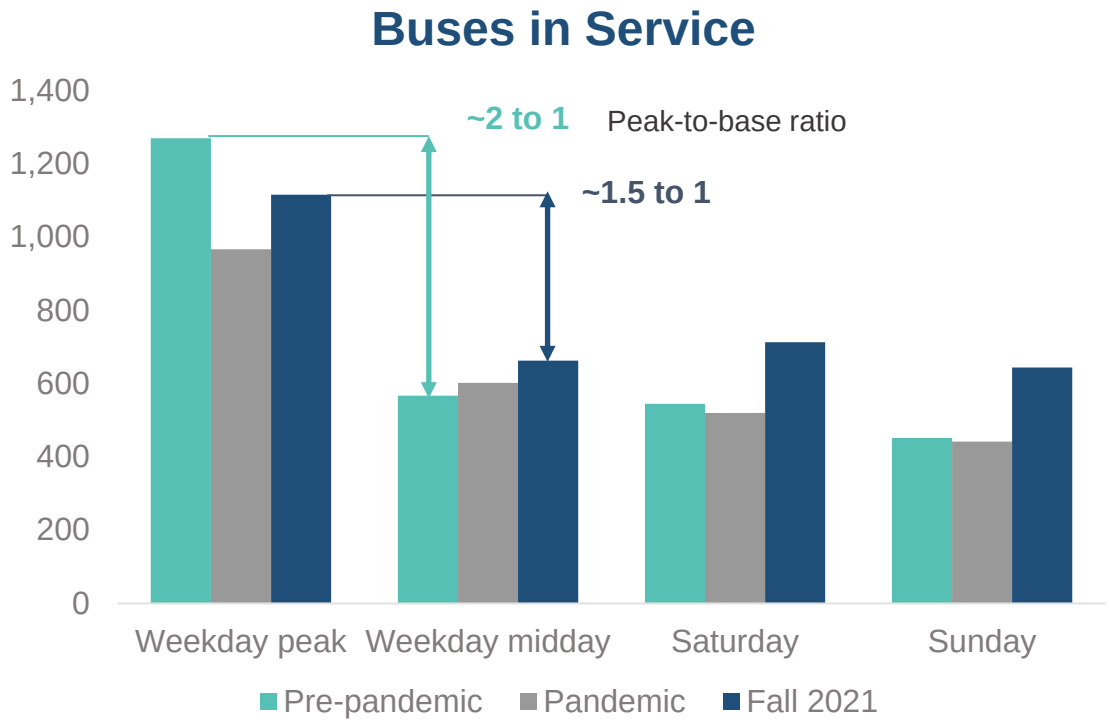
Metrobus Fleet Composition Projection



- **Flexibility and adaptability** considered in strategy, especially as technologies emerge and develop
- 100% of new bus procurements to be **zero-emission by 2030, ~65% zero-emission** fleet by 2038, **100% zero-emission** fleet by 2045
- Hydrogen fuel cell and other zero-emission bus types considered and evaluated in future

Bus Fleet Use in Service

- All day service changes how we use our bus fleet
  - At the same total service level, fewer buses operating during peak periods and more during off-peak weekdays and weekends
  - Flexibility to support future service changes (e.g., additional service enhancements, bus network redesign)
  - Implications for maintenance schedules



Bus Fleet Capacity Usage

- Fall 2021 peak vehicle requirement (PVR) remains below pre-pandemic levels
- FTA granted a temporary deviation from the spare ratio threshold of 20% through the end of FY2022
- Metro has the opportunity to enhance future service in the context of additional fleet capacity

Fleet Strategy: Transformational Investment Opportunity

- Increased capital costs:
  - Electric bus acquisition cost approximately **~$300,000** higher (~45%) than diesel bus.
  - Average infrastructure cost per electric bus of **~$400,000** per bus, based on preliminary peer agency project cost estimates. Suggests approximate project cost of **~$60m** for single 150-bus garage.
  - Approach to support electric charging infrastructure likely to differ by location:
    - Incremental addition to active major projects (e.g., Northern, Bladensburg). Lower incremental cost than retrofit or facility replacement.
    - Retrofitting of existing facilities (e.g., Andrews Federal Center, Four Mile, Shepherd Parkway).
    - Conversion likely to require facility replacement (e.g., Western).

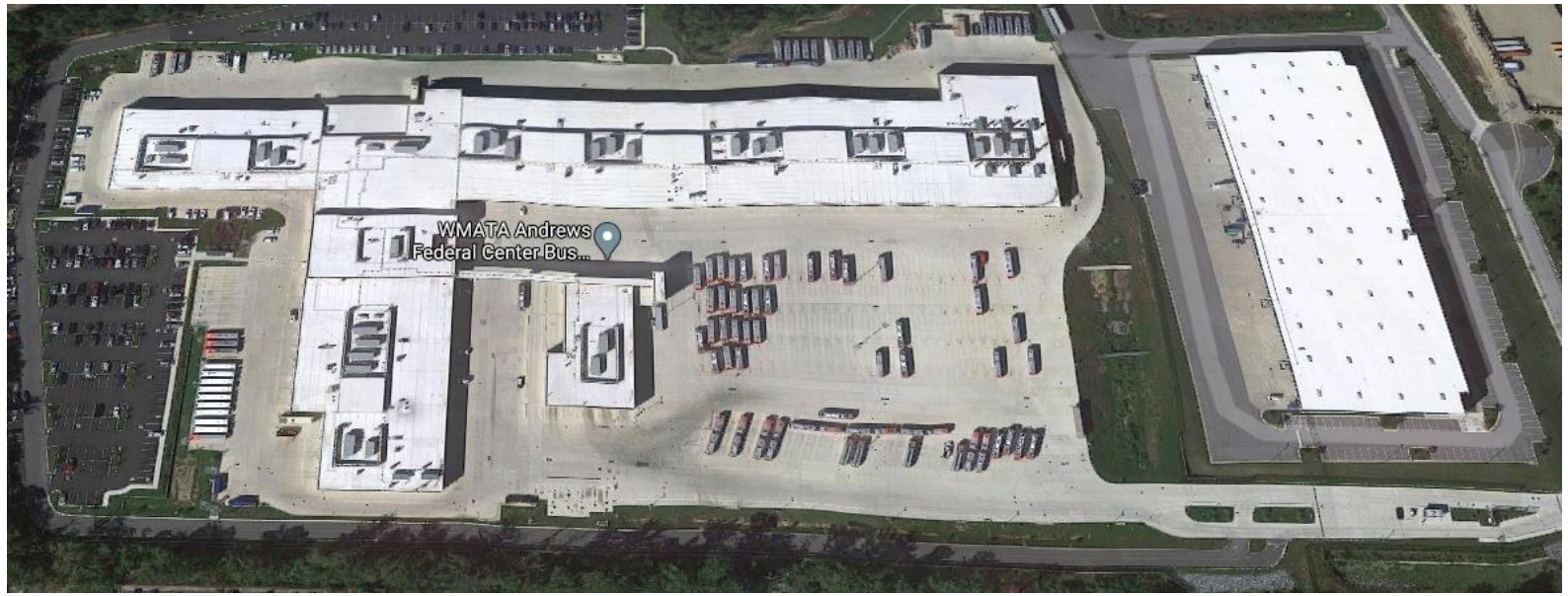
Figures represent order of magnitude estimates based on external benchmarks and experiences of peer transit agencies. Not official estimates; additional work required for development of projects at Metro facilities.

Draft Strategy Order of Magnitude Estimated Incremental Capital Costs

Period	Incremental Capital Cost Estimate
6-Year Capital Program (FY22-FY27)	~$125-200m
10-Year Capital Plan (FY22-FY31)	~$400-500m
Draft Fleet Strategy (FY22-FY38)	~$900m-1b

Metro Garage Summary, Andrews Federal Center

- Total bus capacity: 175

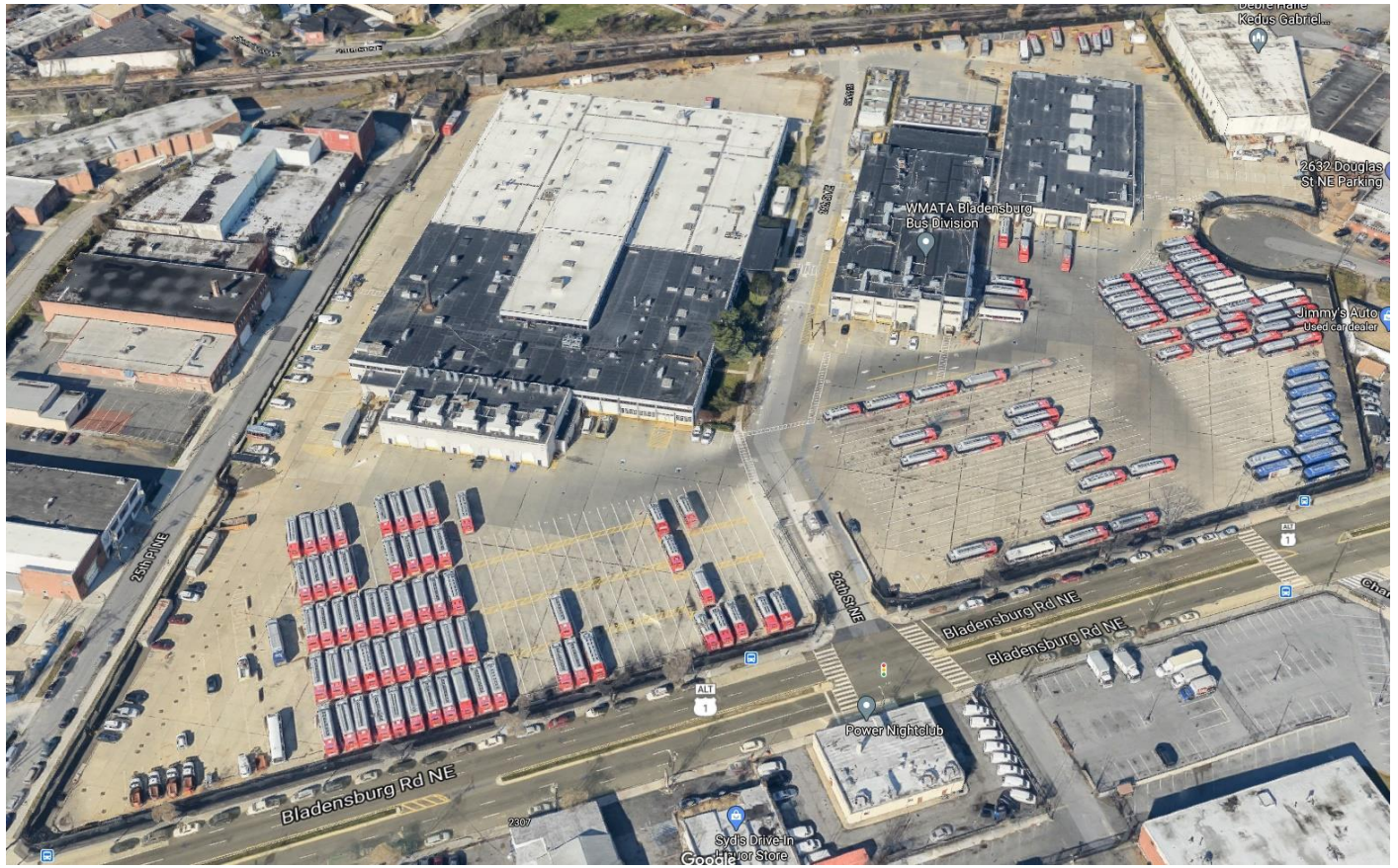


Has articulated bus maintenance bays

Source: Google Maps 3D Satellite View

Metro Garage Summary, Bladensburg

- Total bus capacity: 263, will be upgraded to 300 by about FY27
- Being designed for future support of electric buses. Space designs, overhead clearance, pathways for conduits and equipment are included in the current design plans.

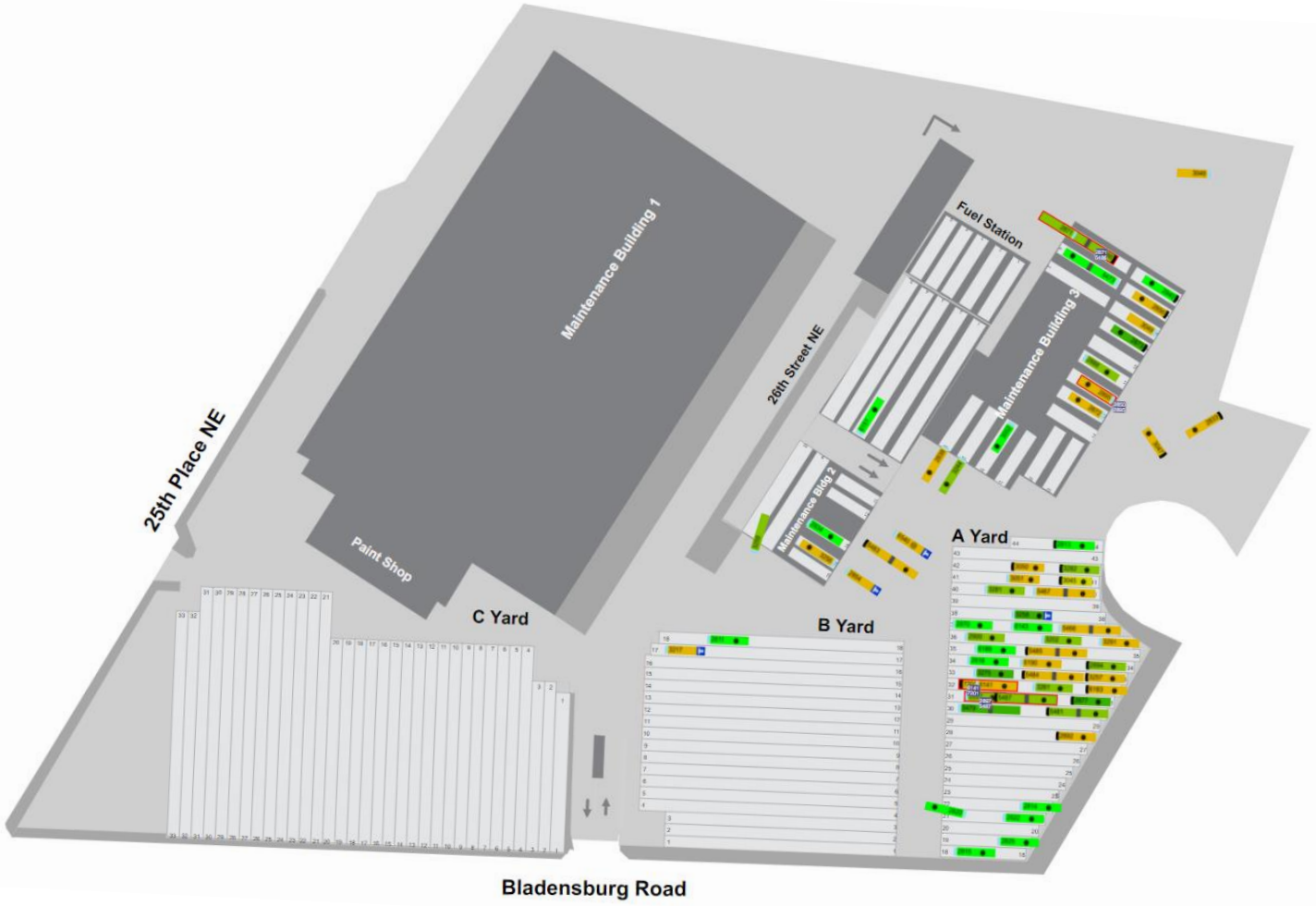


Has articulated bus maintenance bays

CNG fueling capacity

Source: Google Maps 3D Satellite View

Metro Garage Summary, Bladensburg



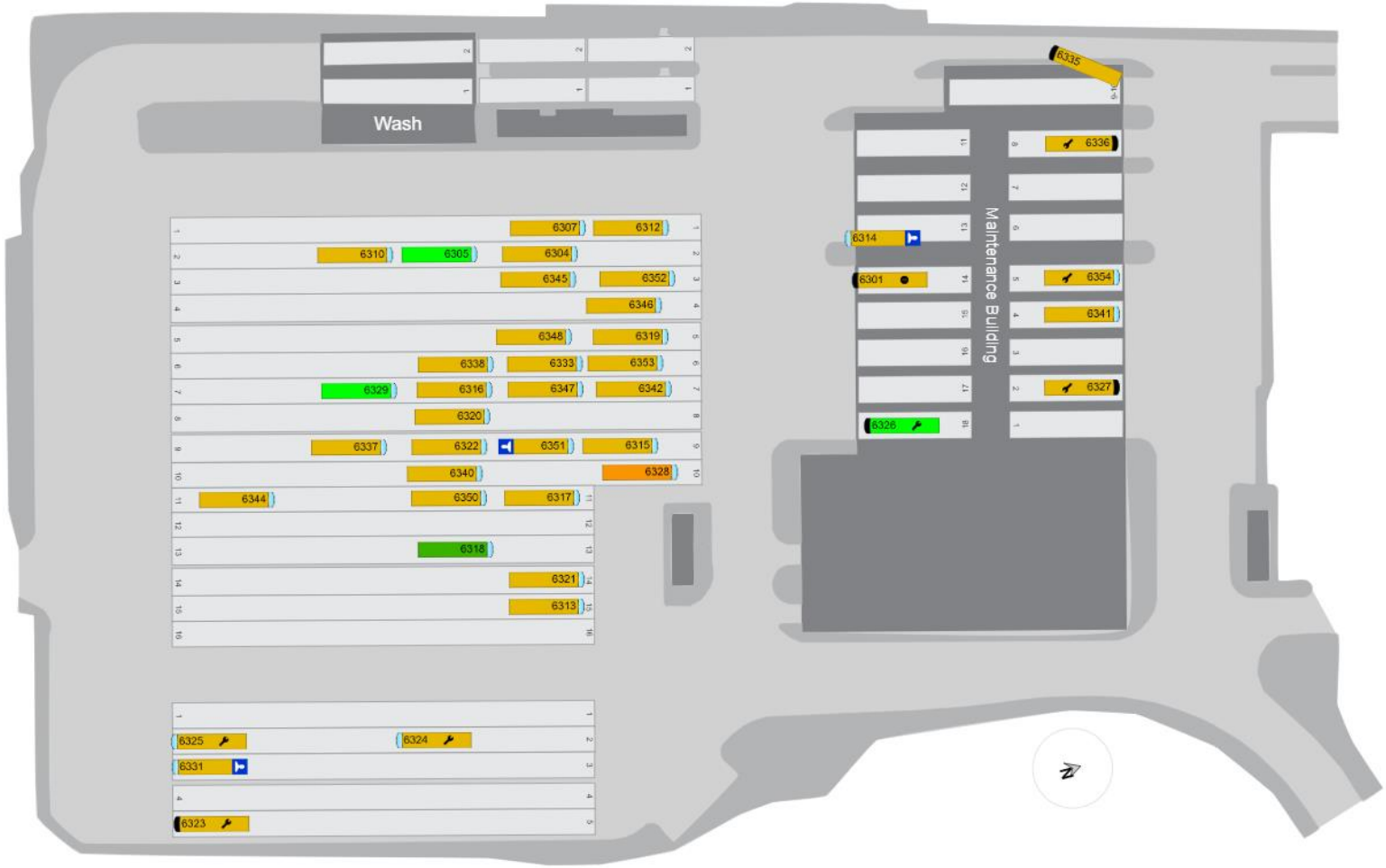
Metro Garage Summary, Cinder Bed Road

- Total bus capacity: 110

Has articulated bus maintenance bays

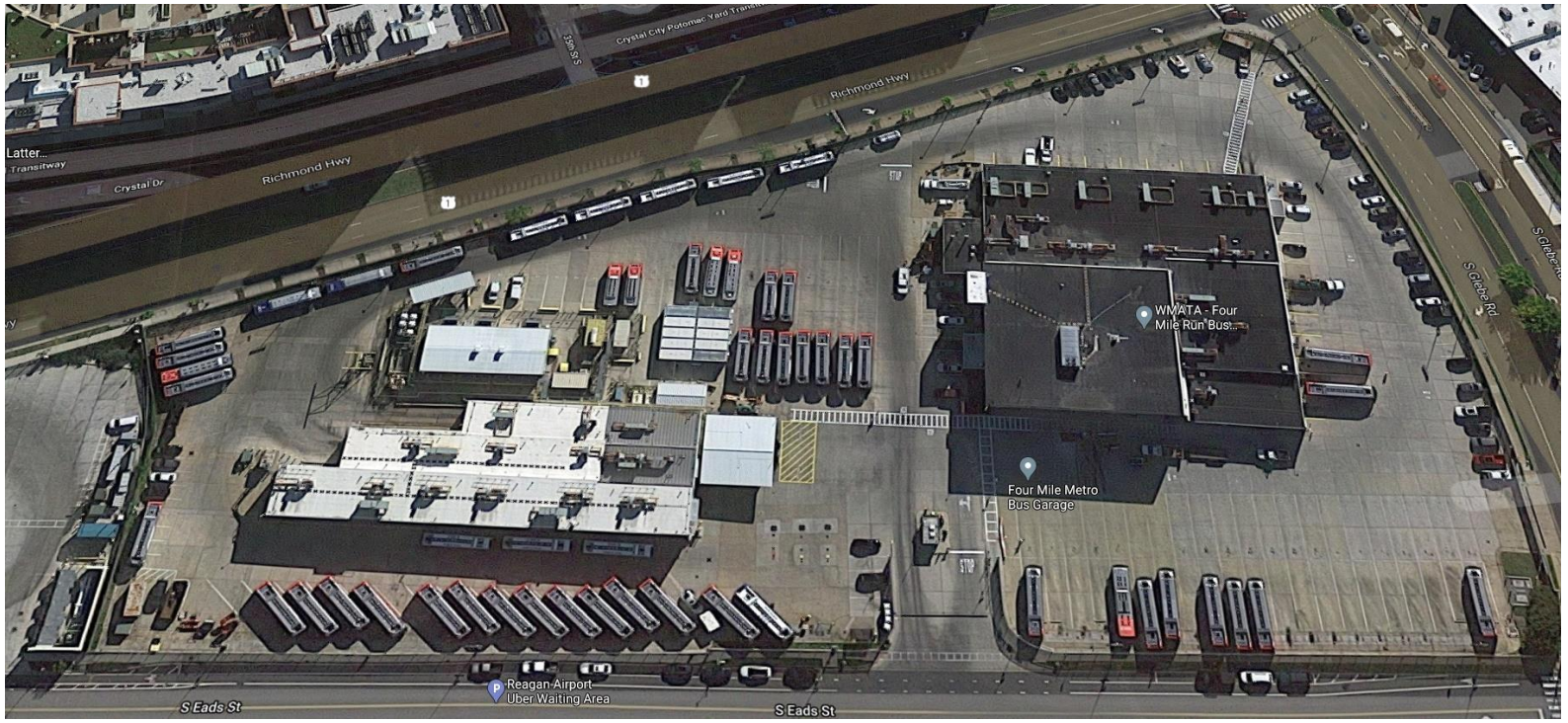
Source: Google Maps 3D Satellite View

Metro Garage Summary, Cinder Bed Road



Metro Garage Summary, Four Mile Run

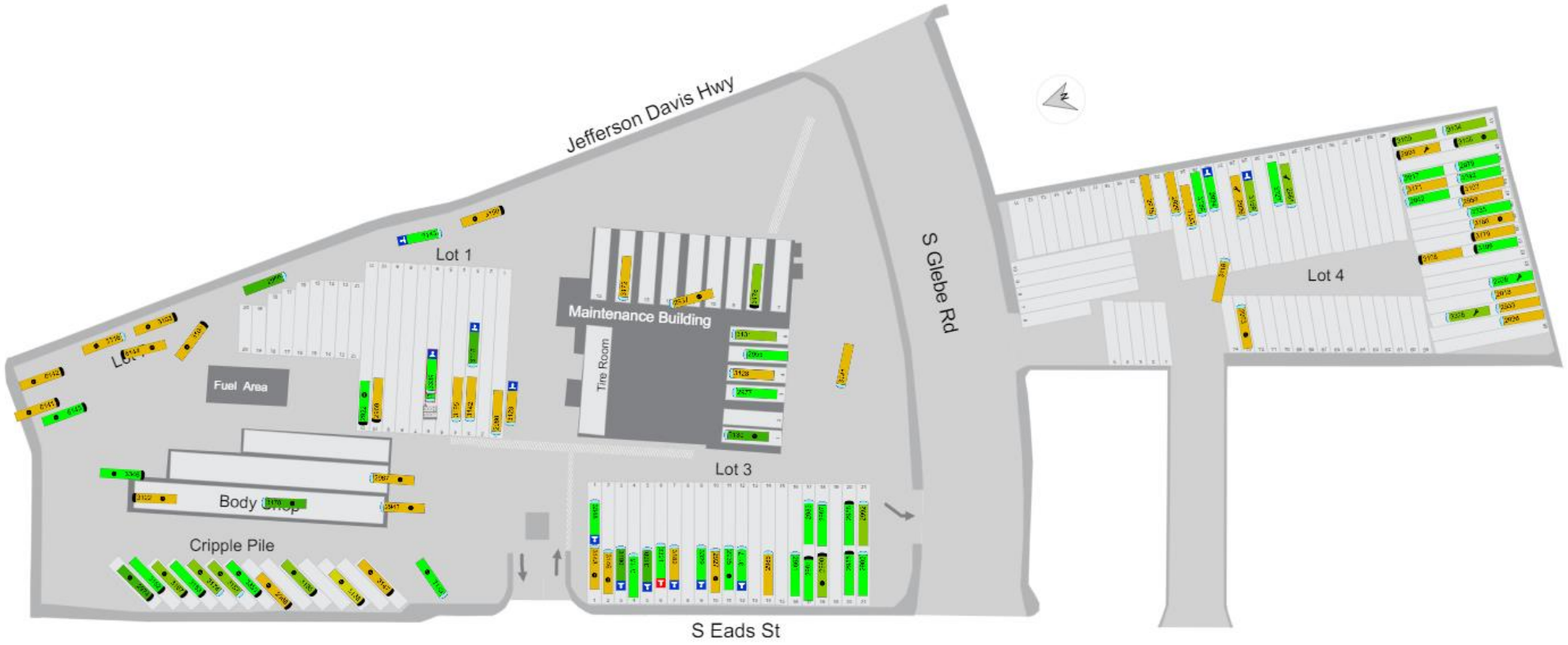
- Total bus capacity: 218



CNG fueling capacity

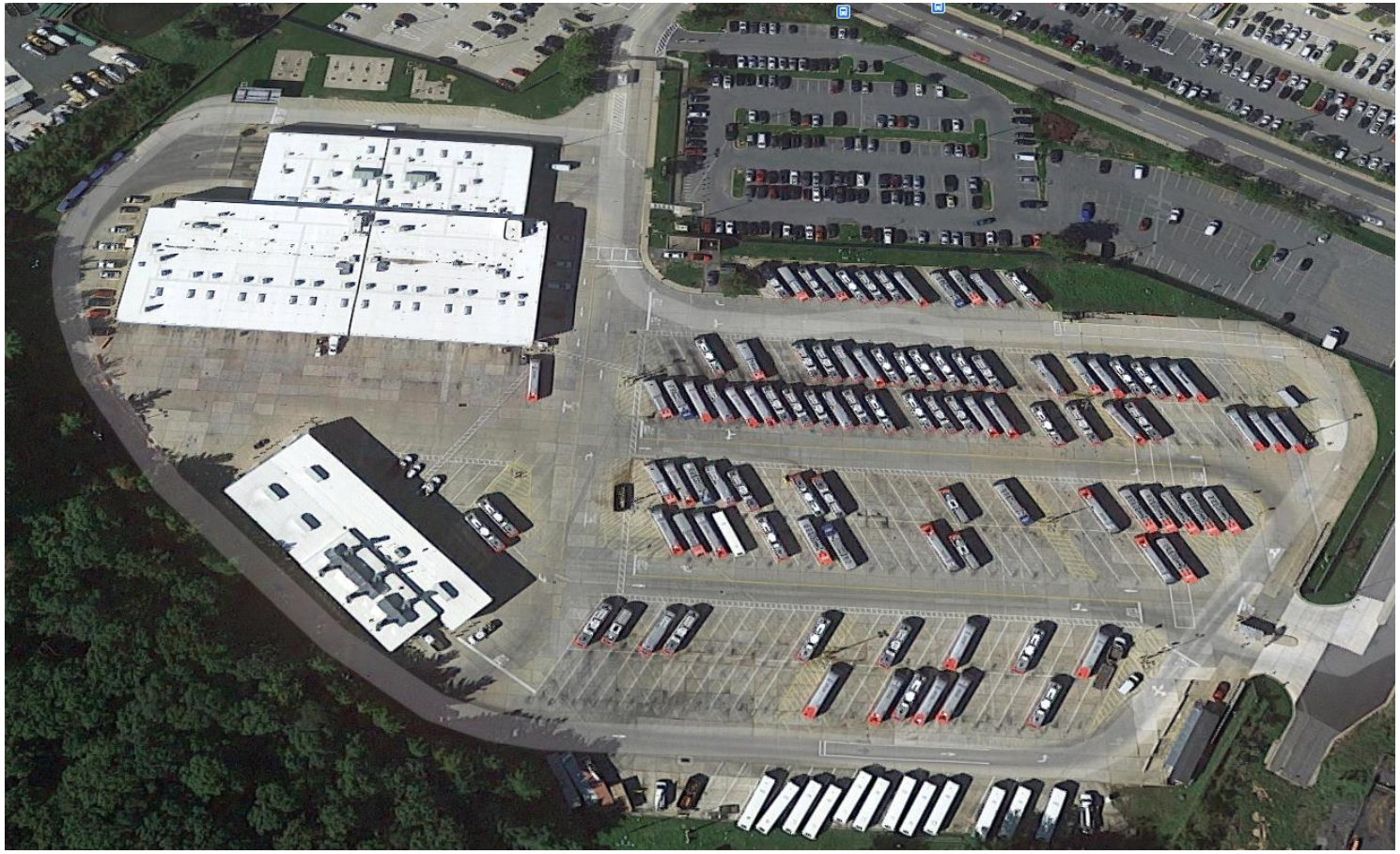
Source: Google Maps 3D Satellite View

Metro Garage Summary, Four Mile Run



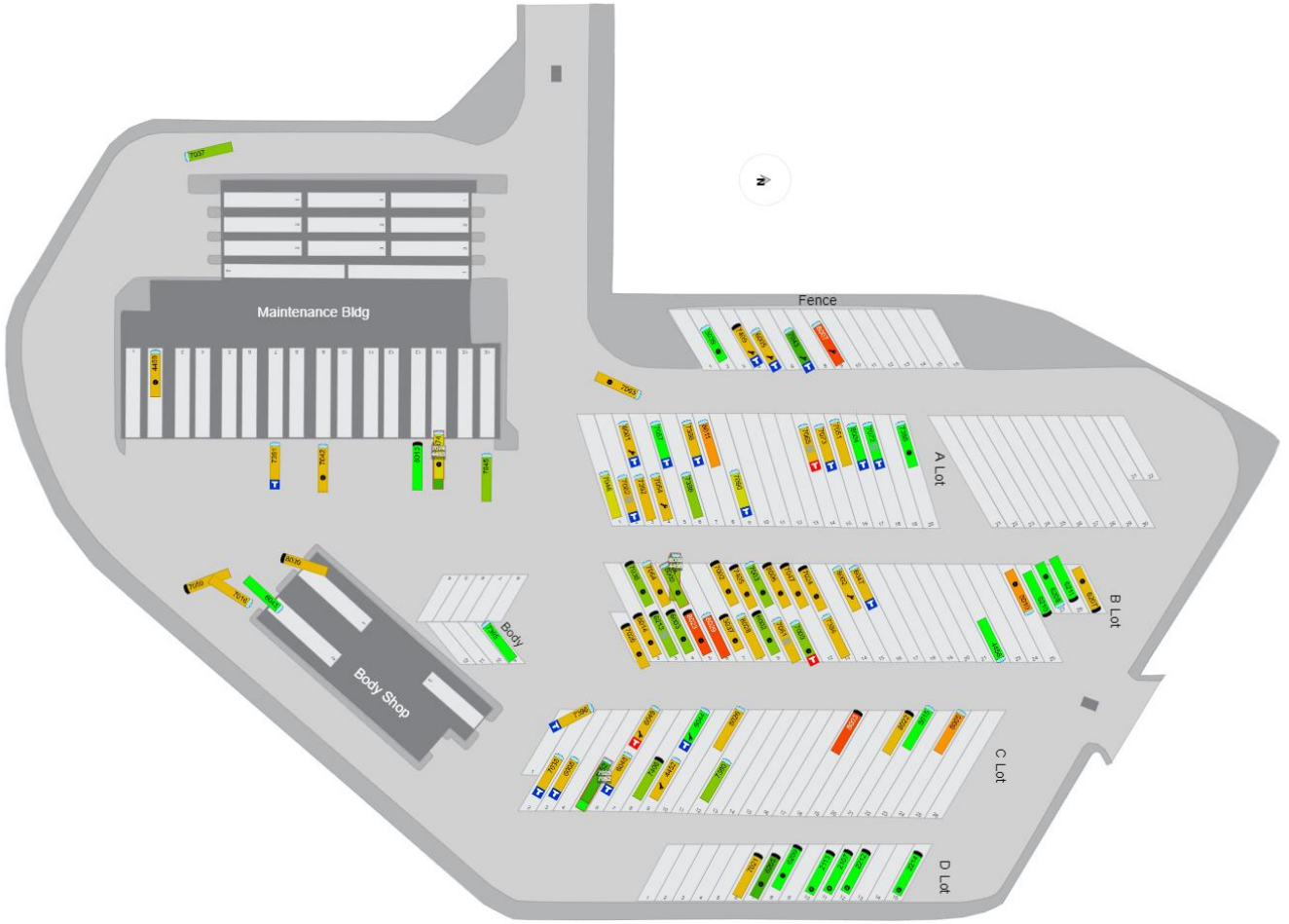
Metro Garage Summary, Landover

- Total bus capacity: 172



Source: Google Maps 3D Satellite View

Metro Garage Summary, Landover



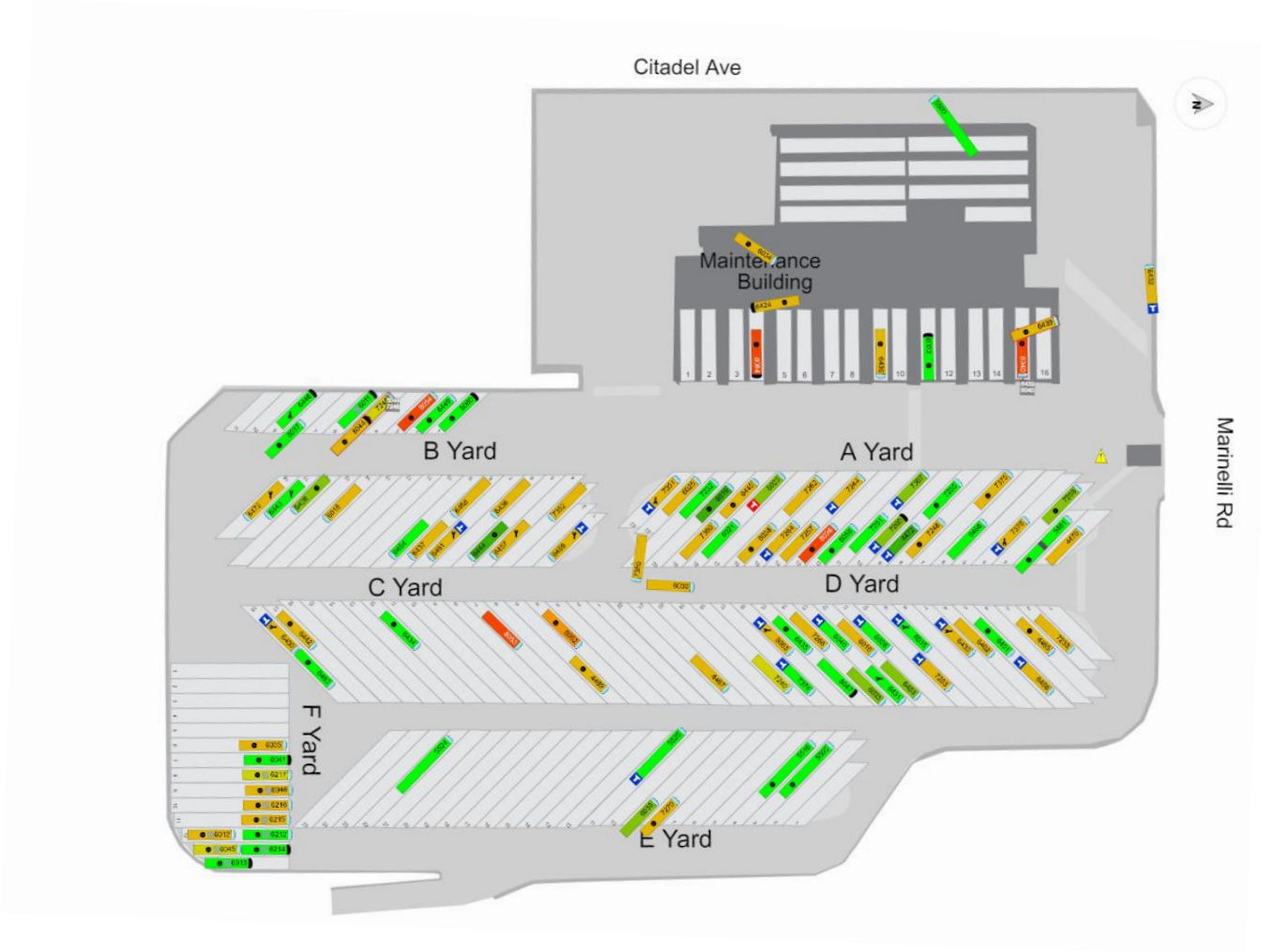
Metro Garage Summary, Montgomery

- Total bus capacity: 220

Has articulated bus maintenance bays

Source: Google Maps 3D Satellite View

Metro Garage Summary, Montgomery



Metro Garage Summary, Shepherd Parkway

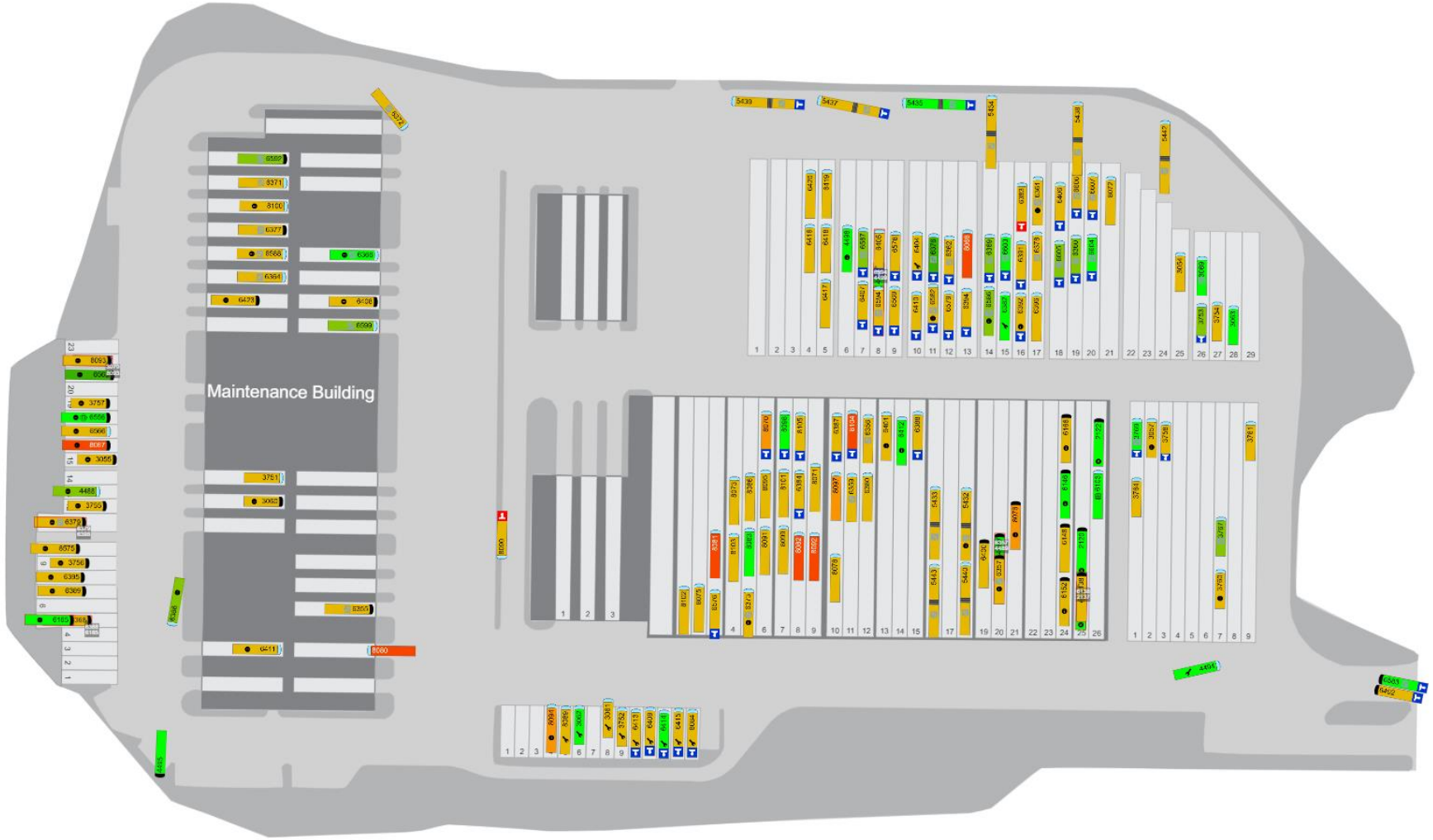
- Total bus capacity: 223
- Site of Metro's upcoming 12-vehicle Electric Bus Test & Evaluation program, which will include the addition of charging infrastructure
- CNG capacity to be added in FY23

Has articulated bus maintenance bays

Pending CNG fueling capacity

Source: Google Maps 3D Satellite View

Metro Garage Summary, Shepherd Parkway

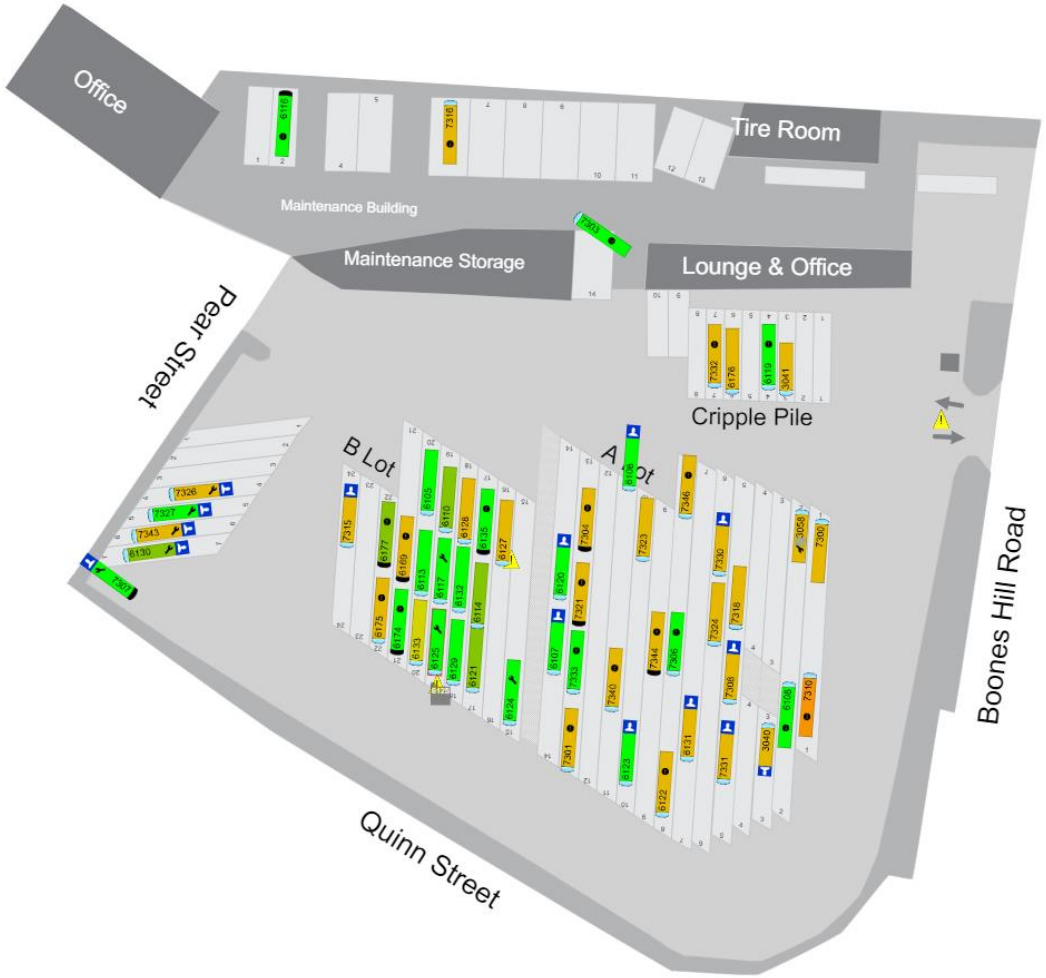


Metro Garage Summary, Southern

- Total bus capacity: 83

Source: Google Maps 3D Satellite View

Metro Garage Summary, Southern

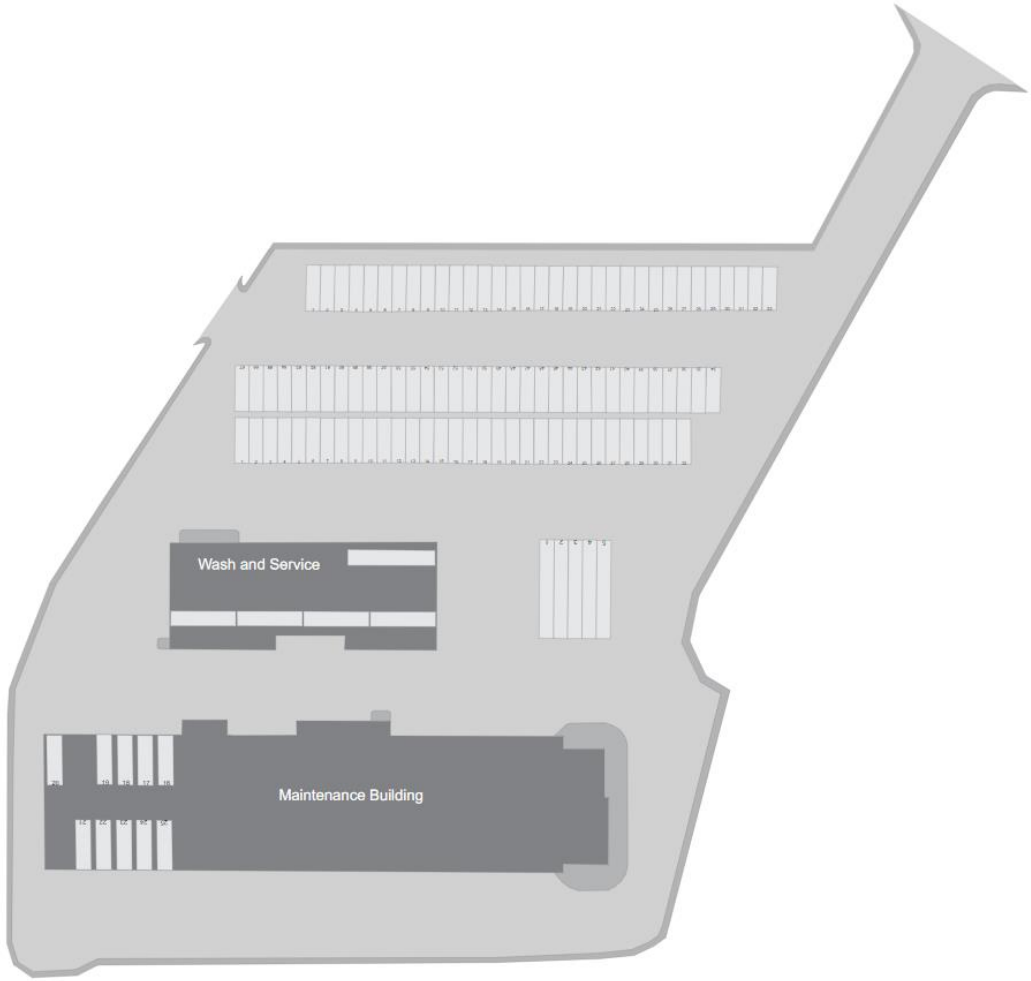


Metro Garage Summary, West Ox

- Total bus capacity: 100
- Operated in partnership with Fairfax County

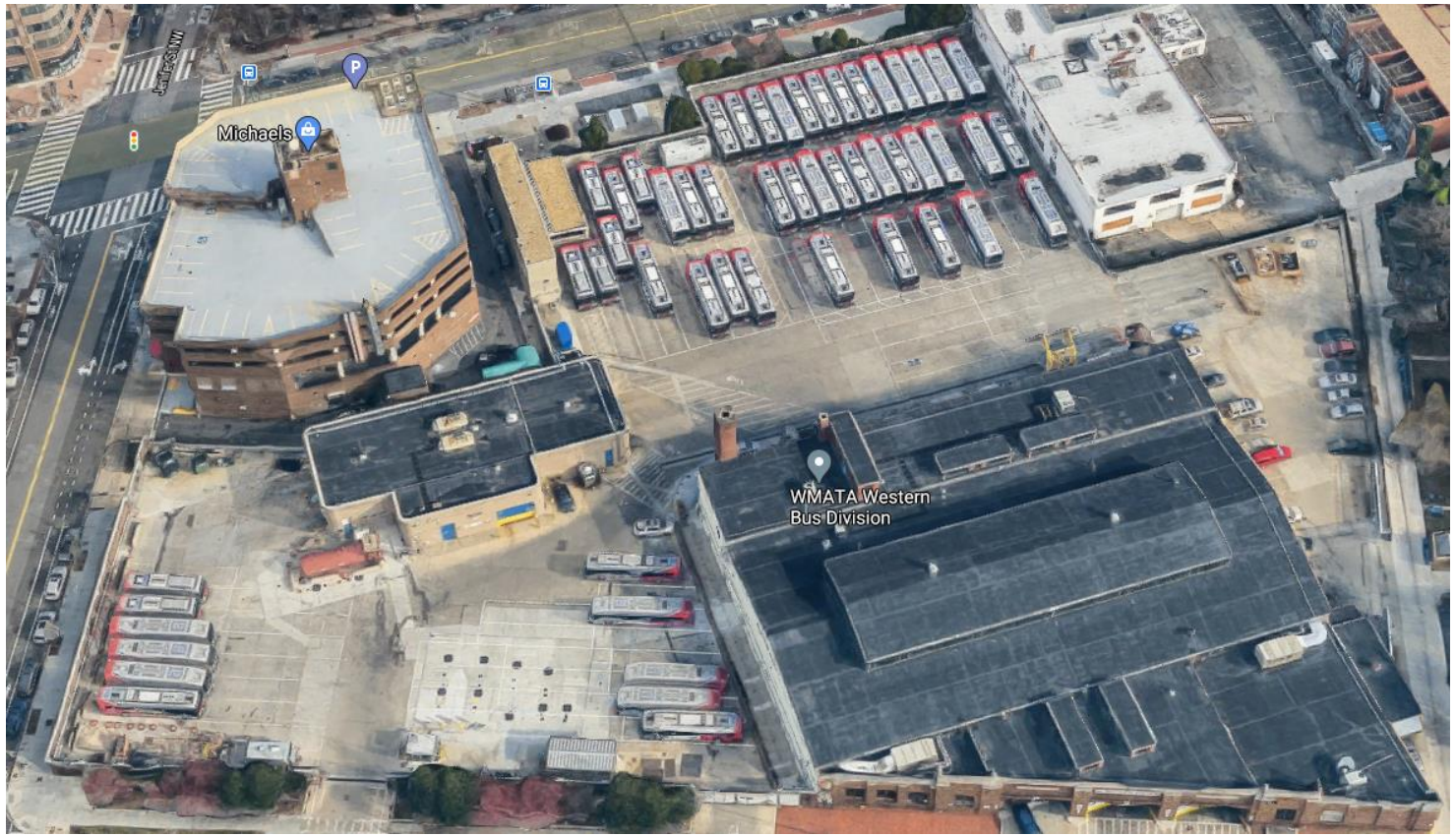
Source: Google Maps 3D Satellite View

Metro Garage Summary, West Ox



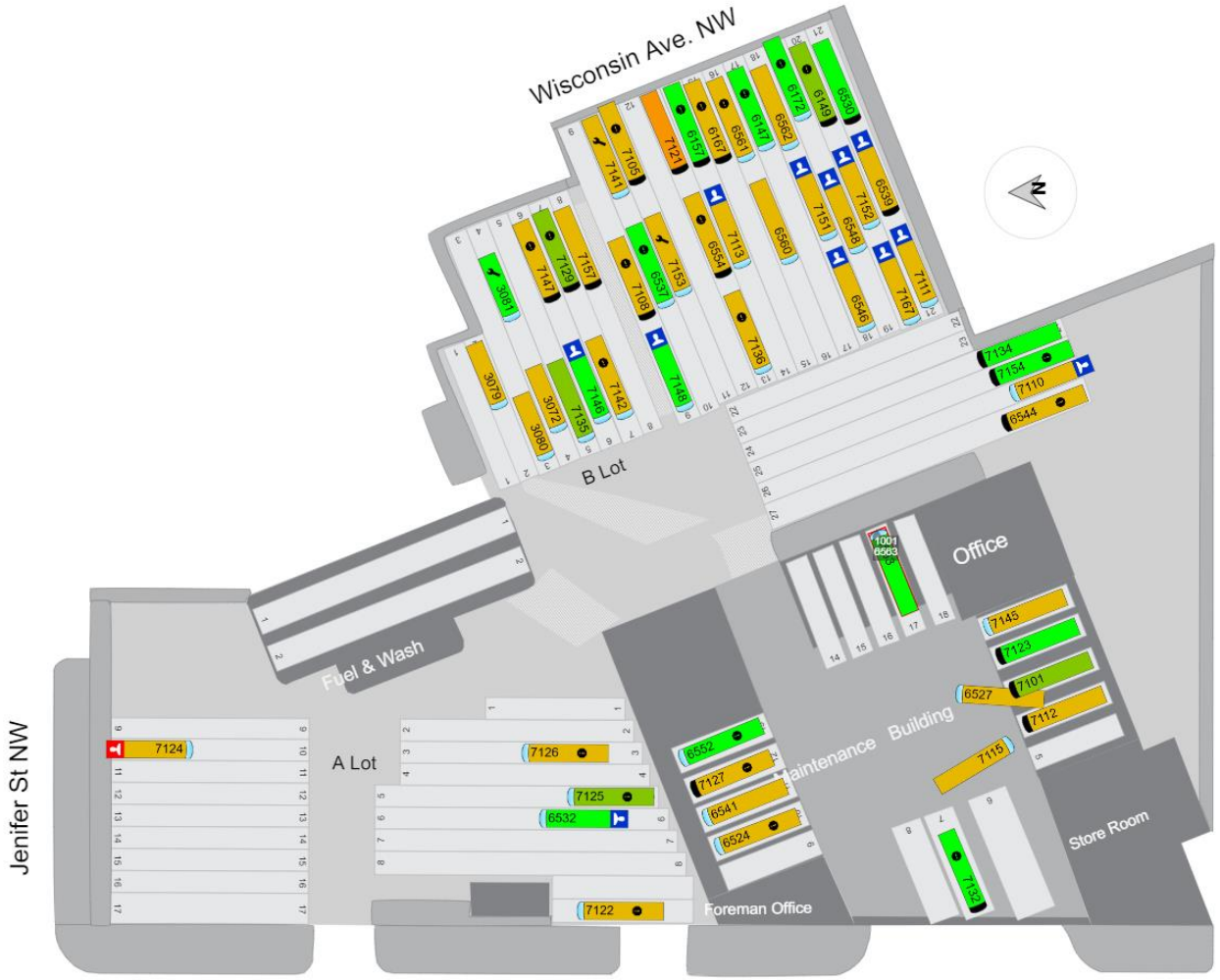
Metro Garage Summary, Western

- Total bus capacity: 117



Source: Google Maps 3D Satellite View

Metro Garage Summary, Western



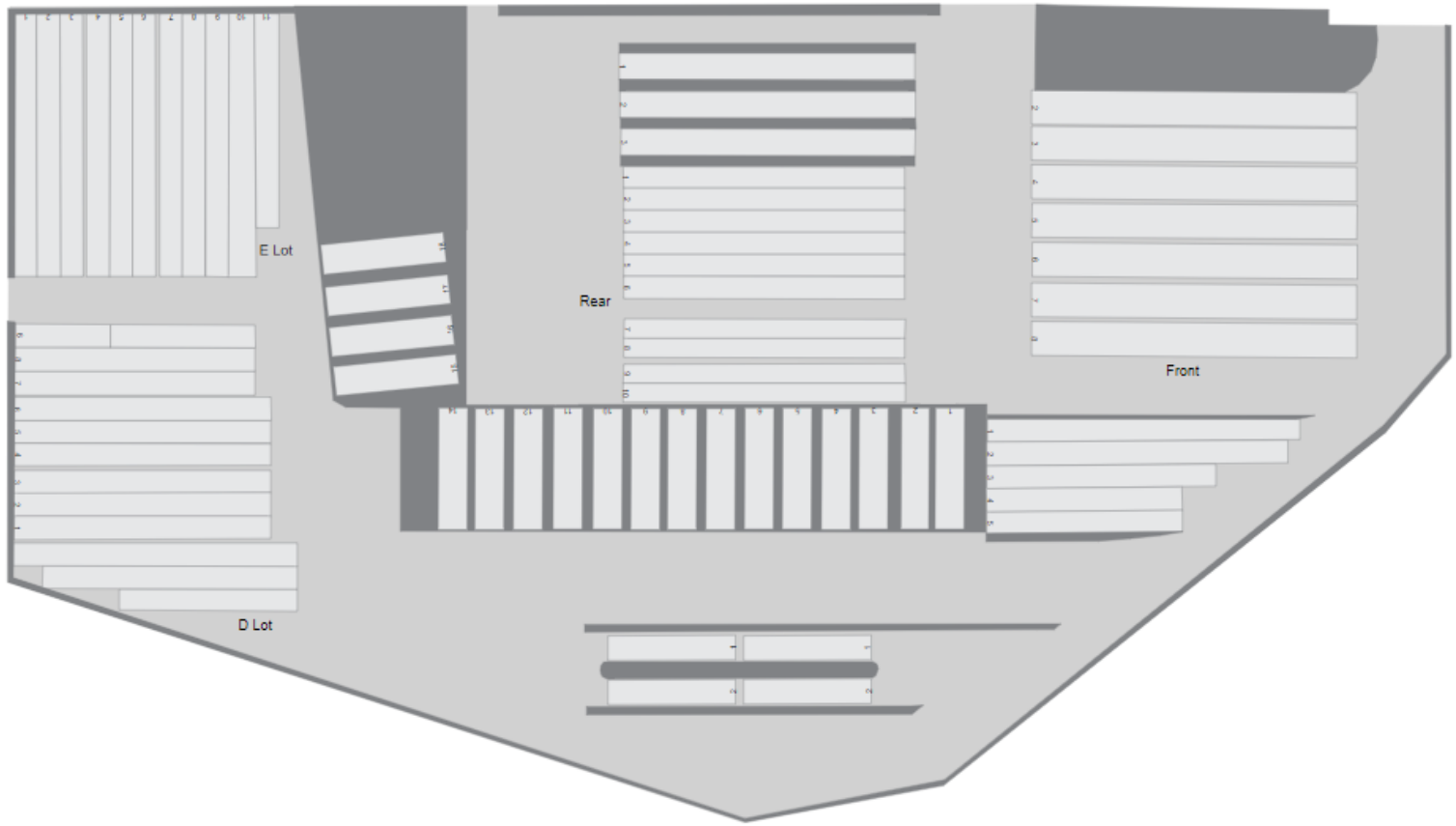
Metro Garage Summary, Northern (currently closed for reconstruction)

- Total bus capacity: 150
- Currently closed for reconstruction, completion expected in FY26
- Being designed for future support of electric buses. Space designs, overhead clearance, pathways for conduits and equipment are included in the current design plans.

Has articulated bus maintenance bays

Source: Google Maps 3D Satellite View

Metro Garage Summary, Northern (currently closed for reconstruction)



Note: previous facility layout shown