



Safety and Operations Committee

Board Information Item III-B

Rail Signal System Update

Washington Metropolitan Area Transit Authority
Board Action/Information Summary

Action Information

MEAD Number:
203439

Resolution:
 Yes No

TITLE:

Rail Signal Safety Updates

PRESENTATION SUMMARY:

Brief the Board on American Public Transportation Association (APTA) Peer Review assessment of Metro's readiness to restore automatic train operations (Grade of Automation 2)

PURPOSE:

Update the Board on a key rail signal safety initiative.

DESCRIPTION:

A progress update will be provided to the Board to restore automatic train operations (Grade of Automation Level 2 or GoA2).

In November 2022, Metro requested APTA to review its readiness to restore automatic train operations. The goal of the peer review engagement was to align engineering, maintenance and safety practices with industry standards and identify industry best practices. APTA brought in four experts from the industry which included three members from US agencies (BART, MARTA, CTA) and a member from Transport from London (TfL). As part of the update, APTA peers will provide a summary report of their findings. The peer report will be followed by project updates.

Interested parties: **Parsons; Hitachi; Mott McDonald; APTA Peer Review**
Panelists: **Roy Aguilera, Geoff Mitchell, David Carol, Addi Matthew, and Nancy-
Ellen Zusman**

Key Highlights:

- APTA Peer Review team concurs that GoA2 provides important safety benefits and 3 out of 4 peer agencies operate in GoA2.
- APTA Peer Review team concluded from a technical perspective that the infrastructure, systems and maintenance practices are in alignment with industry practices and, therefore, the Automatic Train Control

System (ATC) is ready for ATO utilization.

- APTA Peer Review team recommended that Metro capitalize on the strong labor support that exists to support ATO utilization.
- APTA Peer Review team recommended that Metro incorporate additional time into the program schedule for rules updates in the training curriculum.
- GoA2 on track to launch December 2023.

Background and History:

Since opening in 1976, Metro's train control system was designed to operate utilizing automatic train operations, or grade of automation 2 (GoA2). After 33 years of safe operations, in 2009 Metro responded to the Fort Totten incident in an abundance of caution and suspended GoA2. Since this time Metro has operated in manual operation, or grade of automation 1 (GoA1).

After suspending the use of automatic train operations throughout the network in 2009, Metro has operated utilizing a manual mode (GoA1). Since this time, several safety reviews and engineering assessments were conducted to identify necessary safety improvements and provide recommendations the organization should consider in support of re-initiating use of GoA2 in support of operations. In response to the safety improvements, staff prioritized funding to address the replacement of track circuits, cables, bonds and other key signal system components. In 2020, the proposal to return to a higher level of automatic train operations was evaluated by the Senior Executive Team. It was determined that the state of the infrastructure was being adequately addressed to begin efforts of restoring the system to utilizing GoA2, its designed mode of operating.

As presented to the Board in December 2022, safety improvements through implementing procedural and training changes are optimized. Human factors continue to be the leading cause of safety violations such as red signal overruns. GoA2 functionality allows increased safety in the rail operating environment utilizing an engineered solution. Additionally, the use of GoA2 permits the realization of improvements to service reliability and on-time performance.

The Community of Metros Benchmarking Group (COMET) evaluated 52 lines across 16 transit systems and found that OTP improves with ATO because there tends to be fewer significant delays. The study found that lines that utilize GoA2 experienced a 26 percent reduction in 5+ min delay incidents when moving from manual (GoA1) to automatic (GoA2) operations. Additionally, it was determined that a higher percentage of Metro lines using GoA2 (14 of 28) met reliability targets compared to those using GoA1 (2 of

27). The study found that headway regularity is significantly better with increasing automation.

Discussion:

In evaluating system readiness to reinstate use of GoA2, Metro requested a peer review to assess the program. APTA assembled a team of experts in the areas of safety, operations and signal system design and maintenance to perform a comprehensive review of the program. Metro provided a fully transparent review to include supplying policies and procedures, testing data, coordinating field visits, and organizing interviews with personnel from varying ranks within the Authority, to include key leadership in the Safety and Readiness team. Additionally, interviews with representatives from the Washington Metrorail Safety Commission (WMSC) and Union leadership were organized to allow the APTA Peer Review team time to understand potential concerns with the program.

APTA Peer Review team members will brief the Board on findings and recommendations. Additionally, the Infrastructure and Operations teams will provide updates on progress since the conclusion of the review.

FUNDING IMPACT:

The program is fully-funded and this briefing is to provide information only.	
Project Manager:	Tiffani Jenkins
Project Department/Office:	Infrastructure/Signaling Systems Renewal

TIMELINE:

Previous Actions	<ul style="list-style-type: none"> • 2019 Return to ATO program deferred • 2019 ATC State of Good Repair Programs launched • Q4 FY 2021 ATO Restoration for Stations Program Relunched with Senior Executive Team approval • Q2 FY2023 – Engaged APTA to conduct peer agency review
Anticipated actions after presentation	<ul style="list-style-type: none"> • Partner with Safety and Readiness to perform final rule change review: March 2023

- Partner with Safety and Readiness to develop training curriculum: May 2023
- Update master schedule that incorporates employee training and safety certification: April 2023
- Initiate integrated testing on the Red Line: April 2023

APTA Peer Review Automatic Train Operations

Safety & Operations Committee
March 9, 2023



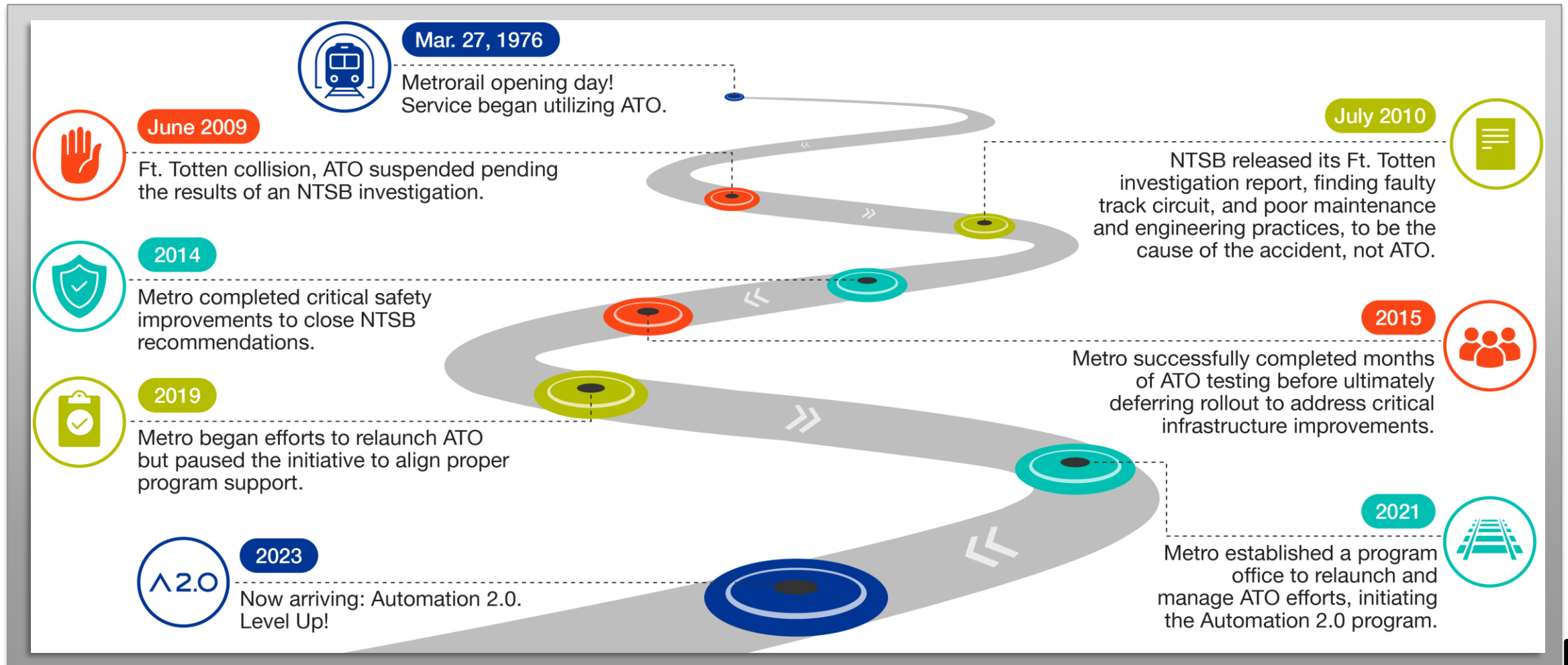
Purpose

Brief the Board on American Public Transportation Association (APTA) Peer Review assessment of Metro's readiness to restore automatic train operations (Grade of Automation 2)

Background

- In November 2022 Metro requested APTA to review readiness to restore automatic train operations
 - *What else should Metro do to align engineering, maintenance and safety practices with industry standards?*
 - *What are issues that other agencies have experience that Metro should prepare for?*
 - *What are we missing?*

Metro's Road to GoA2



GoA2 is Linked to Increased Reliability

COMET Case Study: 2013 NOVA Group Train Service Reliability

Study evaluated 52 metro lines across 16 transit systems to assess factors that impact train service reliability:

Key Findings

- *Lines using G0A2 reported a **26% reduction** in 5+ min delay incidents associated with moving from manual (GoA1) to automatic (GoA2) driving*
- ***14 of 28 lines with ATO meet the reliability target**, while only 2 of the 27 manually-operated lines meet that criteria*

On time performance improves with ATO because there tends to be fewer significant delays

APTA Peer Review Signaling Experts

Roy Aguilera:

- Chief Transportation Officer
- Bay Area Rapid Transit (BART)
- 38-year transportation professional
- Vice Chair of APTA Operating Practices Working Group
- Responsible for leadership Operations teams including 1000+ frontline employees, management of 50 stations and 5 yards, and oversight of the Operations Control Center and training departments



Addi Matthew

- Director Maintenance of Way
- Metropolitan Atlanta Rapid Transportation Authority (MARTA)
- 20-year signal professional
- Member of the APTA Signal Standard Committee
- Responsible for the maintenance, repair and planning of the Train Control, power, track and structures



Geoff Mitchell

- Head of Profession Rail & Traffic Control Systems at Transport for London (TfL)
- 40-year of signal engineering and operations professional
- Serves on the licensing committee for the Institute of Railway Signaling Engineers (IRSE)
- Serves as engineering lead for all signaling control across TfL rail modes and road network, including the London Underground, London Trams, London Overground and Docklands Light Railway





APTA PEER REVIEW

Preparing for Automatic Train Operations



Presentation to the WMATA Board of Directors

March 2023



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Peer Review Panel Members



Roy Aguilera

Chief Transportation Officer
Bay Area Rapid Transit
Oakland CA

Addi Matthew

Director Maintenance of Way
Metropolitan Atlanta Transportation Authority
Atlanta GA

Geoff Mitchell:

Head of Profession Road and Rail Traffic
Control Systems
Transport for London
London UK

Nancy-Ellen Zusman

Chief Safety & Security Officer
Chicago Transit Authority
Chicago IL

David Carol

Chief Operating Officer
American Public Transportation Association
(APTA)
Washington, DC





Scope of Review

Peer Review Team focused on the following areas:

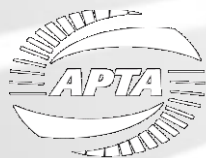
1. WMATA has implemented various safety improvements in advance of ATO activation. **What else should WMATA consider to align with industry standards?**
2. WMATA has implemented improved maintenance and engineering practices in advance of ATO activation. **What else should WMATA consider to align with industry standards?**
3. WMATA has developed a rollout plan including training, safety certification requirements, test plans to conduct non-revenue and revenue testing. **What are the issues that other transit systems have experienced that WMATA should prepare for?**
4. WMATA has developed an extensive communications plan for employees and the public. **Is anything missing?**



Peer Review Activities



- On-Site: February 5-10, 2023
- Activities:
 - **Review of key documents:** procedures; logs; training; track circuit diagrams; maintenance records
 - **Inspections** of the Rail Operations Control Center; training and simulations facilities; platform control room; on-board operations
 - **Interviews:** key leadership staff; management for signals, track, maintenance, safety and training; WMATA train operators; ATU union leadership
 - **Briefing:** WMATA senior leadership team





ATO Provides Important Safety Benefits

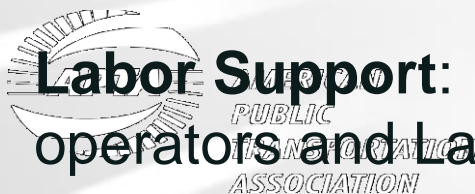
- BART (San Francisco area) and MARTA (Atlanta area) have systems very similar to Metro. Both employ ATO. Transport for London also utilizes ATO.
- Metro is unique in being designed for ATO but currently employing manual operations
- ATO provides important safety benefits:
 - Prevents operator-caused red-signal overrun violations
 - Eliminates operator-caused station platform overruns
 - Smoother train stopping and acceleration
 - By reducing operator responsibilities for stopping and starting the train, the operator can better focus on door closing
- Track inspectors and workers are as safe under ATO as manual operations provided appropriate rules and training





Summary of Findings

1. **Technical/Infrastructure:** From a technical perspective – infrastructure, systems, infrastructure maintenance - **WMATA is ready to implement ATO.** Its practices and plant comport with industry standards.
2. **Rules & Training:** Additional work and time is required to:
 - Continue review and update of current operating rules and procedures to accommodate ATO operations
 - Advance the training curriculum, which must await changes to the operating rules
 - Train operating and control center employees, which will take 3-4 months to complete for all personnel.
3. **Labor Support:** There is strong support for ATO reactivation by operators and Labor provided adequate training



Safety Enhancements



WMATA has implemented various safety improvements in advance of ATO activation

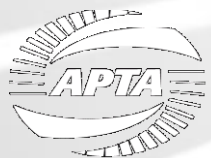
- **Track Circuits:** Gen 2 track circuits have been removed; WMATA also has an active project to replace older version track circuits with a more up-to-date model.
- **Markers Coils:** Updated the position and maintenance practice for the marker coils –this improves stopping accuracy for proper platform berthing.
- **Preventive Maintenance:** Critical PMs such as track circuit readings and shunting were verified and documented in WMATA’s asset management system Maximo.
- **Train Detection Tool:** ROCC procedure and equipment is in place and in operations.



Maintenance & Engineering Practices



- WMATA has implemented important improvements:
 - **Preventive Maintenance (PM):** Critical PMs such as track circuit readings and shunting were verified and documented in WMATA's asset management system Maximo.
 - **Corrective Actions:** Observed issues are corrected by the technicians on site if possible or submitted to the engineering team for further investigation.
 - **Training:** WMATA's techs receive frequent documented training in the form of OJT that keeps each tech current on the equipment they maintain.
 - **Staffing:** The signals maintenance department is fully staffed as budgeted.
 - **Finding:** WMATA's practices are in line with industry standards as verified by transit representatives from BART, MARTA and Transport for London.





Getting to the Finish Line

- **The infrastructure is ready**
- **Advance the rules revision and training curriculum.** Peer agencies such as MARTA and BART can provide materials and data to assist.
- **Leverage strong labor support** to enable smooth transition to automatic train operations





Thank you

Many thanks to Tiffani Jenkins and her great project team for their time and for their passion for this project!

Many thanks to Narayana Sundaram for organizing and scheduling all the meetings for the peer review.

Thank you WMATA!



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Level Up

Λ2.0

Next Steps

Rules	Status	Completion Date
Finalize rule changes	Initiated	March 2023

Training	Status	Completion Date
Advance training	Initiated	Summer 2023

Testing and Commissioning	Status	Completion Date
Mainline testing – Red Line first*	Initiated	November 2023
Systemwide integration	On schedule	~ Dec 2023

* Successful data collection train completed on 3/2/23 and 3/3/23

