Safety and Operations Committee

Board Information Item III-A

Fleet of the Future Design Review
Washington Metropolitan Area Transit Authority

Board Action/Information Summary

Presentation Name:
Fleet of the Future Design Review

Project Manager:
Brian Dwyer

Project Department:
COO

Purpose/Key Highlights:

Key Highlights:

- Metro has updated the 8000-series (8K) rail car design with extensive input from customers to reflect the mobility needs of all customers and post-pandemic changing travel patterns.

- Certain design aspects have been improved to achieve the goals of Your Metro, the Way Forward, including service excellence, regional opportunity and partnership, and sustainability.

- Hitachi Rail will deliver a soft mock-up of the railcar to confirm the revised design in March 2024.

Interested Parties:
Hitachi, LTK, Parsons

Background:
In order to timely replace the oldest trains in its fleet (2000- and 3000-series), which are 40 years old, Metro conducted a competitive procurement and awarded to Hitachi Rail a base contract for 256 railcars in 2021, with a number of options that can be exercised in the future at the negotiated price (approximately $2.4 million per car). Hitachi broke ground for a factory to assemble the railcars in Hagerstown, Maryland in 2022, which is on track to be completed early next year. As Metro works with
Hitachi Rail to finalize the design of the trains, it’s important to ensure that the trains meet Metro’s organizational goals for service excellence and sustainability, which includes adjusting to changing customer preferences and post-pandemic market shifts in ridership.

**Discussion:**

**Customer Preferences & Market Shifts**

Since Metro awarded the contract for the next generation of trains, it has added the Silver Line extension with an international airport station to its network. Reagan National and Dulles International airports serve more than 3 million passengers monthly, with most customers carrying luggage. Today, roughly 180,000 customers enter those two stations each month to travel to or from airports.

Another significant change in the market is the mix of Metrorail customers’ travel purposes, including work and non-work trips. Hybrid work has changed commuting patterns. Pre-pandemic non-work trips accounted for just 20 percent of travel, and Metro’s most recent rail passenger survey reveals that non-work trips now account for 35 percent of travel, with customers taking transit to school, medical appointments, stores, restaurants, sporting events, and other destinations at a higher rate.

Metro seeks to build ridership from the emerging market of non-commute and more occasional customers and to make the service more convenient to use for all who choose transit. This means that the design has carefully considered national and international visitors to the nation’s capital, families with strollers, seniors (including those who retire in place), and people with disabilities, as well as bicyclists, pedestrians, and other multimodal customers.

**Safety and accessibility**

To ensure that all customers are considered in the design of the new trains, Metro conducted several months of outreach and met extensively with the Board’s Accessibility Advisory Committee (AAC), AAC Bus and Rail Subcommittee, and Riders’ Advisory Council (RAC). Representatives of each group also traveled with Metro staff to New York City Transit to tour the new R211 cars that are being commissioned for subway use, giving customers an opportunity to experience open gangway connections between railcars. Nearly two dozen specific suggestions from the groups were reviewed throughout the process.

More broadly, direct customer outreach was conducted through information displays at Minnesota Avenue, Largo, and Ballston stations, as well as a week-long pop-up exhibit at Gallery Place that collected feedback from 16,700 customers.

Additionally, in April, Metro surveyed a representative sampling 1,000 customers across all demographics, including frequent and occasional customers for all trip purposes (work and non-work travel). Other Metro customer research that has tracked customer concerns and preferences was also reviewed for this effort.
In order to achieve a design worthy of a global capital city, meet the needs of our current and future customers, and achieve a new level of inclusivity in train design, Metro Rail Transformation and Vehicle Engineering staff recommended to the General Manager a number of design improvements to the most current (7000-series) fleet.

**Design changes onboard made to reflect customer input include:**

- Connecting pairs of cars with open gangways to allow safe movement for all customer between cars, while expanding capacity, and improving passenger flow
- Improve customer comfort and convenience through reconfigured seating that adds more horizontal seating, expands aisle ways and makes room for designated wheelchair space, as well as designated space for bicycles, luggage and strollers
- Expanded security camera coverage with real time feeds to the control center
- New LED red/green lights at the exterior doors indicated opening/closing
- More and larger digital information displays (including station ahead, maps, local destinations, and service information)
- Clearer public address system
- USB ports for charging personal devices
- Integrated grab bars at priority seats to assist customers who need them
- Additional handholds in the center of the cars
- Lighted emergency call buttons for improved visibility

**Energy savings**

In order to make Metro’s rail fleet more sustainable, the new trainbodies will be aluminum rather than stainless steel. A return to aluminum train bodies (all Metro trains prior to the 7000-series) enables Metro to operate a lighter fleet, reducing wear and tear on tracks and other infrastructure, and generating a forecasted energy savings of approximately $10 million over the life of the vehicles. Combined with energy savings from in-floor heating, the total energy savings for the fleet if all options exercised would approach $25 million.

**Funding Impact:**

No action is required by the Board to amend the six-year capital budget and six-year plan. The associated costs for this change will impact the longer-term capacity of the capital program.
Previous Actions:

- March 2023 - General Manager Randy Clarke discussed customer engagement initiative in his Board remarks
- A survey of representative customers was conducted
- Design reviews were performed with Board advisory committees
- A tour of NYC Transit's first opengangway cars was conducted for customers, transportation and mechanical staff
- A design exhibit was installed at Gallery Place to collect customer feedback

Next Steps:

- Soft mock up will be made available by Hitachi Rail
- Hitachi to deliver first pilot cars to WMATA in Q42025

Recommendation:

Information Only
Fleet of the Future Design Review

Safety & Operations Committee
June 22, 2023
Align Next Generation Railcars With Strategic Plan

Service excellence
Deliver safe, reliable, convenient, equitable, accessible, and enjoyable service for customers.

Talented teams
Attract, develop, and retain top talent where individuals feel valued, supported, and proud of their contribution.

Regional opportunity and partnership
Design transit service to move more people and equitably connect a growing region.

Sustainability
Manage resources responsibly to achieve a sustainable operating, capital, and environmental model.
Goals: Service Excellence, Regional Opportunity & Sustainability

- Update 7K design to accommodate **ALL customers** and align with post-pandemic market

- Ensure rail fleet showcases **global capital region**

- Remedy pain points in current experience for residents and visitors

- Generate energy savings
## Extensive Customer Engagement Spring (Mar-June)

<table>
<thead>
<tr>
<th>Consult</th>
<th>Tour &amp; Survey</th>
<th>Gallery Place Exhibit</th>
<th>Refine Design</th>
<th>Final Design</th>
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</thead>
</table>
| • Riders' Advisory Council (RAC)  
• Accessibility Advisory Committee (AAC)  
• Customers in stations  
• Bike/ped advocates | • Open gangway NYC Transit  
• Surveyed customers across demographics | • 2,400 customer comments  
• 517,600 social media impressions  
• 7,000 handouts distributed  
• 10,900 web page views  
• 32 Customer Service comments | • Working with Hitachi Rail | • Review with RAC/AAC |
New York Gangway Trip
April Customer Survey Input

• Crowding is #1 most frequently mentioned concern

• 2 in 3 support open gangways

• Cameras, speakers, and info displays also very important

• 62% favor revised floor plan, or have no preference on seating

• 7 in 10 prefer to sit sideways (horizontal) than backwards
May Gallery Place Exhibit

- Customer outreach at Gallery Place station from May 22-30
- Bilingual website, social media push, collateral distribution
- Renderings, sample seating, aluminum exterior, flooring for customers to react to
- Tablets to capture quick customer feedback
Results from May Customer Engagement

- 517,600 social media impressions
- 7,000 handouts
- 10,900 web page views
- 2,400 questionnaire responses
- 16,700 customer engagements
- 9 days of outreach
Customer Feedback at Gallery Place

- 89% report the new trains met their needs
- 83% like open gangways
- 82% approve of dedicated space for bicycles, strollers, and luggage
- Most interested in digital screens and open gangways
- Preference to see next station and direction of travel on digital screens
# Design Improvements

<table>
<thead>
<tr>
<th>Feature</th>
<th>Description</th>
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<tbody>
<tr>
<td>Car pairs with open gangways</td>
<td>Reconfigured seating</td>
</tr>
<tr>
<td>Designated space for wheelchairs</td>
<td>Designated space for bicycles, luggage, strollers</td>
</tr>
<tr>
<td>Expanded security camera coverage/real time feeds to control center</td>
<td>New LED red/green lights at doors indicate opening/closing</td>
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<tr>
<td>More and larger digital information displays</td>
<td>Improved Inter-Car Barrier</td>
</tr>
<tr>
<td>USB ports for charging personal devices</td>
<td>Integrated bars at priority seats to assist customers</td>
</tr>
<tr>
<td>Center of car handholds</td>
<td>Lighted emergency call buttons for improved visibility</td>
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</tbody>
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Customers Prefer Open Gangway Connection
Customers Support More Capacity

More Horizontal Seating, Wider Aisles
Customers Want Designated Spaces For Bikes, Strollers, Luggage
Customers Want Designated Spaces For Wheelchairs
Car Pairs With Open Gangways, More Capacity, Greener Car Body

- **Aluminum shells**
  - Lighter weight/less wear on infrastructure
  - Supply chain benefits
  - Approximately $10 million in energy savings over lifecycle vs. stainless
  - Sustainable through recycling

- **Open gangway**
  - Between two cars
  - Customer safety benefits
  - Improve flow for customers, wheelchairs, bicycles, luggage, strollers

- **Reconfigured seating**
  - More horizontal seating to improve passenger flow
  - Capacity increase from 321 per pair to 332 per pair
### Potential Energy Savings

<table>
<thead>
<tr>
<th></th>
<th>Base Order</th>
<th>Base + Option 1</th>
<th>Total Order</th>
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<tbody>
<tr>
<td><strong>Number of New Rail Cars</strong></td>
<td>256</td>
<td>360</td>
<td>800</td>
</tr>
<tr>
<td><strong>Carsheel and Heated Floor Weight Savings per car</strong></td>
<td>2803 lbs</td>
<td>2803 lbs</td>
<td>2803 lbs</td>
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<tr>
<td><strong>Energy Savings</strong></td>
<td>$193,849</td>
<td>$272,601</td>
<td>$605,779</td>
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<tr>
<td><strong>Energy Savings over Life of Fleet (without escalation)</strong></td>
<td>$7,753,976</td>
<td>$10,904,029</td>
<td>$24,231,175</td>
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Next Steps

- Hitachi to provide first (soft) mock-up of 8k car March 2024*
- Hitachi to provide a final (hard) mock-up February 2025*
- First pilot cars delivered to Metro Q4 2025

*subject to changes as production schedule finalized.