



**Massachusetts Bay
Transportation Authority**

Maintenance of Way (MOW) Initiatives

MOW Department Initiatives

September 14, 2023

Erik Stoothoff, Acting Chief Operating Officer

MBTA Maintenance of Way Department

294 Current Employees (281 Active)

Budgeted 2024 Positions = 372

162 miles of active track

Over 600 switches



Engineering & Maintenance and specifically Maintenance of Way (MOW) has been working on improvement initiatives prior to March 2023, and subsequently have continued to focus on operational improvements.



Maintenance of Way

In response to the identification of geometry testing documentation deficiencies in March 2023:

- The MBTA immediately contracted with multiple consulting firms to provide expert track engineering resources to augment internal staff.
- 100% validation by both parties was achieved on April 25, 2023.
- The validation effort concluded that approximately 50% were false defect findings, typically the result of the geometry testing system configuration inaccurately recording a defect (e.g., sharp reverse curves) or other system issues such as interference.
- The MBTA identified that it needed to:
 - **Accelerate investment in track inspection and maintenance activities**
 - **Review and revise track geometry testing requirements**
 - **Increase staffing resources across the entire MBTA organization to repair the track infrastructure and the Public's confidence in our operation**



Maintenance of Way

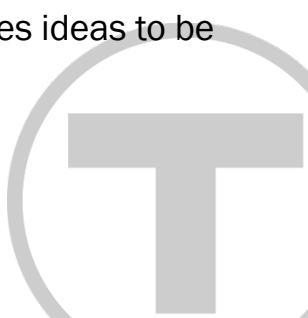
In response to the identification of geometry testing documentation deficiencies in March 2023, the MBTA immediately contracted with Carlson Transport to perform an independent review of the MBTA MOW Division, and specifically the inspection programs, and initiated an investigation by the Safety Department. These two investigations provided an independent review to ensure that all areas of needed change were identified. The following are the recommendations from each report:

Carlson:

- Complete the Standard Operation Procedures for visual and vendor inspection including a clear procedure for documentation of defects identified during vendor testing
- Elevate the inspection (System Repairperson and Section Forepersons) positions in the MOW organization
- Modify the selection process and qualifications and requirements necessary for the inspection roles
- Further enhance training, certification, and recertification for System Repairperson
- Provide Section Forepersons with ability to witness vendor testing in real time
- Evaluate using alternative criteria for track geometry testing as suggested by APTA
- Adequately staff MOW to levels that support managing SOGR activities including assessment and maintenance activities
- Assess the responsibility and compensation parity across functional departments
- Engage highly qualified, experienced MOW engineers to participate in developing the program and priorities for a long-range improvement plan

MBTA Safety:

- Develop and implement a process document for geometry testing, including training for affected employees.
- Develop track testing standards specific to MBTA vehicles and track configurations.
- Incorporate new standards into geometry testing vendor contracts.
- Ensure adequate staffing at all levels as determined by Department head and leadership.
- Develop program for succession planning to ensure institutional knowledge is retained, as well as a method to retain resources.
- Institute a suggestion program to allow employees ideas to be shared.



Maintenance of Way Strategic Plan

Prior to March 2023 – MBTA identified MOW as a function in need of investment, work already underway:

- MOW Strategic Plan ("Track Strategy") was initially developed in 2020
 - Track assets inventoried and configured in Trapeze EAMS
 - Asset criticality framework created to determine operational criticality of each track asset and section of track for maintenance, operations and investment prioritization
 - PM&I Management Plan developed, and framework developed to formalize all required inspections
 - MaxTrax mobile application developed and configured with Trapeze interface to record all track inspections
 - Assessments of System Repair and Section Foreperson positions
 - Inspection tools introduced to improve accuracy of Track Geometry measurements
 - Work management SOPs, instructions, and training guides developed to formalize MOW roles and responsibilities
 - SOPs formalized for all PM&Is executed by MOW
 - Assurance framework developed to oversee PM&I compliance to schedule requirements

- *Through the development of the Strategic Plan and recent evaluations, gaps were identified in MOW Division resources, training, track standards and SOPs, quality, and work management practices.*

- *Next review planned for end of 2023*



KEY AREAS IDENTIFIED FOR ENHANCEMENT

Resources

Attract strong leadership, achieve required staffing, procure equipment, tools and technology to effectively maintain the infrastructure

Training

Benchmark current training curriculum; update initial track inspection training program; establish recertification and field assessments for track inspection roles

Standards & SOPs

Review and update track standards, maintenance practices and SOPs to ensure industry best practices are being employed

Quality

Ensure consistent quality and accountability at all levels of Maintenance of Way

Work Management

Develop tools to effectively plan and execute maintenance and capital trackwork and track progress versus schedule.



RESOURCES

PROBLEM: Add key leadership and technical staff in Maintenance of Way Department

Completed: Added Chief of Infrastructure, significant transit experience with emphasis in Track

Completed: Added Sr. Director of MOW, significant transit experience with emphasis in Track

Completed: Hired Deputy Director of Maintenance of Way (Engineering)

Ongoing: Hiring Director of Maintenance of Way

Ongoing: Hiring Deputy Director of Track (Operations)

Ongoing: Hiring additional 6 Track Engineers

Ongoing: Hiring 80 Track Laborers

- **Completed:** Hired dedicated instructor to train new track laborers
- Ongoing: Hired 30 track laborers since Dec 2022, 50 ongoing

Ongoing: Increase number of Section Forepersons from 15 to 30

Next Step: Promote/train existing Track personnel to welders and equipment operators

Next Step: Implement targeted production crews to enhance maintenance capabilities

Completed: 3 instructors hired

Ongoing: Hiring 3 additional instructors



RESOURCES

PROBLEM: Improve skillset of existing track inspectors, inadequate quantity of Section Forepersons to perform track inspections

INCREASE QUALITY OF APPLICANTS FOR SECTION FOREPERSONS

Attract higher quality applicants by revising selection criteria

PRIORITY: High

TIME FRAME: Short

STATUS: In progress

RESPONSIBILITY: E&M, HR



INCREASE QUANTITY SECTION FOREPERSONS

Increase quantity of Section Forepersons from 15 to 30, in 3 groups of 5

PRIORITY: High

TIME FRAME: 9 months

STATUS: Post positions by 9/1/23

RESPONSIBILITY: E&M, HR, Ops Administration

- Complete: Section Foreperson candidate qualifications, modified to require additional track maintenance experience on a broader scope (e.g. Not only MBTA Transit experience is required, FRA/Railroad experience is acceptable).
- Ongoing: Selection interviews enhanced to incorporate technical questions where historically candidates were required to have extensive MBTA Transit knowledge.



RESOURCES

Equipment: Procurement of new hi-rail vehicles and work trains

- Ongoing: Delivery of new work trains for each line

- Ongoing: Procurement of track maintenance equipment
 - Hi Rail
 - Utility
 - Lifting

- Next Step: Determine additional equipment requirements and initiate procurement/lease
 - Continuously Welded Rail (CWR) handling equipment
 - Tampers
 - Ballast stabilizers

- Next Step: Identify or construct new yard tracks and/or sidings to accommodate MOW equipment

- Next Step: Improve maintenance process for MOW equipment,



IMPROVE MOW TRAINING

PROBLEM: Materials and instruction of existing training is reviewed and enhanced

REVIEW TRAINING CONTENT AND DELIVERY

Review MBTA track training materials and instruction

PRIORITY: High

TIME FRAME: Commence immediately

STATUS: Complete 3Q23

RESPONSIBILITY: MOW Contractor

OUTSIDE INSTRUCTION OF TRACK PERSONNEL

Bring in outside trainer for instructors and/or personnel

PRIORITY: High

TIME FRAME: Commence 4Q23

STATUS: Following Review

RESPONSIBILITY: MOW

IMPROVE TRACK INSPECTION TRAINING

Improve training for System Repairers and Section Forepersons, focus on identifying track defects and remedial actions

PRIORITY: High

TIME FRAME: Commence 3Q23

STATUS: In progress

RESPONSIBILITY: MOW

Benchmark training content and delivery against other transit properties, review and evaluate effectiveness of training, mentor MOW instructors ("train the trainers")

Improve initial training of Inspection Staff (Section Forepersons and System Repairers) by adding 50% more classroom time and additional OJT field training and use of digital reporting tools, add training to LMS

IMPROVE MOW TRAINING

PROBLEM: Develop recertification of track inspectors, inability to determine if skillsets are adequate

SECTION FOREPERSON RECERTIFICATION

Create biennial recertification program consisting of 1-week refresher course w/exam

PRIORITY: High
TIME FRAME: Commence 1Q24
STATUS: Plan and initiate
RESPONSIBILITY: MOW

SYSTEM REPAIRER RECERTIFICATION

Create biennial recertification program with new syllabus, add training to LMS

PRIORITY: High
TIME FRAME: 3Q23-3Q24
STATUS: Plan and initiate
RESPONSIBILITY: MOW

ESTABLISH MANDATORY ANNUAL TRAINING

Establish mandatory annual training requirements for each classification and enhance training schedules

PRIORITY: Medium
TIME FRAME: Medium/Long
STATUS: Initiate
RESPONSIBILITY: MOW

For Section Forepersons, create biennial recertification program utilizing initial training as a base, with a final exam

For System Repairers, create biennial recertification program consisting of 1 week refresher course, with a final exam



STANDARDS AND SOPS

- Track Standards
 - Ongoing: Review of track standards compared to FRA and APTA regulations
 - Ongoing: Review of track standards compared to other leading transit providers and industry best practices
 - Ongoing: Establish thresholds for Out of Service Track Conditions
 - Next Step: Establish working committee with outside support to completely revise existing HR and LRT track standards (last revision was 2008).
- Implement Standard Operating Procedures for key track inspection activities
 - **Completed: Geometry testing SOP, implemented prior to recent HR and LRT testing**
 - **Completed: Increase accountability by implementing PM in Trapeze for Section Foreperson and Supervisor Inspections of assigned territory.**
 - Ongoing: Update and implement SOP for visual inspection
 - Ongoing: Publish & implement SOP for Optical Testing
 - Ongoing: Publish & implement SOP for Ultrasonic Testing



STANDARDS AND SOPS

- Inspection Alerts to Track personnel
 - Alerts are released approximately every quarter in 2023 to call attention to issues uncovered during inspections or incidents (e.g., Packard's Corner derailment)

- Improve Geometry data post-processing to increase data quality
 - Completed: since Feb 2023, worked with geometry testing vendor to improve data post-processing and reduce incidence of false geometry exceptions
 - Ongoing: Issued RFI for vendors in August 2023
 - RFP in October and contract award by end of year incorporating industry feedback

MBTA
Maintenance of Way
Division

INSPECTION ALERT: MAY 2023

PROCESS FOR NEW RED AND YELLOW DEFECTS IDENTIFIED DURING VISUAL TRACK INSPECTION

All RED and YELLOW defects must be properly mitigated and documented from the moment they are identified. This is essential to providing safe service!

This process applies to any NEW RED or YELLOW defect, including:

- ⊗ Any new YELLOW or RED.
- ⊗ Previously reported GREEN that is now YELLOW.
- ⊗ Previously reported GREEN or YELLOW that is now RED.

LINE	FREQUENCY/DAY
Red	1-6 defects
Blue	1-4 defects
Green	1-5 defects
Orange	1-4 defects

Steps when a defect is found:

1. System Repairperson should enter defect into MaxTrax.
2. System Repairperson calls Section Foreperson to come to site for YELLOW and RED defects.
3. System Repairperson **MUST REMAIN** on track until Section Foreperson arrives. (This ensures trains will slow down when passing through the defect area)
4. Section Foreperson comes to location ASAP and inspects the defect with their own eyes.
5. Based on inspection Section Foreperson takes action **IMMEDIATELY** if the defect requires mitigation, such as a speed restriction.
6. Once any required mitigation is implemented, System Repairperson continues with track inspection.
7. Once track inspection is complete and report is submitted, Section Foreperson **MUST** provide notes in the Trapeze Service Request for new red and yellow defects.

TRAPEZE DOCUMENTATION
Beginning 6/15/23, Section Forepersons will be required to provide notes in Trapeze for every new RED and YELLOW Service Request. More details on this requirement are available in the "Red and Yellow Defect Verification EAM" video and the "Red and Yellow Defect Verification EAM" one pager.

GREEN DEFECT CLEAN-UP, PART 2
On May 12, we will complete a 2nd round of service request rejections for conditions that are:

1. "Pending" Status
2. Green Priority
3. Submitted through MaxTrax
4. Not Verified in the Past 120 Days

4090 old service requests rejected in PART 1

FOR QUESTIONS/SUGGESTIONS CONTACT YOUR SUPERVISOR



IMPROVE QUALITY AND ACCOUNTABILITY

TRACK QA & MENTORING PROGRAM

Conduct external over-the-shoulder inspections, to guide training, inspection alerts, and expectations for inspectors

PRIORITY: High

TIME FRAME: since Spring 2023

STATUS: Ongoing

RESPONSIBILITY: E&M, OCE Contractor

IMPROVE PERSONNEL TRAINING

PROVIDE INSPECTOR FEEDBACK

UPDATE INSPECTION METHODS

ENSURE REQUIRED INSPECTIONS ARE COMPLETED TIMELY

Add PM in Trapeze for Section Forepersons and Supervisors to ensure their inspections are completed as required

PRIORITY: High

STATUS: Complete

RESPONSIBILITY: E&M

Systemwide independent visual track inspections, driving defect identification and tracking

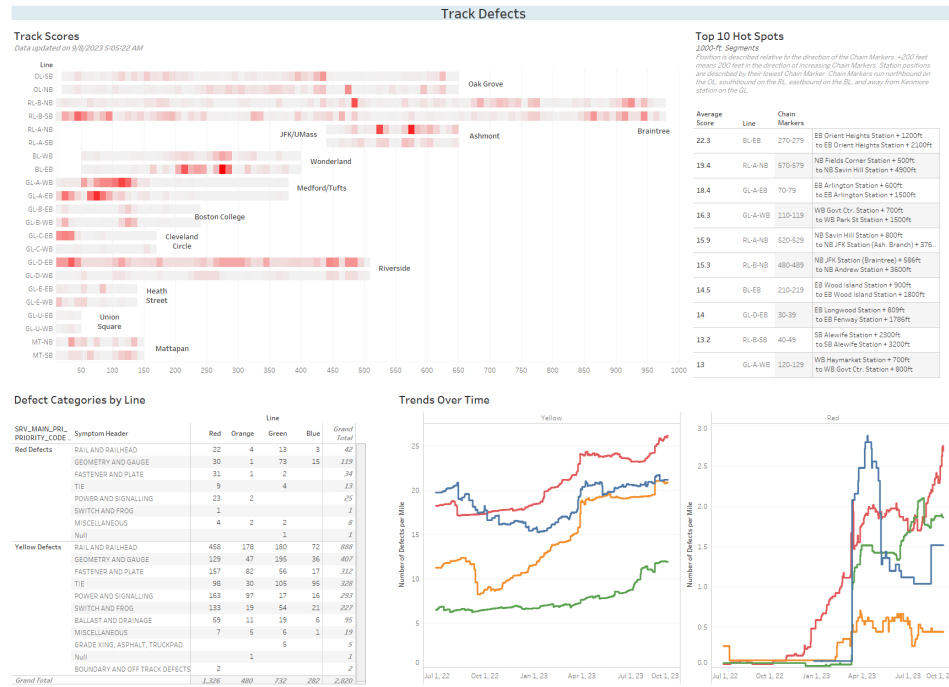
Ongoing since 2019



QUALITY

Inspection Compliance – E&M has established Work Management KPI Dashboards to improve management and compliance, such as:

- Inspection and Preventative Maintenance
- Track Condition
- Speed Restrictions



PM&I Compliance

Dashboard last updated:
9/8/2023 03:08 AM

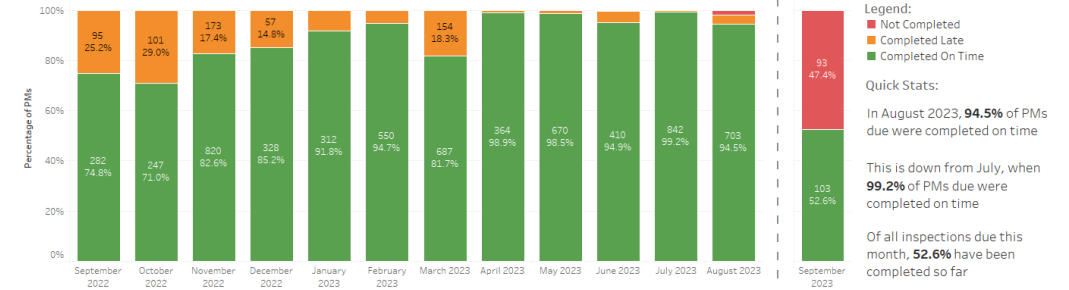
This page shows a high-level summary of Preventative Maintenance & Inspections (PM&I) compliance. By default, this dashboard shows only safety-critical inspections. Use the filters below to break down the data by criticality, asset category, etc. For more in-depth information, navigate to the 'Supervisor View' page of the dashboard.

What is Compliance? In this dashboard, compliance is defined as completing an inspection by the end of the month in which it is due. For example, if an inspection is due on May 22nd, the dashboard would consider it to have been 'completed on time' as long as the work is finished by May 31st.

Department: MOW | PM Work Location: All | Criticality: Safety Critical | Asset Category: All

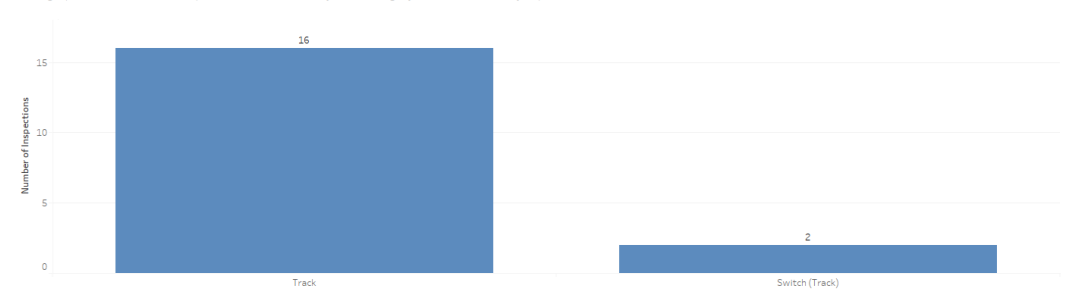
PM Completion by Month

This graph shows the completion and on-time status of inspections by the month in which they are due. For example, the 'May' bar represents all inspections with a due date in May. Each bar shows the percentage and number of inspections completed on time, completed late, and those that have not yet been completed. The bar on the right shows the current month - the 'green' percentage will increase as the month progresses.



Overdue PMs by Asset Category

This graph shows all overdue inspections, broken down by asset category. Bars are colored by department.



Additional Information

Update Schedule: This dashboard is updated once per day at 3am.

Contact: For any questions or comments about this dashboard please contact Greg Croft, gcroft@mbta.com.

WORK PLANNING AND MANAGEMENT

- SOP for Vendor Testing
 - Qualified Track Engineer required to supervise testing
 - Section Foreperson required to take immediate action on critical defects as identified by Engineer

- Establish consistent prioritization framework
 - Consistent prioritization of defects (Red/Yellow/Green) and update time scales for repair and mitigation with Special Maintenance Repair Plan

- Establish systemwide prioritization of repairs for identified defects
 - System created to prioritize defects based on age of restriction, severity of defect, impact to operations, and SME input



WORK PLANNING AND MANAGEMENT

1 Safety: Ensure all safety critical maintenance is performed in an acceptable time period. Control for the risk that a safety incident occurs as a result of degraded track.

The goal is to define SAFE OPERATION and keep our system safe at all times.

- No red defects are allowed to persist beyond 365 days (Unless explicitly authorized by leadership team)

2 Service: Improve reliability, frequency, and runtimes.

The goal is to minimize SERVICE DELAYS. This is best measured in minutes of excess runtime.

- Minutes of excess runtime: The number of extra minutes for a train to travel each line (in both directions).
- Versus a “baseline” speed that represents good quality service.
- Baseline is defined as the runtime in a state of no speed restrictions.

Reflecting the safety-first mentality, safety is a **constraint** and service is a **metric to optimize**.



Maintenance of Way Initiatives

Questions?

