**Safety and Operations Committee**

**Board Information Item IV-A**

# Metrorail Fleet Strategy

Washington Metropolitan Area Transit Authority

# Board Action/Information Summary

| ○ Action ◉ Information | Document Number: 206760 | Resolution: ○ Yes ◉ No |
|---|---|---|

**Presentation Name:**

Metrorail Fleet Strategy

**Project Manager:**

Brian Dwyer

**Project Department:**

Operations

**Purpose/Key Highlights:**

Metro's railcar fleet strategy is informed by the Your Metro, the Way Forward Strategic Transformation Plan goals of service excellence, talented teams, regional opportunity and partnership, and sustainability.

Fleet planning is based on the kind of service Metro plans to deliver. Reliably delivering good service is key for generating ridership for the Metrorail system. Metro's current service plan increased mid-day, late night, and weekend service. Ridership is growing, but remains below 2019 levels, particularly during peak hours, which supports a near-term right-sized fleet.

Over the longer term, the upcoming 8000-Series trains give Metro the opportunity to support ridership growth over the next decade. Metro has the option to buy up to 800 new railcars, depending on service needs.

**Interested Parties:**

Hitachi Rail

**Background:**

Metro's rail fleet strategy outlines future service goals and decision points for the Authority in the next few years. Metro's railcar fleet comprises of 74 2000-series, 276 3000-series, 180 6000-series, and 748 7000-series, totaling 1,278 railcars. Railcars have a typical useful life of 40 years. Metro's 2000-series are over 40 years old, and the 3000-series are between 36 and 40 years old. Metro also has flexibility in the size

and makeup of its future fleet, with 256 of the 8000-Series railcars on order, with contract options for up to 800 total new railcars.

Fleet planning is based on the requirements needed to meet Metro's service plans, particularly the need to meet peak ridership when Metro requires the most railcars in service.

While ridership is growing, projecting future ridership levels is particularly challenging, and Metro's fleet strategy must account for a wide range of scenarios. Total Metrorail ridership continues to grow, with year to date rail ridership up 18% in 2024. This follows changes to reallocate service resources in FY2024, with more trains in service during mid-day, late night, and weekend time periods. Weekend ridership is now 113% compared to 2019 levels (calendar year to date, through April 30). The middle of the week (Tuesdays through Thursdays) are busier than Mondays and Fridays, with mid-week days increasing by 20% in March 2024, and 16% in April 2024 over the same months in 2023. Peak Hour ridership remains below 2019 levels but is also growing rapidly.

Railcar reliability has improved with the 7000-series return to service. The reliability of newer 7000-Series railcars have greatly increased Metro's overall fleet reliability, now best in the nation. Metro continues to press on wheels per the NTSB recommendation and expects to have all cars in service by September 2024.

Metro continues to operate 7000-series trains in both an eight- and six-car configuration to sustain frequency while reducing railcar miles and traction power costs. Metro is monitoring crowding on all lines to determine where eight-car trains are assigned.

Metro's Fleet of the Future will be based on the 8000-Series railcar design, which will be designed to accommodate all kinds of customers and different types of trips.

**Discussion:**

Metro's fleet planning centers around peak hour vehicle demand and ridership. Because of the longevity of Metro's railcar assets, fleet decisions directly impact the quality of service and capability of Metro over the next decade.

Metro's near-term service plan allows Metro to right-size the railcar fleet until the 8000-Series trains enter service. This will reduce the fleet size to 1,204 railcars and result in savings from current ongoing corrective maintenance and periodic inspections of that fleet. This fleet strategy maintains rail service at the FY2025 budgeted service levels and allows for peak hour ridership growth of up to 33 percent with more 8-car trains before sustained rush hour crowding.

Looking beyond the near-term time horizon, Metro has the opportunity to increase capacity, improve service, and extend the system. However, each potential peak service improvement requires additional railcars as well as concurrent investments in Metro's facilities. These service improvements could include service changes such as increasing Red Line service to every 4 minutes or extending Yellow Line service to

Greenbelt.

Metro's 8000-series contract provides opportunities to support ridership growth and entice even more riders to the Metro system with a flexible option schedule. Both the Base Order and Option 1 are funded in the six-year Capital Improvement Program for a total of 360 railcars. Options for an additional 440 railcars are not funded and the first exercise date is June 2027. Part of the challenge in planning for future service are the different time horizons for ridership growth over the next several years, compared with the decision point for railcar options to purchase assets that will be part of Metro's fleet for decades to come.

Several factors beyond the railcar fleet determine the capacity of the Metrorail system. These include fleet size, yard storage, maintenance shops, tractions power, core throughput, terminal capacity and stations. Expanding the capacity of many of these facilities also requires multi-year lead times.

In the near future, Metro needs to decide on whether to exercise Option 1 of the 8000-series railcar purchase. This decision will impact the flexibility to make future decisions regarding service levels and fleet size; and the complementary investments in rail yards, shops, systems, and terminal capacity. These future decisions are dependent on predictable, sustainable funding.

**Funding Impact:**

No funding impact from this information item.

**Previous Actions:**

June 2021 - Adoption of a Sustainability Vision and Principles and Zero-Emission Vehicle Goals
December 2021 - Approval of Metrorail and Metrobus Fleet Plans and Rail Service Standards

**Next Steps:**

Develop updated rail fleet management plan that considers service to be provided, workforce availability, facility constraints, and impacts to operating and maintenance costs, and capital investment needs.

**Recommendation:**

Information Only

Washington Metropolitan
Area Transit Authority

May 9, 2024

# Metrorail Fleet Strategy

## Safety and Operations Committee

RD OR SV BL YL GR metrobus Metro Access

# Your Metro, the Way Forward


*Objectives of Service Excellence Goal*

**Convenience |** Deliver frequent and accessible service that modernizes and enhances the customer experience.

*Objectives of Regional Opportunities and Partnership Goal*

**Regional Opportunity and Partnership |** Design transit service to move more people and equitably connect a growing region.

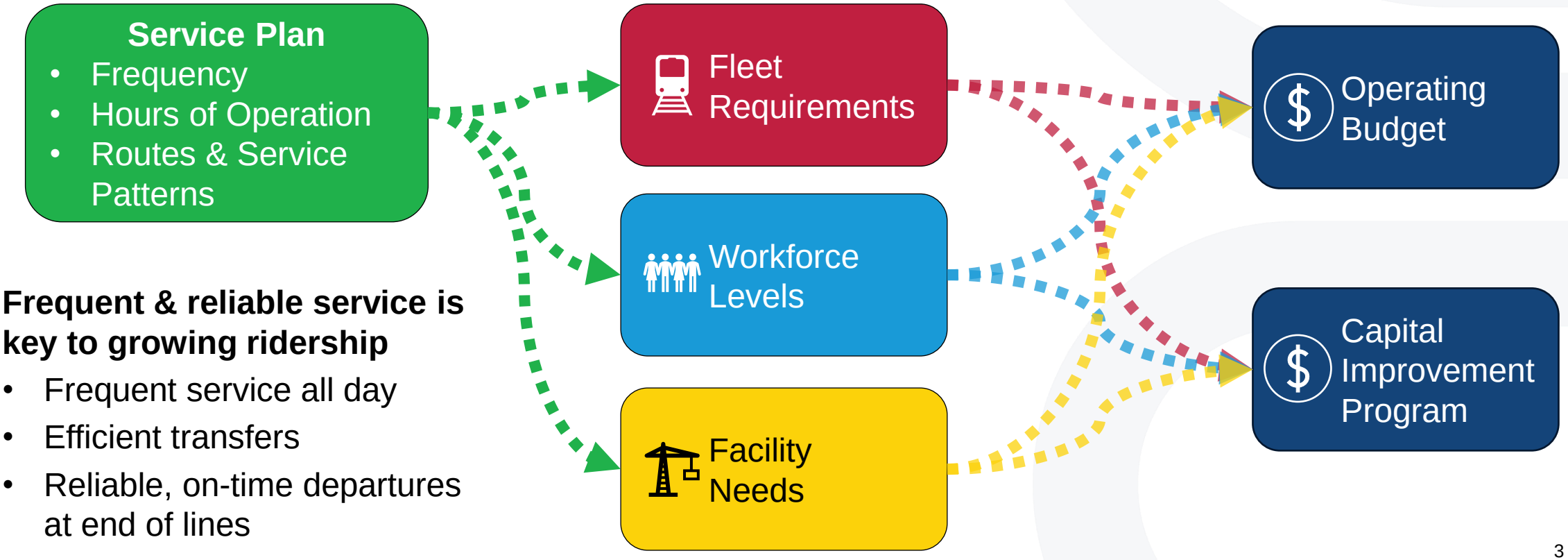
*Objectives of Sustainability Goal*

**Financial Sustainability |** Establish dedicated, ongoing, regional funding to support multi-year operating and capital plans and steward public investment.

# Service plans inform fleet strategy



Fleet, workforce, and investment plans all follow from service plans



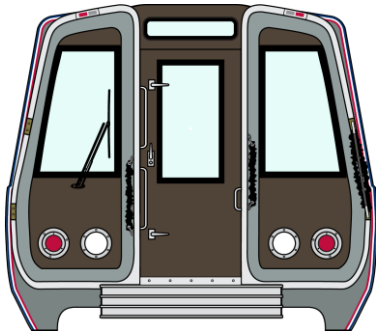

**Frequent & reliable service is key to growing ridership**

- Frequent service all day
- Efficient transfers
- Reliable, on-time departures at end of lines

# Current, near-term, and future fleet composition



**2000-Series are past their useful life; 3000-Series are near the end of their useful life; 8000-Series options provide flexibility to support future service levels & ridership**

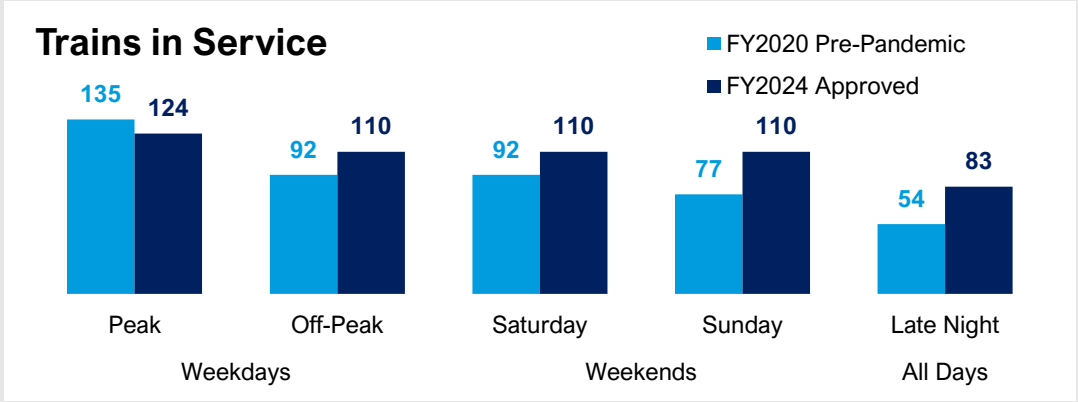



| Railcar Series | Entered Service | Age (years) | Current Fleet | Near-Term Fleet | Future Fleet |
|---|---|---|---|---|---|
| 2000 | 1983 to 1984 | 40 to 41 | 74 | 0 | 0 |
| 3000 | 1984 to 1988 | 36 to 40 | 276 | 276 | 0 |
| 6000 | 2006 to 2008 | 16 to 18 | 180 | 180 | 180 |
| 7000 | 2015 to 2020 | 4 to 9 | 748 | 748 | 748 |
| 8000 | TBD | n/a | 0 | 0 | 256 to 800 |
| **TOTAL** | | | **1,278** | **1,204** | **TBD 1,184 to 1,728** |

# Total Metrorail ridership continues to grow

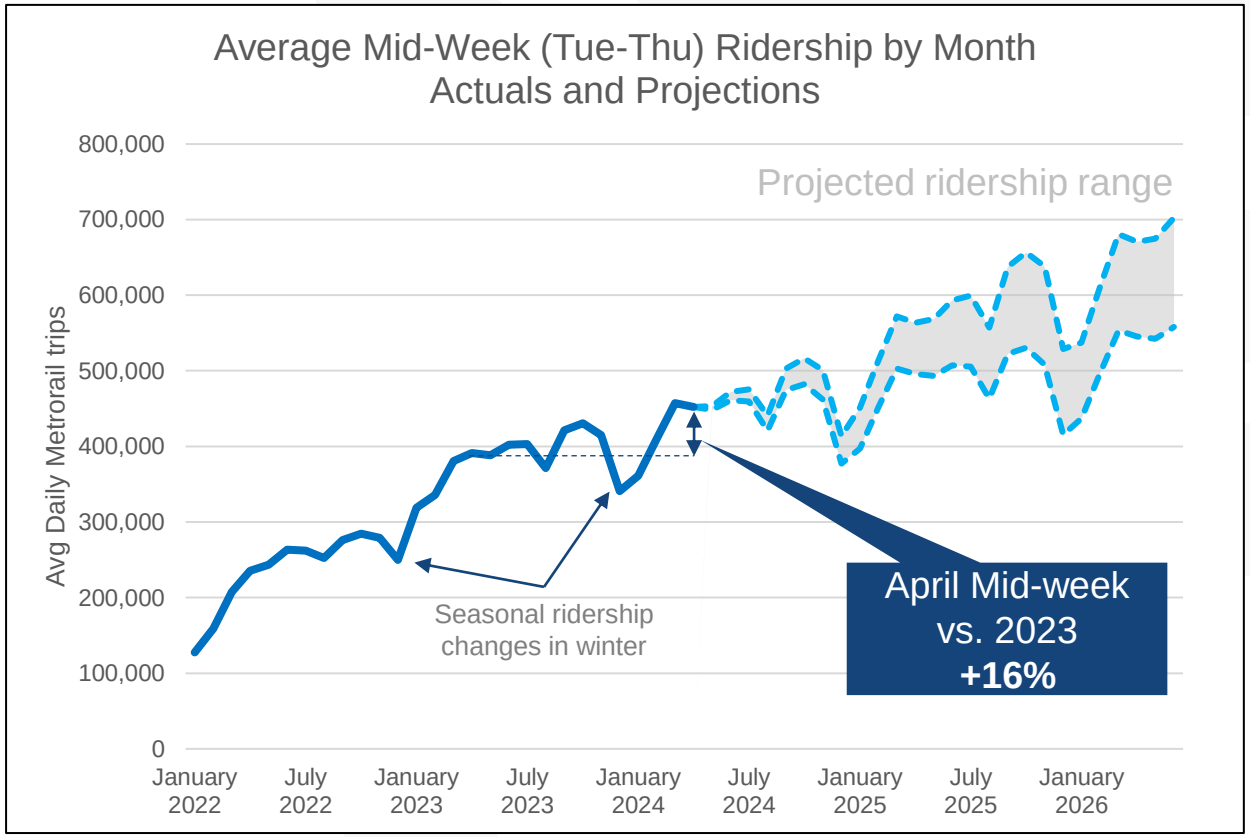
## Fleet planning considers a wide range of ridership growth scenarios

**Metro added more mid-day, late night, and weekend service:**




**2024 year to date ridership:**

- All days: +18% from 2023; 72% of 2019 ridership
- Weekends: +18% from 2023; 113% of 2019
- Weekdays: +17% from 2023; 66% of 2019




2024 year to date ridership data through April 30

# Peak Metrorail ridership continues to grow

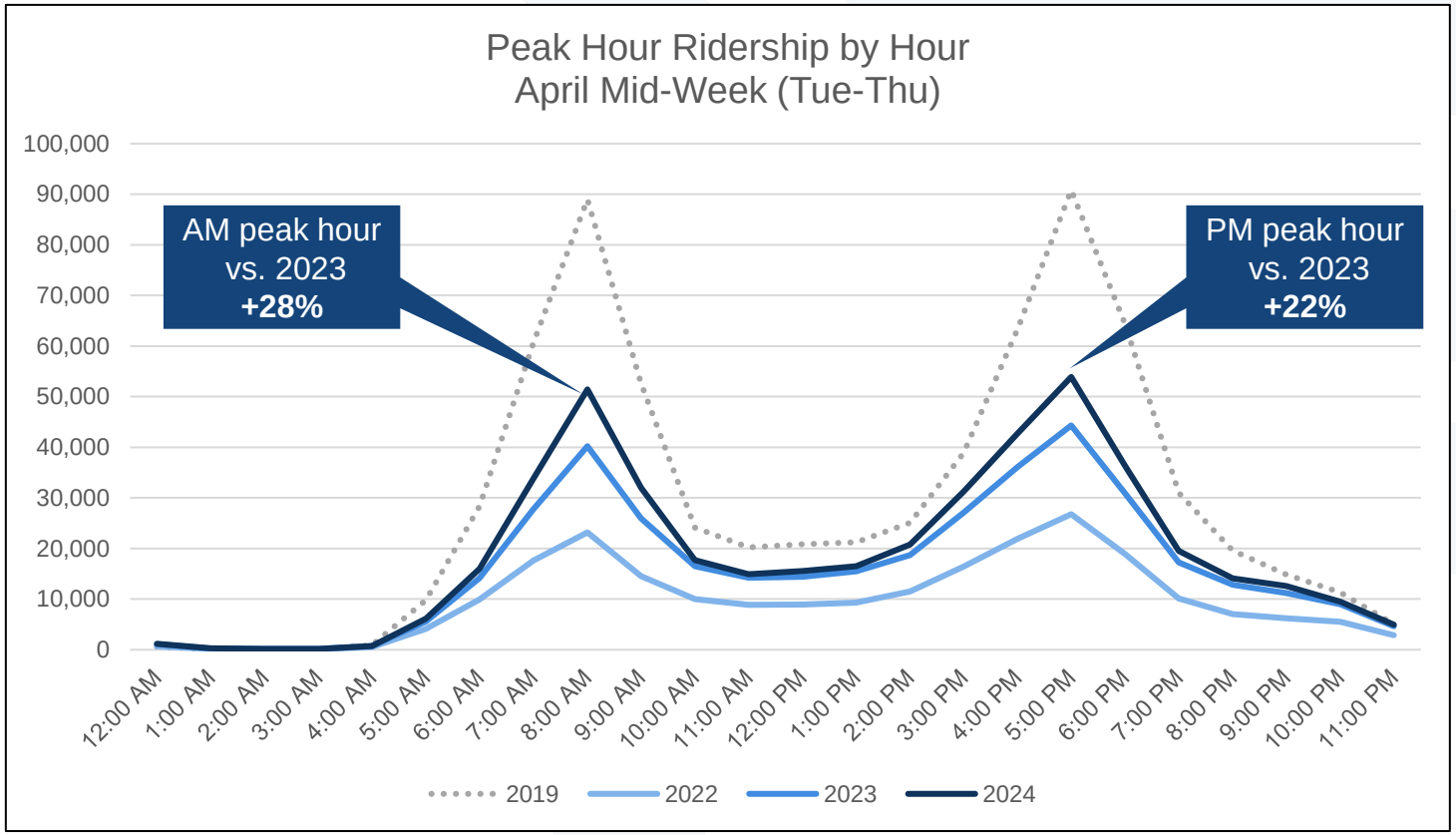
## Rush hours are the busiest times for the rail system
## Ridership remains below pre-pandemic levels, but growing rapidly

**Peak-hour ridership increasing:**

- April 2024 mid-week peak hour ridership up 22% to 28% over 2023
- 60,000+ afternoon peak entries on Tuesday, March 26 – highest peak hour since pre-pandemic

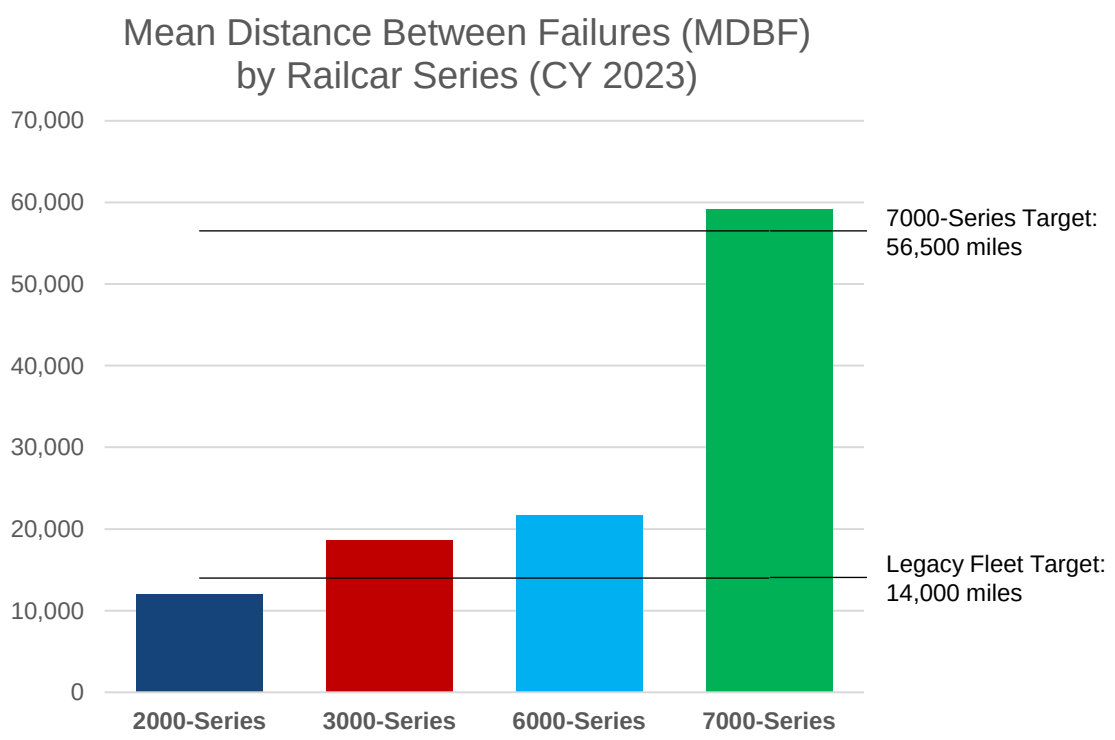
**Peak-hour ridership remains below pre-pandemic levels:**

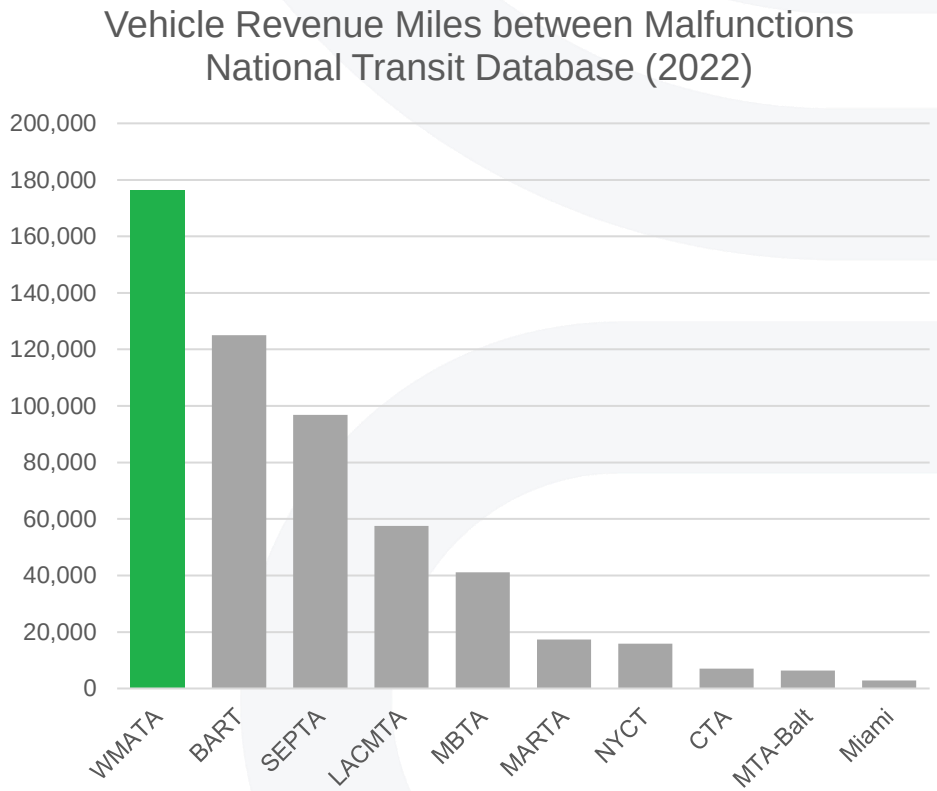
- April mid-week peak hour ridership was 58% to 60% of 2019



# Modernizing Metro's fleet improved reliability

Newer 7000-Series trains are more reliable than Metro's legacy fleet
Metro's overall fleet now the most reliable in the nation



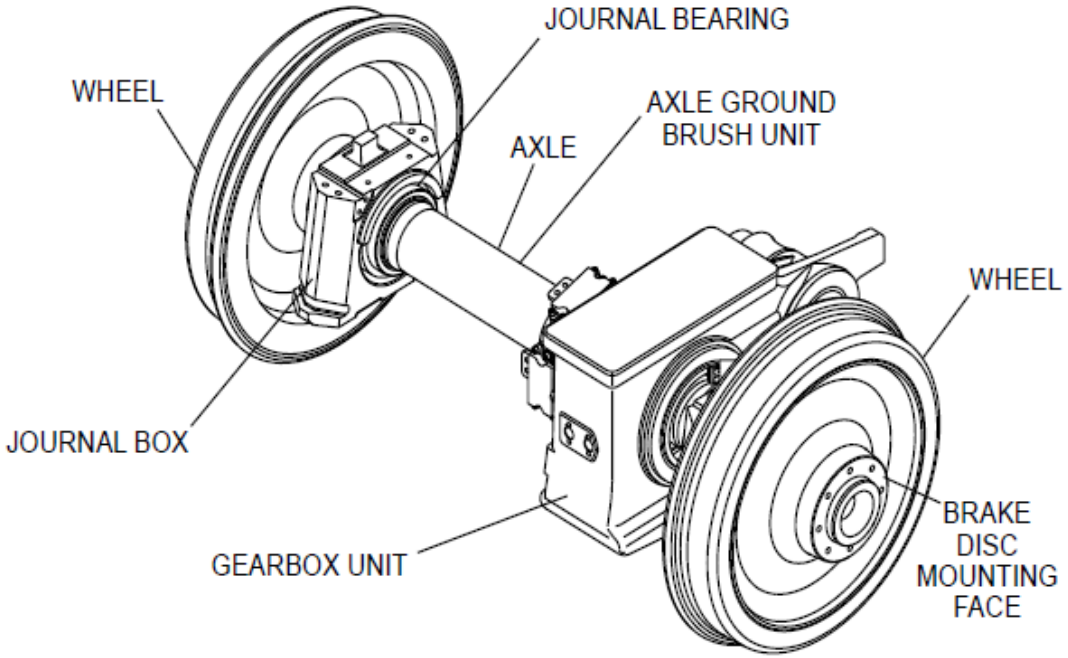




2022 data from the National Transit Database is the most recent available

# 7000-series return to service



Metro continues to press wheels per the NTSB recommendation and expects to have all cars in service by September 2024




# Improving service delivery

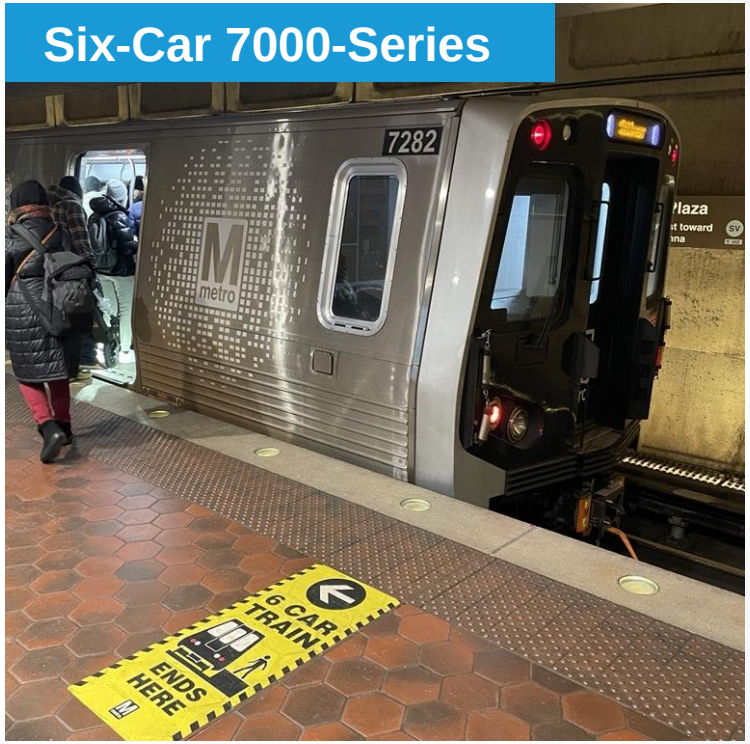


## Revisiting old assumptions to find efficient ways to deliver good service

### More Six-Car Trains


Sustain service frequency with fewer railcars; Reduce maintenance & traction power

### Six-Car 7000-Series




Get the most service out of most reliable railcars

### Modernization

Safely and efficiently deliver service with Automatic Door Operation

# Fleet of the Future



## 8000-series railcars designed to accommodate all customers and types of trips


**Aluminum Carbody**

- Lighter weight than stainless steel
- Enables addition of open gangway
- Benefits from the manufacturer's supply chain expertise

**New Interior Layout & Open Gangways**

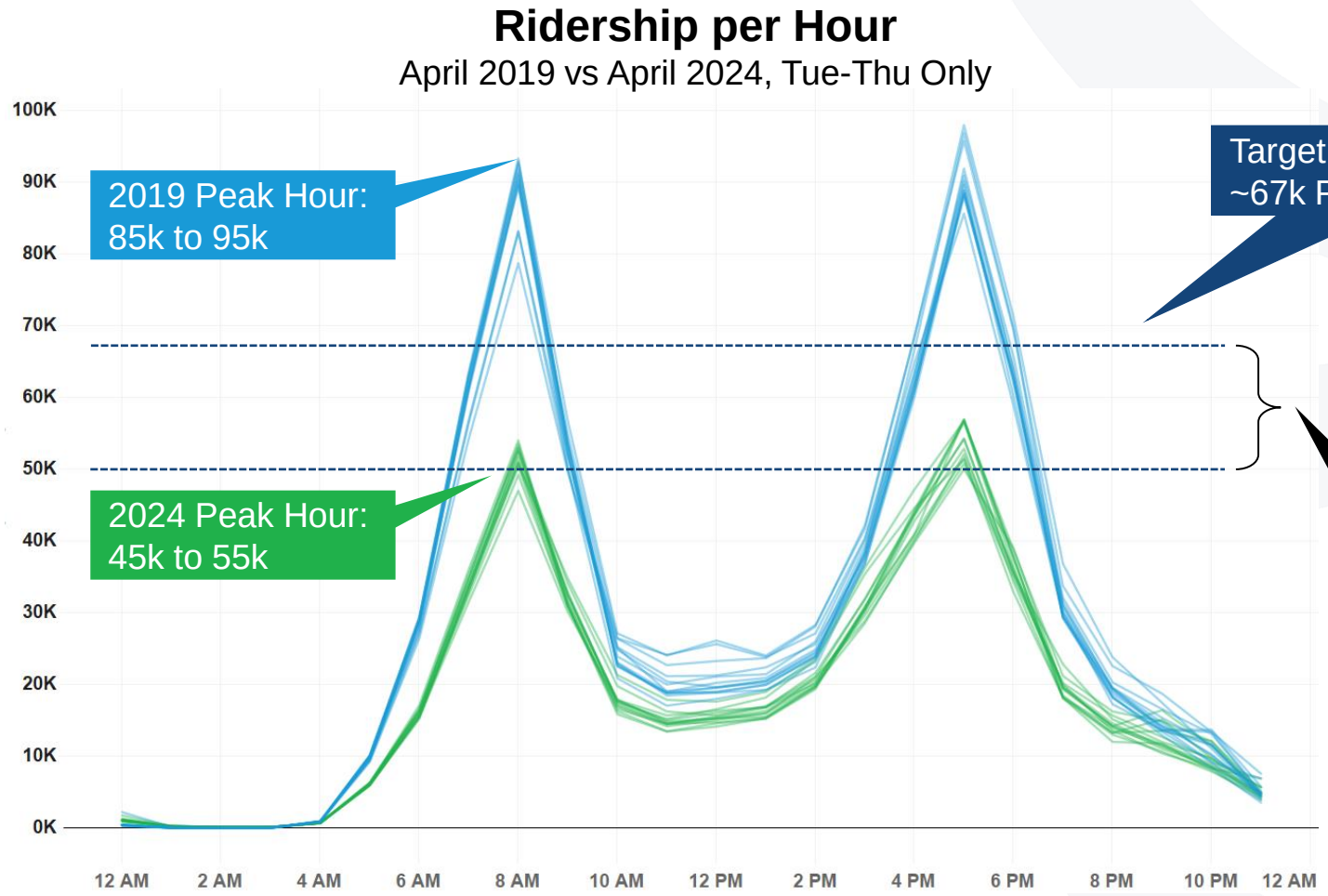
- Improve customer flow between cars
- More horizontal seating and wider aisles
- Popular with customers


**Design Improvements**

- Dedicated space for bikes, strollers, and luggage
- More and larger digital information displays
- In-floor radiant heating saves energy and increases comfort

# Peak hour ridership drives vehicle needs

**Metro's current fleet allows for peak hour ridership growth of up to ~33% before sustained crowding**



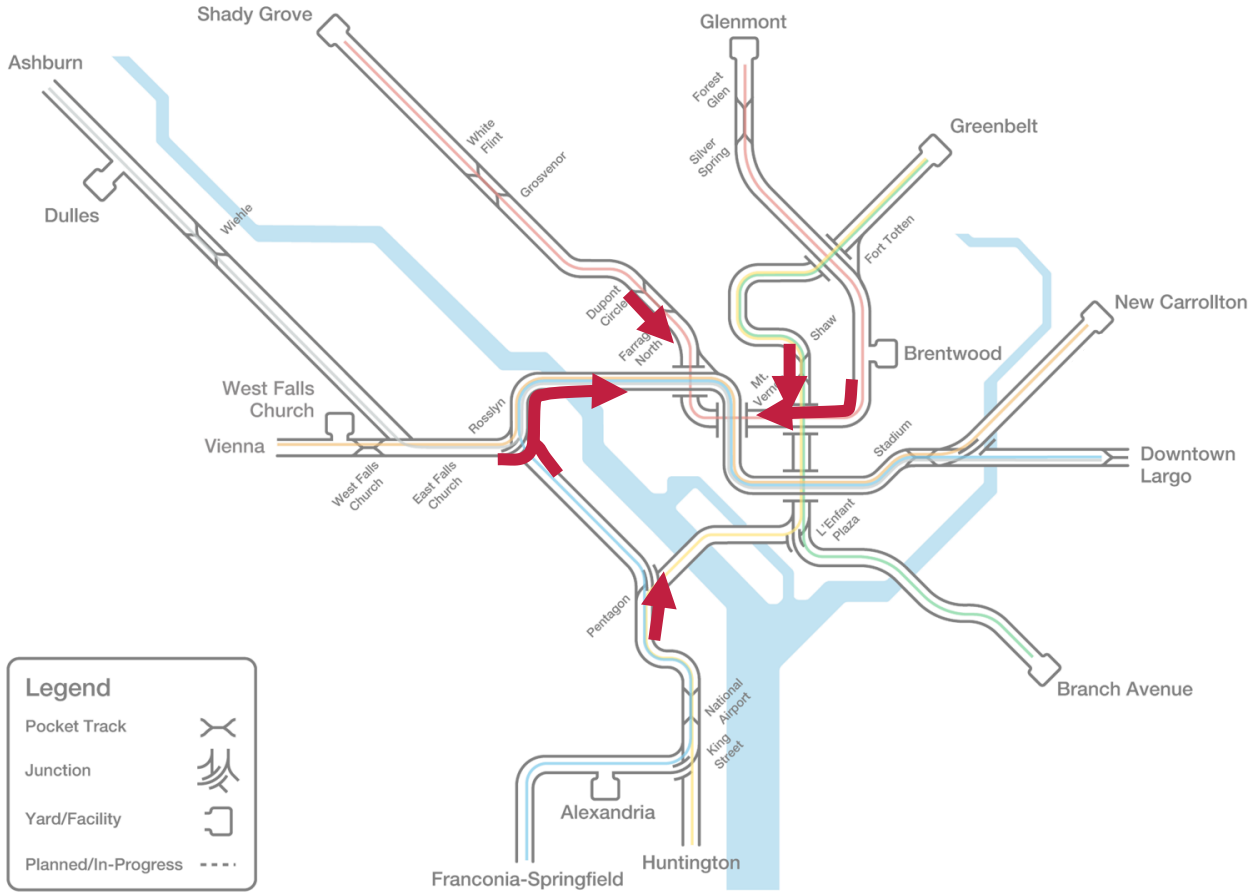

Service plan can accommodate about 67K riders in the peak hour, or the hourly average level of 100 persons per railcar

# Where the rail system is busiest

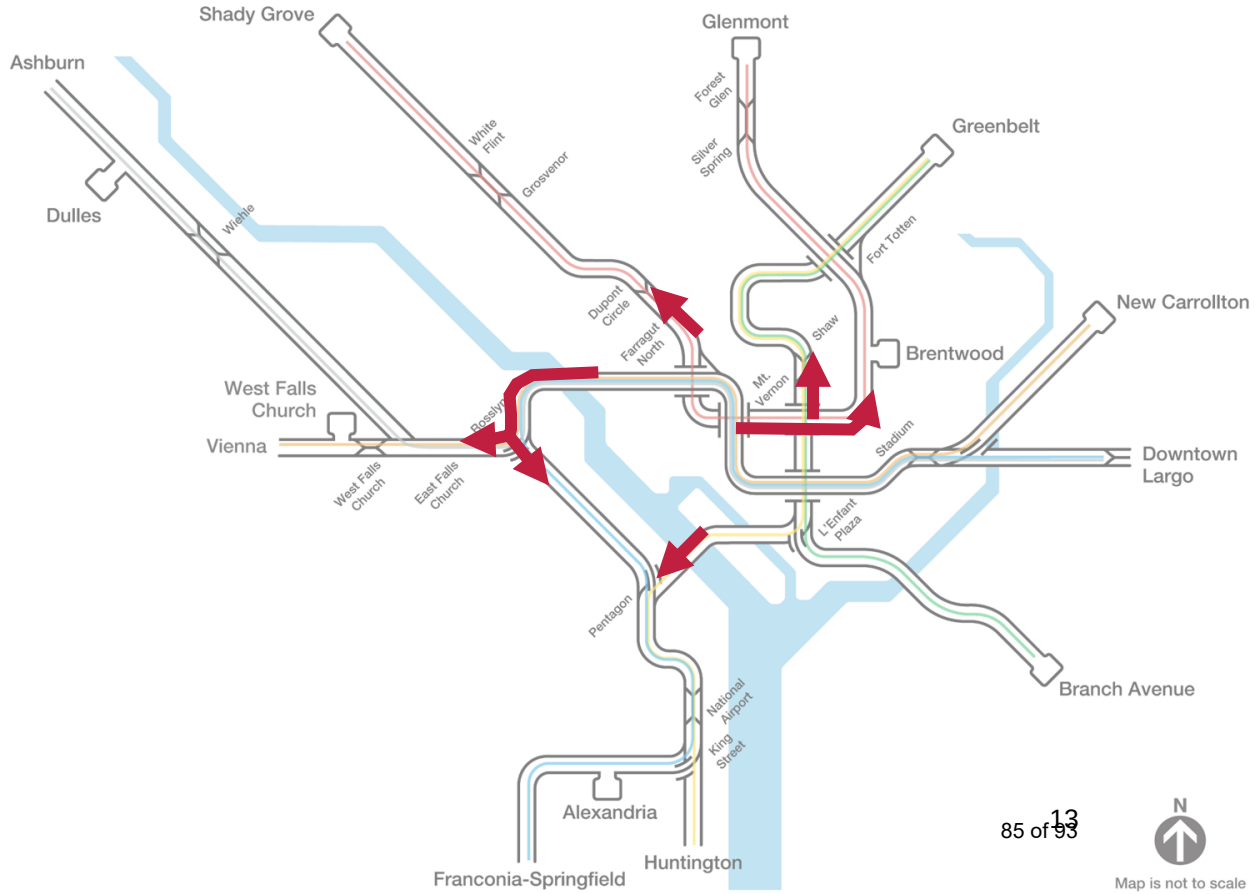


Locations where trains are carrying the most customers, travelling into the center during the morning peak and out of the center in the afternoon

## Morning Peak



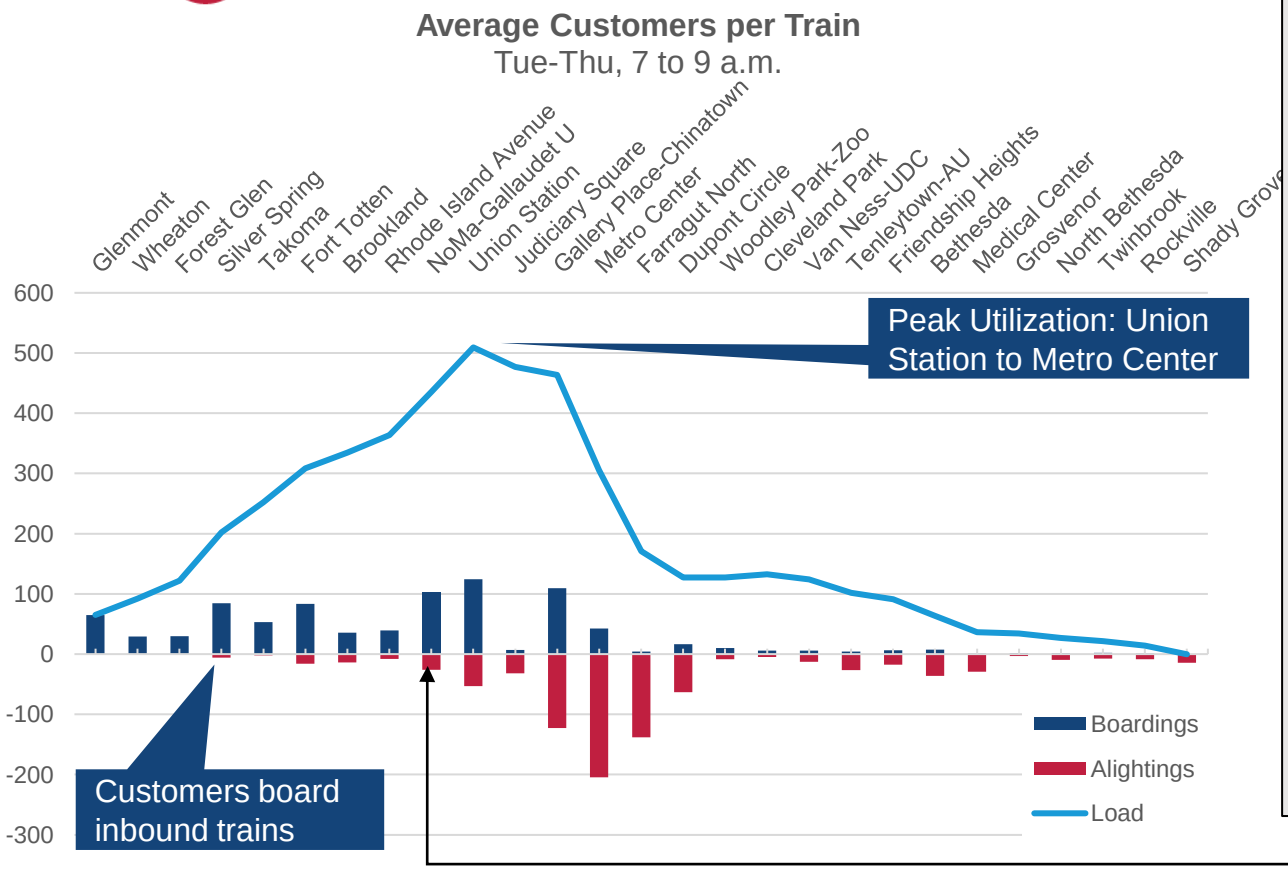

## Afternoon Peak



# Example of where ridership is growing rapidly

## Frequent, all-day service & transit-oriented development increase ridership, including peak hour customers

RD ➡ Glenmont to Shady Grove




**NoMa-Gallaudet U Station**

- Weekday ridership 13% above 2019 levels to 19,000 per day
- Weekday mid-day & evenings up 32%
- Weekend ridership up 137%

# Service levels drive railcar requirements

## FY2025 budgeted service requires a minimum of 1,150 railcars

| Current Service Requirement | Near-Term Service Requirement |
|---|---|
| **1,036**<br>Active + Spare Railcars<br>50% 8-car Trains | **1,150**<br>Active + Spare Railcars<br>73% 8-car Trains |
| **1,204**<br>Total Fleet | **1,204**<br>Total Fleet |

| Vehicle Requirement | Fleet Requirement | |
|---|---|---|
| | **Trains** | **Railcars** |
| Peak Service Requirement, including Strategic Trains | 120 | 896 |
| Training & Certification Trains | 5 | 38 |
| Spares and Seasonal Trains | -- | 216 |
| **Total Fleet Requirement** | | **1,150** |
| Storage/Contingency Railcars | -- | 54 |
| **Total Fleet Size** | | **1,204** |

# Factors for Metrorail system capacity

**Several factors determine overall system capacity; near-term system capacity can deliver 75% eight-car trains at current peak frequencies**

**Fleet size:** number of railcars operating in daily service and spare requirements

**Yard Storage:** amount and configuration of railcar storage tracks in rail yards

**Maintenance Shops:** capacity of maintenance shops to service and overhaul railcars

**Traction Power:** capacity to provide power for vehicle propulsion

**Core Throughput:** maximum number of trains able to move through core segments of system, typically measured as trains per hour

**Terminal Capacity & Turnbacks:** number of trains able to turn around at end-of-line terminals, typically measured as trains per hour

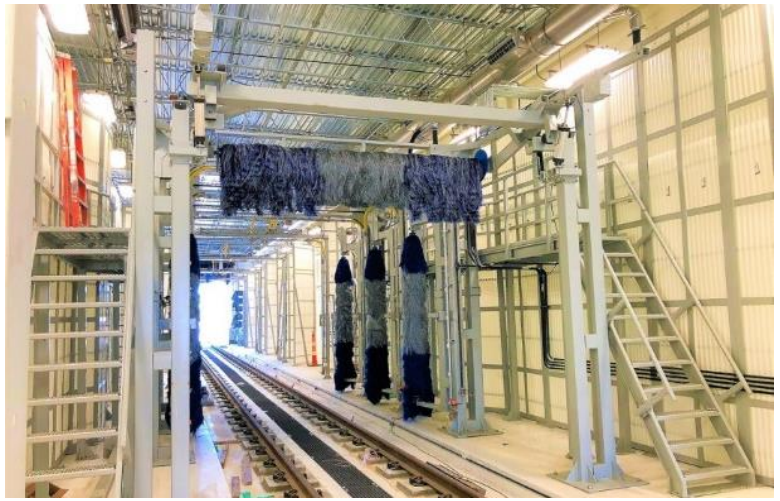
**Stations:** impact of platform lengths on maximum cars per train; dwell time impacts from crowding and station passenger flow

# Facility improvements strategy



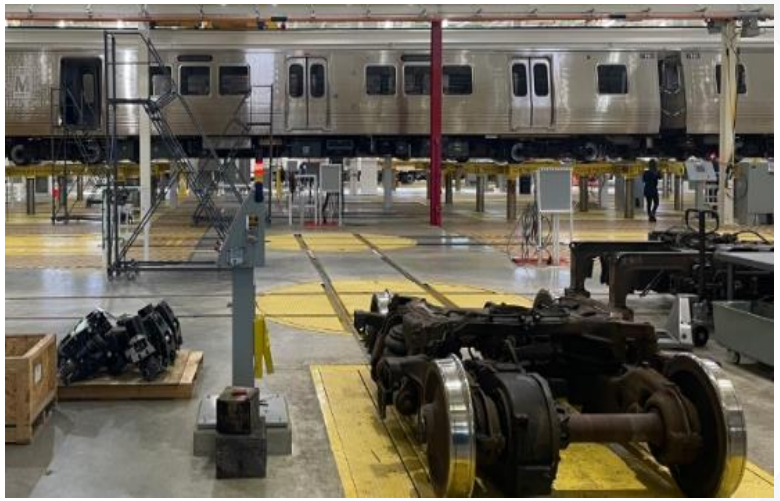
Improve system reliability and optimize operations by modernizing the system and adding incremental capacity

## State of Good Repair



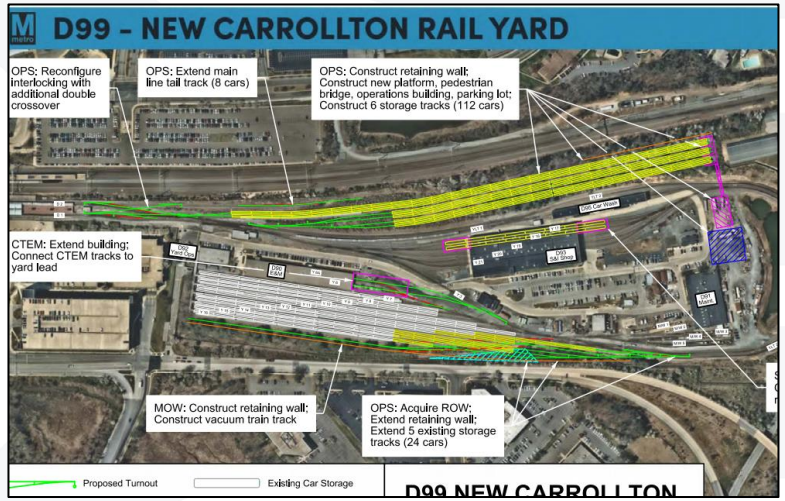
- Rail yard state-of-good repair
- Train washes

## Modernization



- Yard changes for efficient operations and storage of 8-car trains
- Railcar lift upgrades
- Overhaul capacity

## Incremental Capacity




- Yard Optimization (including New Carrollton & Shady Grove)
- Terminal capacity analysis

# 8000-Series railcar procurement options



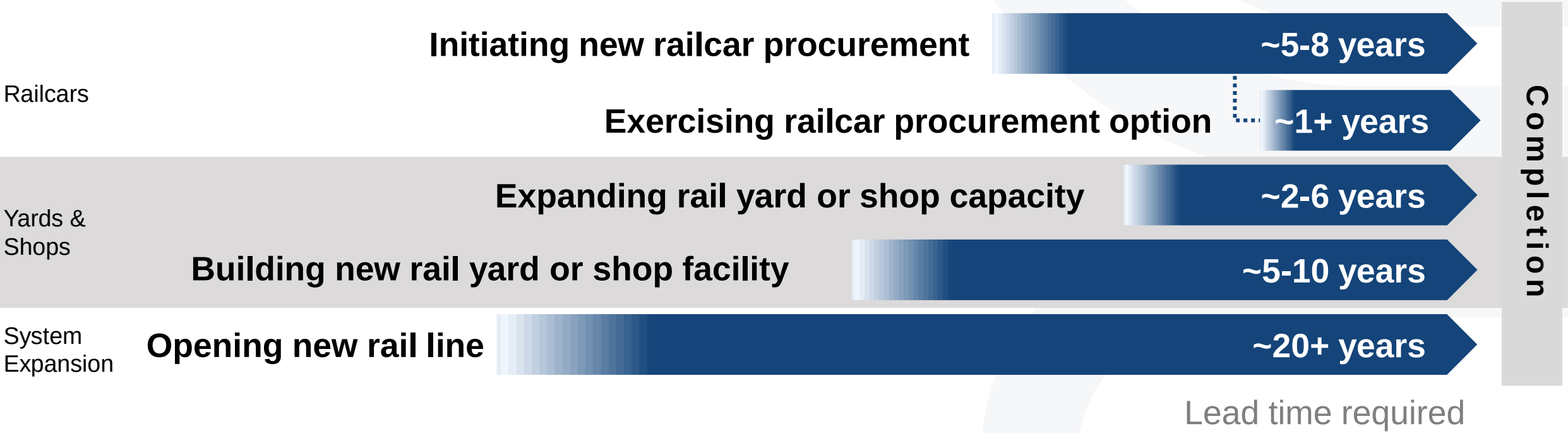
Procurement approach structured for flexibility with a base order and options to upgrade the fleet and enable potential service improvements

| Option | Option Size | Total Order | Future Fleet | Funding | Contract Status/ Expiration Date |
|---|---|---|---|---|---|
| **Base Order** | 256 | 256 | 1,184 | **In CIP** | **Awarded Mar. 2021** |
| **Option 1** | 104 | 360 | 1,288 | **In CIP** | Exercise by Dec. 2026* |
| **Option 2** | 104 | 464 | 1,392 | **Not funded** | Exercise by June 2027* |
| **Option 3** | 120 | 584 | 1,512 | **Not funded** | Exercise by (est.) October 2028* |
| **Option 4** | 216 | 800 | 1,728 | **Not funded** | Exercise by (est.) June 2029* |

*Decision points for railcar options based on maintaining continuous production
*Contract includes cost escalation based on date options are exercised

# Lead time & development for capacity investments

Long-term system planning and investment requires decisions made well in advance



# Potential future service concepts



**Service improvements, extensions, and capacity increases will require additional railcars and investments in Metro's facilities, system flexibility, and capacity**

| 8000-Series Milestone | Railcars |
|---|---|
| **Future Fleet Size with Base Order** | 1,184 |
| **Option 1** | +104 |
| **Option 2** | +104 |
| **Option 3** | +120 |
| **Option 4** | +216 |

| | Railcars Needed |
|---|---|
| ***FY25 Budgeted Service***<br>*(FY25 budget + FY26 plan)* | *1,150* |
| **Improved Reliability** | *n/a* |
| **Increase Capacity**<br>100% 8-car Trains | *+76* |
| **Increase Red Line Service**<br>4 min, full line (2020 service) | *+68* |
| **Extend Yellow Line to Greenbelt**<br>6 min headway | *+78* |
| **Maximize BL/OR/SV (24 trains per hour)**<br>5 min OR, 10 min BL & SV | *+136* |
| **Red Line Turnbacks**<br>Half of RD trains at Grosvenor & Silver Spring | *(48)* |
| **Silver Line Turnbacks**<br>All SV trains at Stadium-Armory | *(40)* |

# Future Metrorail service requires predictable and sustainable investment

## Decisions Metro needs to make:

### Service Planning Considerations

- Capability to deliver service improvements beyond FY2026
- Ridership growth outlook over the next decade plus

### Near-Term Investments in Metro's fleet and facilities

- Total 8000-Series order size
- Facility investments in yards, shops, systems, and terminal capacity

## Next steps:

### Update Rail Fleet Management Plan

- Considers service plans, workforce availability, facility constraints, and impacts to operating and maintenance costs, and capital investment needs