

## **FY 2024 Competitive Grants for Rail Vehicle Replacement Program (Rail Program)**

### **Applicant and Proposal Profile**

**Project Title:** Maryland Transit Administration (MTA) Light Rail Vehicle Fleet Replacement Project

**Project Executive Summary:** Through the MTA Light Rail Vehicle (LRV) Replacement Project, the MTA will modernize its fleet of 52 vehicles, all of which have a 30-year service life and have already exceeded or are within five years of the end of their useful life. MTA seeks to fund the one-for-one replacement of 52 vehicles through the Federal Transit Administration's RVR Program, and will procure a total of 55 new 95-foot, low-floor-clearance LRV cars over the next decade (the three additional vehicles will not be covered by this grant request). This systemwide overhaul will complement the forthcoming implementation of the Red Line Project to create a new fixed-transit guideway along a 20-mile corridor between western Baltimore County and southeastern Baltimore City.

MTA's 52 LRVs have been in service for between 24 and 32 years, and each will have exceeded its 30-year useful life by 2029. Thirty-five LRVs from ABB Corporation (now Alstom) entered revenue service between 1992 and 1994, and 18 LRVs from ADtranz Corporation (now Alstom) entered revenue service between 1997 and 1999; one vehicle was decommissioned in 2023, bringing the total to 52.

From month to month, between 45% and 56% of LRVs are out of service for a range of issues, including axle wear or disfunction, burnt articulation cables, damage from collisions involving trees and other debris, and more. As an indication of the dire need of maintenance challenges posed by the poor SGR, at the time of this submission MTA has implemented an emergency shutdown of the entire LRV fleet to address a recurring safety issue with one of the vehicle components. Even without an emergency shutdown in place, the aged vehicles require unscheduled repairs that routinely bring them out of service. As of November 2023, before the grounding of the entire fleet, less than half of the LRVs were available for revenue service. MTA cannot adequately meet customers' service needs for daily reliability and frequency with the existing fleet's condition. Poor reliability and frequent outages and delays hamper passengers' timely arrival and transfers between other transit modes in the region.

Through the LRV Replacement Project, MTA will achieve a long-desired level of SGR. New rolling stock will vastly improve systemwide functionality through more seamless daily operations, more reliable and efficient service, and improved connectivity with other transit services that leverages benefits across the region. This would include more closely adhering to scheduled linkages with MTA's existing bus lines, MARC commuter rail, and Metro Subway system, as well as locally operated transit services such as the multi-jurisdictional Regional Transportation Agency's (RTA) and Anne Arundel County Transit. The Project will also improve existing Light Rail service to BWI Airport, providing a more dependable transit option to the busiest airport in the Baltimore-Washington region.

As part of the Project, MTA will implement an 80-hour operator education program covering daily and emergency procedures, general troubleshooting and fault isolation, display screens, data, and more, as well as a 300-hour maintenance education program covering orientation to new LRVs, both running and heavy maintenance training, and training for bench equipment testing. Finally, the MTA will provide a train-the-trainer program for staff in the MTA Training Department.

Fleet replacement will create a more accommodating experience for people of varying ages and abilities, enable simpler and easier boarding access for passengers, and eliminate the need for segregated raised platforms currently in place for passengers boarding with a mobility device, stroller, or luggage. If Light Rail is selected as the mode for the forthcoming Red Line Project, the RVR Replacement Project will leverage interoperability between lines to improve reliability and operational flexibility, and generate cost efficiencies through sharing of personnel resources, equipment, and tools.

**Demonstration of Need:** Following a Request for Information from transit vehicle manufacturers in 2023, MTA calculated an estimated project cost of approximately \$425.5 million to procure 52 replacement LRVs. This represents a substantial capital investment to procure a new fleet, mitigate recurring service interruptions, and enable more seamless boarding and alighting.

Present LRV availability is poor. During the first nine months of 2023, MTA had between 23 and 28 cars available for daily use, averaging approximately 26 LRVs – roughly half of the existing fleet. Frequent causes for loss of service include damaged axles, faulty brake resistors, burnt articulation cables, and other deterioration of and damage to various railcar parts. As of this application’s submittal, MTA has implemented an emergency shutdown of the entire LRV fleet in order to address a recurring safety issue with one of the vehicle components.

In-reach surveys by MTA highlighted significant concerns about vehicle functionality and reliability. Experienced operations and maintenance team members surveyed in the Fall of 2023 shared insights on recurring challenges: “Only a handful [of vehicles] work like they are supposed to”; “on a day-to-day basis nothing appears to be working well”; that there are recurring “issues with the doors and it is causing ADA complaints”; and “trains experience the same break downs all the time.” Overall, staff responses affirm that fleet-related issues plaguing the system go beyond standard maintenance and upkeep.

Rider outreach surveys highlight issues with reliability and customer experience. A survey of riders at six stations and aboard LRVs in March 2023 highlighted desires for more real-time information about service changes (56%), more single seats to serve riders (29%), and a need for improved accessibility for people with disabilities (34%). MTA is working to address concerns through improvements to its existing fleet and will more sustainably resolve them through outright replacement. MTA will continue to use passenger feedback to guide development of specifications for its future LRV fleet.

The LRV Replacement Project will make the Light Rail system more accessible by providing level boarding at all train doors, eliminating the need for manually operated high-block boarding. Presently, at the front door of the first car, the operator deploys a ramp to assist passengers in boarding and exiting. While this feature meets ADA accessibility requirements and is well-used – MTA recorded 911 high-block boardings in October, for example – it does not provide equal access to all railcars, is time-consuming, and creates safety risks for operators. One operator attested to the pitfalls of the high-block system during the in-reach survey: “The high-block use is old and outdated. The ramps are damaged or don't work properly.” Deploying a new low-floor vehicle fleet will directly address the need for improved accessibility.

For maximum operational efficiency by 2035, MTA determined it will need a fleet of 55 vehicles to operate two-car trains satisfying 7.5-minute headways in the trunk service of the Central Business District (CBD). This trunk between Linthicum and Fairground Stations that carries service on both the alignment between BWI and Hunt Valley stations (requiring 26 LRVs, including 24 live and two hot

standby vehicles), and the alignment between Glen Burnie and Fairground stations (requiring 20 LRVs, including 18 live and two hot standby vehicles). By replacing all 52 LRVs and separately acquiring three more LRVs (independent of this grant request), MTA will have 31 LRVs available for BWI-Hunt Valley (five spares and 26 live or hot standby vehicles), and 24 LRVs for Glen Burnie-Fairgrounds (four spares and 20 live or hot standby vehicles). In total, nine spare vehicles to support the 46 required LRVs for these two routes provide an approximately 20% spare ratio, satisfying FTA's set guideline for fleets of more than 50 vehicles.

**Demonstration of Benefits: Safety:** Replacing the LRV fleet will assure a state of good repair and rider safety, mitigating potential for safety incidents that plague the system. In the last three years, MTA recorded 33 mechanical failures, some of which resulted in rider injuries or required evacuation of passengers to the track area. MTA also recorded 16 injuries related to the manually operated high-block boarding ramps during this period, and logged nine high block-related injury incidents from 2018 through 2022 that led to worker's compensation claims from LRV operators. With new low-floor LRVs, MTA can operate a service-ready fleet with reduced operator safety and mechanical failure risks.

Low-floor cars will also improve safety conditions for passengers who must climb the existing sets of four steps to board or exit, and will instead be able to walk or roll directly on or off. This will be particularly beneficial during high-volume events with crush loads of passengers, such as baseball games at Camden Yards, Ravens games at M&T Bank Stadium, and concerts at CFG Bank Arena, all of which have dedicated Light Rail stations.

**Performance:** Replacing 52 LRVs and separately acquiring three more vehicles will provide sufficient supply for a 20% spare ratio, enabling 7.5-minute headways for two-car trains. This spare ratio is currently not attainable with an average of 26 cars out of service during a typical month.

From fiscal years 2021-2023, MTA spent a total of \$17,421,654 (\$5,807,223 on average annually), on vehicle maintenance. The LRV Replacement Project will provide a valuable reset in terms of reducing regular operation and maintenance (O&M) costs and mitigating the need for unscheduled repairs and service interruptions.

Day-to-day performance and rider experience will improve by eliminating time-consuming high-floor boarding and alighting. During high-volume events, some passengers may crowd near the stairwells by the vehicle doors, and at various stops passengers may exit and reboard to allow room for additional riders. With a new fleet, operational performance will be flexible and resilient, and would be enhanced further systemwide via future interoperability with the forthcoming Red Line, if MTA selects Light Rail as the mode of choice.

**Enhanced Access and Mobility for People with Disabilities:** Low-floor LRVs will not require stairs and deployable ramps for passengers with visual and/or physical disabilities, as well as families traveling with small children. Removing high-block platforms will free up additional accessible routes and more maneuverability for all customers, especially those with disabilities.

**Combatting Climate Change:** MTA Light Rail uses electric propulsion via a system of overhead catenary wires that run above the tracks and power trains by contacting each train's overhead pantograph. This already produces minimal emissions compared to diesel-powered transit and does not require charging as with battery-powered vehicles. Potential emissions savings will come from the replacement of legacy

railcars. New railcars have more efficient engines, translating to more emissions savings, and have regenerative braking capabilities that could feed power back into the grid.

**Promoting Equity and Sustainability:** The Project is mentioned directly or alluded to in various local and regional planning documents, including MTA's Transportation Asset Management (TAM) Plan, the state's legislatively required Capital Needs Inventory (CNI), and the Baltimore Metropolitan Council-Baltimore Regional Transportation Board's (BMC-BRTB) Short-Range and Long-Range Statewide Transportation Improvement Plans.

- TAM Plan: This document includes the project of "Light Rail First Year of Vehicle Replacements," assigning it a Priority Score of 65.57 (within the top-20 highest-value SGR Needs) and a cost of \$56.2 million. MTA previously planned to replace its LRVs in single-year phases, rather than as a total fleet vehicle replacement project, in its most recent TAM Plan update in 2022. At the time, MTA envisioned incrementally replacing the oldest LRVs in its fleet while prolonging other vehicles' lifespans with ongoing mid-life overhauls and planned life-extending rebuilds. However, the overhauls proved to not be as beneficial as desired and the need for total fleet replacement has become critically urgent; as noted in Demonstration of Need, LRVs in MTA's fleet continue to experience ongoing mechanical failures and other disruptive issues, even for overhauled vehicles, that routinely bring them out of service, hampering daily operations of the Light Rail system. With all 52 vehicles now either having surpassed or approaching the end of their 30-year useful life within the next five years, MTA seeks to replace the 52-vehicle fleet as part of a cost-effective single procurement. This will be reflected in next scheduled update of MTA's TAM Plan in 2026 via project title, Priority Score, and the accurate total cost of \$450 million for 52 LRVs. (Appendix 1)

-CNI: This document mirrors the contents of the TAM Plan, existing as both a state General Assembly-mandated inventory of capital needs and the basis for MTA's TAM Plan where vehicle replacement ranks within the top-20 highest-value SGR Needs. MTA has drafted a legislative update for the CNI, which MTA will approve in 2024, that reflects the planned total fleet vehicle replacement via project title, Priority Score, and the accurate total cost of \$450 million. (Appendix 2)

- BMC-BRTB's Short-Range (2024-2027) Transportation Improvement Plan (TIP), which includes a planned overhaul of LRVs under the project title "Metro and Light Rail Rolling Stock Overhauls and Replacement." While this project specifically speaks to a planned mid-life overhaul for LRVs that would extend vehicles' useful life, MTA seeks to accelerate the replacement of these vehicles and avoid additional expenditure and the prolonging of the replacement of its fleet by instead leveraging federal funds made available under the RVR Program . MTA will submit an updated project title, scope, and cost estimate to accurately reflect the full fleet replacement project during the next Short-Range TIP cycle. (Appendix 3)

-BMC-BRTB's Long-Range Transportation Plan (LRTP), titled "Resilience 2050: Adapting to the Challenges of Tomorrow," which includes LRV fleet projects under both "Light Rail Fleet Mid-Life Overhaul (2028-2039)" and "Light Rail Fleet Replacement with Low-Floor Rail Vehicles (2040-2050)." While these projects call for a \$210 million life-extending overhaul of MTA's LRV fleet prior to outright replacement, MTA has been advised by its fleet quality engineer that "it is critical that MTA accelerate the process of obtaining a new fleet as much as possible." For this reason, MTA is consolidating these projects and accelerating the process to deliver the benefits of a new fleet. MTA will submit an updated project title, scope, and

cost estimate to accurately reflect the full fleet replacement project during the next Long-Range STIP cycle (Appendix 4)

For this grant application, MTA has secured 13 letters of support from elected and public officials, nonprofit organizations, advocacy groups, and private interests. (Appendix 5)

**Local Financial Commitment:** A Letter of Commitment from the Secretary of the Maryland Department of Transportation is included in Appendix 7. Within the Letter of Commitment, Secretary Wiedefeld confirms a commitment of a match of \$90 million for the project. The matching funds will be sourced from the Transportation Trust Fund. The Transportation Trust Fund was created in 1971 to establish a dedicated fund to support the Maryland Department of Transportation (MDOT). Sources of funds include motor fuel taxes, vehicle excise (titling) taxes, motor vehicle fees (registrations, licenses and other fees), and federal aid. In addition, the Transportation Trust Fund also includes a portion of the State’s tax on corporate income, a portion of the State’s sales and use taxes on short-term vehicle rentals, operating revenues (e.g., transit fares, port fees, airport fees), and bond proceeds. Federal-aid projections are based on current appropriations and the match required to meet capital program cash flow needs. Bonds are issued to support the cash flows of projects in the capital program while maintaining debt coverage requirements.

In addition to the replacement of LRVs, MTA’s local match will help to fund the aforementioned workforce development training program, which will commence to coincide with the delivery of the first car. Workforce training will be based upon the material contained in the vehicle operating and maintenance manuals, and will consist of a combination of classroom instruction and hands-on training. The operations training is estimated to require approximately 80 hours of training and will be provided to all Light Rail operators and management, field supervision, and rail dispatchers/controllers. The maintenance training is estimated to require approximately 300 hours of training and will be provided to all repair personnel and technicians. Additionally, a portion of the maintenance program will be provided to all field supervision and rail dispatchers/controllers. All MTA Training Department staff will participate in a train-the-trainer program so that they will be able to provide both operations and maintenance training on the new LRVs in the future.

<b>Project Budget</b>					
Description	QTY	A. Rail Program Grant Amount Requested	B. Other Federal Funds	C. Other Non-Federal Funds	D. Total Cost
Replacement Light Rail Vehicles	52	4,090,909	2,454,545	1,636,364	425,454,536 <input checked="" type="checkbox"/>
Workforce Development Training Program for Operations and Maintenance of Light Rail Vehicles	1	969,073	0	4,909,072	5,878,145 <input checked="" type="checkbox"/>
<input type="button" value="Insert Item"/>					
Total:		213,696,341	127,636,340	90,000,000	431,332,681