QICO 2022

CY22 Q1 REVIEWS

Washington Metropolitan Area Transit Authority
WMATA

May 30, 2022

Internal Safety Review

1. *Automatic Fare Collection Section (AFCS)*
2. *Office of Vehicle Program Services (CENV)*
3. *Offices of Environmental Management and Compliance (EMAC) & Occupational Safety and Health (OSH)*
4. *Track Maintenance and Inspections: Office of Track and Structure*

Engineering & Maintenance

5. *Restraining Rail Installation and Maintenance*

TABLE OF CONTENTS

WHAT WE DO

What is QICO?

The Office of Quality Assurance, Internal Compliance & Oversight (QICO) is an internal management function that partners with other departments to provide an objective review. QICO and the internal review process are authorized by the General Manager as outlined in the Quality Management System Plan (QMSP).

Why QICO Performed These Reviews?

These internal reviews are intended to provide Metro senior management with an assessment of the following areas:

- Automatic Fare Collection Section
- Office of Vehicle Program Services
- Offices of Environmental Management and Compliance & Occupational Safety and Health
- Office of Track and Structure
- Restraining Rail Installation and Maintenance

QICO's Methodology:

- Develop relevant review activities by identifying and assessing any risks to align with the QMSP 15 Core Standards and/or Public Transit Agency Safety Plan (PTASP).
- Review documentation, observe processes, and interview key personnel.
- Findings and required actions are based on risk rating, which ranges on a scale from "Insignificant" to "High".

Note: An itemized internal Corrective and Preventive Action (iCAPA) is developed for each required action to achieve effective and measurable resolution of identified concerns. To check the status of iCAPA implementation go to: wmata.com/initiatives/transparency/.

WHAT WE FOUND | CY22Q1 INTERNAL SAFETY & QUALITY REVIEWS

April 2022

Internal Safety Review

(1) Automatic Fare Collection Section (AFCS)

Wins:

✓ Automatic Fare Collection Section (AFCS) routinely begins and completes 100% preventive maintenance in alignment with scheduled target start and finish dates within Maximo.

Action Areas Identified During Review:

- Utilizing proper safety equipment in accordance with approved Preventive Maintenance Inspections (PMIs) promotes safety culture and enhances risk mitigation.
- Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner.
- Adherence to the Office of Systems Maintenance (SMNT)'s Maintenance Control Policy (MCP), AFCS governing documents and Quality Management System Plan (QMSP) promotes consistent maintenance practices and quality records.
- Maintaining and complying with an accurate training matrix for AFCS assures compliance with governing documents, the SMNT MCP hazard management, and promotes safety.
- Maintaining current Roadway Worker Protection (RWP) training safeguards WMATA personnel from the hazards on and around the roadway and promotes a safe working environment.
- Mitigating hazards and retaining electronic records to include backups of personnel records safeguards from accidents and accidental loss of documents due to flooding or fire and protects the privacy of AFCS personnel.
- Periodically reviewing and updating AFCS job descriptions to comply with the Human Resources (HR) procedure fulfills qualifications' accuracy and job performance.

(2) Office of Vehicle Program Services (CENV)

Wins:

✓ Documentum, a centralized electronic repository is well maintained and updated.

✓ Approved CENV engineering documentation spreadsheet is sent out weekly.

Items Resolved During the Review:

✪ CENV promptly addressed the workplace safety concerns identified at Greenbelt Building H such as tripping hazards and missing labels on chemicals.

Action Areas Identified During Review:

- Performing regular workplace inspections helps reduce incidents, injuries, and illnesses through identification, recording, analysis and mitigation of hazards.
- Maintenance of Test, Measurement, and Diagnostic Equipment (TMDE) calibration is important to promote accurate and reliable data collection.
- Maintaining current policies and procedures results in consistent process control.
- Use of standardized templates is crucial in the creation of controlled records.
- Availability of formal training courses for routine employee tasks and update of training logs improves operations, compliance, safety, and engagement.
- A continuously updated hazard log/risk register contributes to the identification, recording, assessment, and mitigation of potential hazards.
- Participating in all mandatory safety committee meetings helps reinforce safety standards, disseminate new safety requirements, and promote safety culture.
- A reliable Vehicle Monitoring System (VMS)/Event Recorder (ER) is essential for a complete data download and thorough analysis of a railcar systems' operation.

(3) Offices of Environmental Management and Compliance (EMAC) & Occupational Safety and Health (OSH)

Wins:

✓ EMAC and OSH actively support the COVID Clean program.

✓ EMAC proactively engages external services for environmental permit regulatory inspections.

✓ EMAC conducts preparatory internal reviews prior to state and federal audits.

Action Areas Identified During Review:

- Development of documented departmental procedures is necessary for consistent safety oversight within all processes.
- Conducting further investigations after identifying chemical hazards can lead to identification of root cause and lead to mitigation or elimination of the hazards.
- Implementing all aspects of the Fatigue Risk Management Policy can lead to a reduction of fatigue related incidents across all job functions.
- A documented training matrix which includes required departmental safety training is essential to ensure personnel are incorporating safe practices within their assigned work.

WHAT WMATA WILL DO MOVING FORWARD

(1) Key Takeaway:

Updating and implementing established departmental processes to comply with the Public Transportation Agency Safety Plan (PTASP) is essential to establishing a safety-first culture.

Required Actions:

- **QICO-AFCS-21-01**: Enforce implementation of quality control and compliance checks to include PPE, tools and equipment, and PMI checklist population.
- **QICO-AFCS-21-02**: Develop and implement a review and revision process for AFCS governing documents.
- **QICO-AFCS-21-03**: Update AFCS training matrix to reflect the current business practice.
- **QICO-AFCS-21-04**: Create and utilize an electronic repository for handwritten training and personnel documentation.
- **QICO-AFCS-21-05**: Update AFCS job descriptions to fulfill qualifications accuracy and job performance.

(2) Key Takeaway:

Adherence to systemwide safety policies and procedures fosters proper planning and implementation of engineering responsibilities and support activities that drives WMATA's safety culture.

Required Actions:

- **QICO-CENV-21-01**: Meet or exceed standards for workplace safety inspection, safety committee participation, and hazard management processes defined in the Public Transit Agency Safety Plan (PTASP).
- **QICO-CENV-21-02**: Align training, inspection, process control, measuring & testing equipment, and document control management with organization-wide quality management system plan standards.
- **QICO-CENV-21-03**: Develop a solution to improve reliability of 2K/3K event recorder systems to comply with requirements of National Transportation Safety Board recommendation NTSB R-10-21.

(3) Key Takeaway:

Documenting and implementing departmental processes that define existing core functions in alignment with the Public Transportation Agency Safety Plan (PTASP), will provide common understanding and consistent execution of essential departmental activities.

Required Actions:

- **QICO-SAFE-22-01**: Develop and implement documented processes for all EMAC core functions.
- **QICO-SAFE-22-02**: Identify and define all OSH core functions; develop and implement documented processes for each.
- **QICO-SAFE-22-03**: Develop and implement a root cause analysis investigative requirement and process.
- **QICO-SAFE-22-04**: Develop an OSH specific training matrix.

WHAT WE DO

What is QICO?

The Office of Quality Assurance, Internal Compliance & Oversight (QICO) is an internal management function that partners with other departments to provide an objective review. QICO and the internal review process are authorized by the General Manager as outlined in the Quality Management System Plan (QMSP).

Why QICO Performed These Reviews?

These internal reviews are intended to provide Metro senior management with an assessment of the following areas:

- Automatic Fare Collection Section
- Office of Vehicle Program Services
- Offices of Environmental Management and Compliance & Occupational Safety and Health
- Office of Track and Structure
- Restraining Rail Installation and Maintenance

QICO's Methodology:

- Develop relevant review activities by identifying and assessing any risks to align with the QMSP 15 Core Standards and/or Public Transit Agency Safety Plan (PTASP).
- Review documentation, observe processes, and interview key personnel.
- Findings and required actions are based on risk rating, which ranges on a scale from "Insignificant" to "High".

Note: An itemized internal Corrective and Preventive Action (iCAPA) is developed for each required action to achieve effective and measurable resolution of identified concerns. To check the status of iCAPA implementation go to: wmata.com/initiatives/transparency/.

Engineering & Maintenance

- Performing internal SMS compliance audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.
- Creating and maintaining a comprehensive collection of Job Hazard Analyses will promote a safe work environment by identifying specific hazards and mitigations prior to the start of the task.

- **QICO-SAFE-22-05**: Revise PTASP (Rev. 2.0), section 4.1.2, to clarify SMS audit requirements.
- **QICO-SAFE-22-06**: Facilitate the development and maintenance of a library of JHAs that are available to all employees.

(4) Track Maintenance and Inspections: Office of Track and Structure (TRMN)

Wins:

✓ Creation and appointment of an investigation manager position helped in streamlining the SMS log closeout process and increased efficiency.

✓ Completion of RWP quality control checks by TRST supervision assures employee safety in the roadway.

Items Resolved During the Review:

✪ Performing regular inspections of temporary support structures assures safety for personnel and customers.

Action Areas Identified During Review:

- Following established safety protocols and procedures when operating or working around track equipment reduces risk to employee safety
- Consistent communication between the Equipment Operator and the Vehicle Flag Person while operating on track equipment supports a safe working environment
- Following track repair work instructions would support quality work and consistent results
- Utilizing a specific tool for a particular job activity reduces the risk of work-related injuries
- Completing exception forms for Heat Ride inspections according to governing documentation provides traceability and verification of compliance
- Performing regular tool and equipment inspections prior to work initiation demonstrates effective hazard mitigation and reduces the potential for injuries
- Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner
- Verifying safety equipment certification before use would maintain compliance and validate equipment performance

(4) Key Takeaway:

Following established Standard Operating Procedures and Work Instructions would enhance work production, product delivery and a safer work environment.

Required Actions:

- **QICO-TRMN-21-01**: Enforce safety procedures in the MSRPH and SOPs to protect employees, passengers, and WMATA property.
- **QICO-TRMN-21-02**: Enforce established work instructions and SOPs when performing routine maintenance and inspections to provide a safer work environment and support quality standards.
- **QICO-TRMN-21-03**: Assure the availability of the proper tools for specific jobs and routine inspections.
- **QICO-TRMN-21-04**: Revise and update TRST governing documents as per OAP-108-02.

(5) Restraining Rail Installation and Maintenance (RRIM)

Action Areas Identified During Review:

- Implementing modifications through adequate change and configuration management processes, following an Engineering Modification Instruction (EMI) reduces potential errors and promotes compliance.
- Adherence to Restraining Rail installation requirements within design criteria establishes consistency and compliance.
- Alignment of design criteria, maintenance standards, work instructions, and issuance of consistent governing documents would improve efficiency and reduce uncertainty performing inspections and maintenance.
- Documenting Restraining Rail inspections validates data, facilitates proper track maintenance, and promotes traceability.

(5) Key Takeaway:

Collaboration on design control & document control between Track & Structures, Engineering & Architecture, and Maintenance of Way Engineering is critical for the development of consistent standards and maintenance of Restraining Rail.

Required Actions:

- **QICO-RRIM-21-01**: Create and disseminate maintenance bulletins to communicate modifications in standards and maintenance practices.
- **QICO-RRIM-21-02**: Conduct a curved rail study and update design criteria based upon the results of the study.
- **QICO-RRIM-21-03**: Update controlled documents to reflect the consistent design and maintenance standards throughout.
- **QICO-RRIM-21-04**: Review all rail inspection and maintenance documents for alignment of designated tasks with current practices, and conduct quality assurance checks to verify adherence to approved restraining rail maintenance and repair documents.

INTERNAL SAFETY REVIEW SUMMARY

November 2021

(1) Automatic Fare Collection Section

Key Takeaway:

Updating and implementing established departmental processes to comply with the Public Transportation Agency Safety Plan (PTASP) is essential to establishing a safety-first culture.

What worked well (wins):

- Automatic Fare Collection Section (AFCS) routinely begins and completes 100% preventive maintenance in alignment with scheduled target start and finish dates within Maximo.

Areas for Improvement:

- Utilizing proper safety equipment in accordance with approved Preventive Maintenance Inspections (PMIs) promotes safety culture and enhances risk mitigation.
- Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner.
- Adherence to the Office of Systems Maintenance (SMNT)'s MCP, AFCS governing documents and Quality Management System Plan (QMSP) promotes consistent maintenance practices and quality records.
- Maintaining and complying with an accurate training matrix for AFCS assures compliance with governing documents, the SMNT MCP hazard management, and promotes safety.
- Maintaining current Roadway Worker Protection (RWP) training safeguards WMATA personnel from the hazards on and around the roadway and promotes a safe working environment.
- Mitigating hazards and retaining electronic records to include backups of personnel records safeguards from accidents and accidental loss of documents due to flooding or fire and protects the privacy of AFCS personnel.
- Periodically updating AFCS job descriptions to comply with the Human Resources (HR) procedure fulfills qualifications' accuracy and job performance.

Required Actions:

- **QICO-AFCS-21-01:** Enforce implementation of quality control and compliance checks to include PPE, tools and equipment, and PMI checklist population. (Overall Risk – 3C).
- **QICO-AFCS-21-02:** Develop and implement a review and revision process for AFCS governing documents. (Overall Risk – 4B).
- **QICO-AFCS-21-03**: Update the training matrix to reflect the current business practice. (Overall Risk – 3D).
- **QICO-AFCS-21-04:** Create and utilize an electronic repository for handwritten training and personnel documentation. (Overall Risk – 3D).
- **QICO-AFCS-21-05:** Update AFCS job descriptions to fulfill qualifications' accuracy and job performance. (Overall Risk – 4D).

Note: An itemized internal Corrective and Preventive Action (iCAPA) is developed for each required action to achieve effective and measurable resolution of identified concerns. To check the status of iCAPA implementation go to https://www.wmata.com/initiatives/transparency

What is QICO?

- The Office of Quality Assurance, Internal Compliance & Oversight (QICO) is an internal management function that partners with other departments to provide an objective review, proactively identifying safety concerns and assuring compliance with rules and regulations. QICO's Internal Safety Review process is authorized by the General Manager as outlined in the Public Transit Agency Safety Plan (PTASP), and required per the Washington Metrorail Safety Commission (WMSC) Program Standard.

Why QICO Performed This Review:

- This internal safety review is intended to provide Metro senior management and WMSC with an assessment of AFCS' compliance with Metro's PTASP and local, state, and federal safety regulations as appliable and promote the actions needed to address any concerns.

QICO's Methodology:

- Review relevant activities by identifying and assessing any processes subject to Safety Management Policy, Safety Risk Management, Safety Assurance, and Safety Promotion requirements as defined in the PTASP.
- Review documentation, observe processes, and interview personnel.
- Issue findings and required actions based on risk rating utilizing Metro's PTASP.

1.1 FUNCTIONAL OVERVIEW AND STRUCTURE

Automatic Fare Collection Section (AFCS)

The Automatic Fare Collection Section (AFCS) is responsible for managing and maintaining Washington Metropolitan Area Transit Authority (WMATA) Fare Collection and Parking Lot Equipment except for Bus Fareboxes. AFCS performs services on 677 Farecard Vendors, 237 Exit fare Machines, 1,067 Passenger Gates, 112 Station Operator Console (SOC) Computers, 3,515 Parking Meters, 56 SmarTrip Dispensers, 50 Parking Lot Counters & Telemetry Equipment, and seven (7) Jackson Graham Building (JGB) Elevator Lobby Gates (Figure 1). AFCS is supported by a group of engineers from Engineering and Architecture (ENGA), who are specifically tasked with maintaining AFCS asset documentation and specifications as well as providing asset support for repairs and new installations.

Figure 1: AFCS Assets

To deliver reliable, safe, and secure services to internal and external customers, AFCS is responsible for (Figure 2):

- Overseeing the day-to-day maintenance and operations of all assets listed above
- Safeguarding efficient fare transactions through regular Preventive Maintenance (PM)
- Supporting AFCS function with the help desk providing immediate response to emergencies during revenue hours

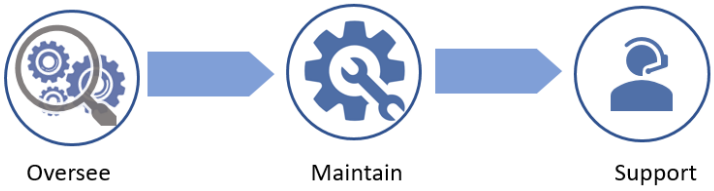


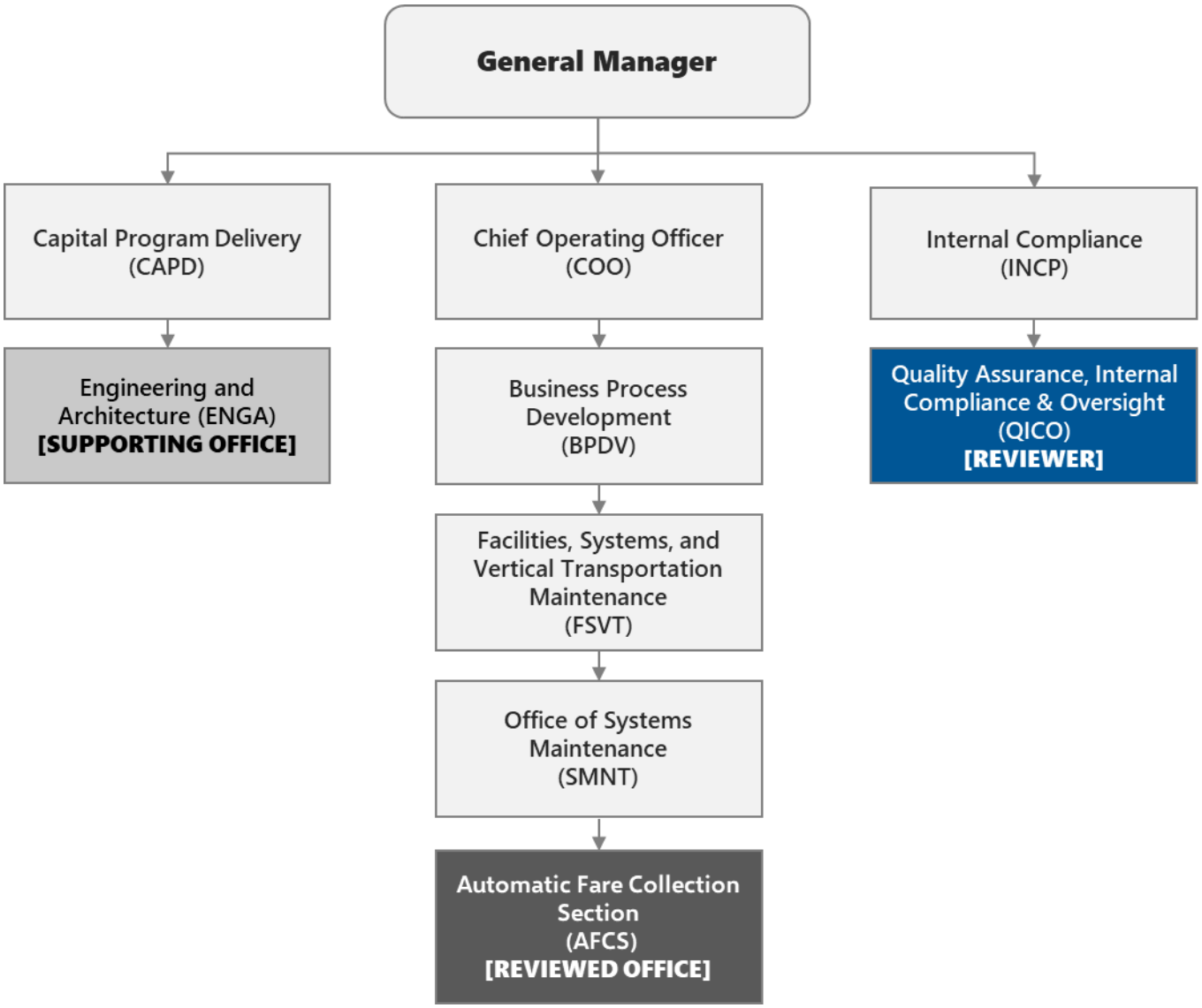
Figure 2: AFCS business functions

The objective of the AFCS Internal Safety Review (ISR) is to internally identify and mitigate hazards, promote safety and validate compliance of maintenance, operation and installation practices and procedures for faregates, farecard vendors, exit fares, SmarTrip Card Dispensers etc. owned and maintained by WMATA in accordance with the following.

- WMATA Public Transportation Agency Safety Plan (PTASP)
  - Safety Management
  - Safety Risk Management
  - Safety Assurance
- SOP 204-01 Calibration, Overdue Calibration, and Non-Calibrated Equipment
- SOP 204-02 SMNT ADA Equipment Maintenance
- FSVT-OAP 100-01-04 Supervisory Inspection of Work Performed in FSVT
- WMATA Quality Management System Plan (QMSP)

Organizational Structure and Background

The department of AFCS reports to the Chief Operating Officer (COO) through Office of Systems Maintenance (SMNT), Facilities, Systems, and Vertical Transportation (FSVT) and Business Process Development (BPDV). As shown in the Organization Chart, QICO is independent of this function reporting to the General Manager through Internal Compliance (INCP).



1.2 REVIEW SCOPE

Documentation Review

- WMATA PTASP, (Ver. 1.0, 10/2020)
- WMATA SMNT Maintenance Control Policy (MCP), (Ver. 3.1, 03/2019)
- WMATA Non-Smoking Policy PI 7.18/2 (11/27/2000)
- Money Spills SOP 204-01 (Ver. 01, 04/17/2017)
- AFCS Exit fare Preventative Maintenance Inspection (PMI) Procedure (Rev. 01, 06/27/2018)
- AFCS Faregate PMI Procedure (Rev. 01 07/05/2018)
- AFCS Station Operator Console PMI Procedure (Rev. 01 07/09/2018)
- AFCS SmarTrip Sale and Reload Machine PMI Procedure (Rev. 01 07/10/2018)
- AFCS Ticket Vending Machine PMI Procedure (Rev. 01 07/10/2018)
- Test Equipment Calibration, OAP 204-01 (04/12/2012)
- Credit Receipt Paper Memorandum (08/09/1999)
- Access to High Voltage AC Switchgear Rooms (07/21/1999)
- Maximo Checklist Documenting Memorandum (04/30/2021)
- Reconciling Fare Media Losses Memorandum (09/09/2002)
- Retrieval of Stuck Credit Cards Memorandum (03/21/2007)
- 68 AFCS Training Records
- 13 AFCS Job Descriptions
- AFCS Daily Work Reports (05/01/2021 – 07/31/2021)
- Two (2) AFCS Weekly Activity Reports (WAR) (09/11/2021)
- Seven (7) SMS incident reports (20210909#95469MX, 20210915#95586MX, 20210615#93893MX, 20201016#89567, 20210629#94192, 20210430#93075, 20210129#91694)
- 25 Preventive Maintenance Maximo Records (05/01/2021 – 07/31/2021)
- Competitive Recruitment Procedure HR-TA-P02-00 (Rev.0 03/08/2019)
- Job Description and Non-Person Profile Update Process (Rev.0 07/05/2019)

Personnel Discussions

- AFCS Superintendent
- Three (3) AFCS Assistant Superintendents
- Four (4) AFCS Shift Supervisors
- Two (2) AFCS Technicians
- Two (2) AFCS Engineers

Field Assessment

- Metro Center (A01/C01) (08/26/2021)
- Huntington Station (C15) (9/2/2021)
- Branch Avenue Station (F11) (9/13/2021)
- Field Office L'Enfant Plaza (F03) (9/21/2021)

Applicable CAPs & iCAPAs Reviewed

Closed	- QICO-AFCS-18-01 - Submitted date: 01/2019	Review and update in accordance with current business practices: reflecting improved quality control standards, consistent maintenance practices, and accurate asset reliability reporting.

1.3 WHAT WORKED WELL (WINS)

Wins are categorized by the System Safety Measures and rated by the Risk Assessment

W-AFCS-21-01 Work Measurement **Reduces Safety Risk** **Owner – AFCS**

✓ **AFCS routinely begins and completes 100% preventive maintenance in alignment with Maximo schedules.**

Discussion

AFCS focuses on achieving 100% completion on all the monthly Preventive Maintenance Inspections (PMI). Complying with monthly Maximo schedules promotes a safer and a reliable system for both internal and external customers.

- QICO reviewed Maximo Work Orders (WO) from 05/01/2021 to 06/30/2021 for AFCS Preventive Maintenance (PM) which includes the following and noted 100% on time completion (Figure3):
  - 923 SmarTrip Sale and Reload Machines (SSRM)
  - 737 Parking Lot Equipment
  - 678 Reversable Gates
  - 425 Exit Gates
  - 422 Entry Gates
  - 317 Exitfare Machines
  - 250 Standard Vendor Machines (SVM)
  - 230 Station Operator Consoles (SOC)
  - 148 Parking Meters

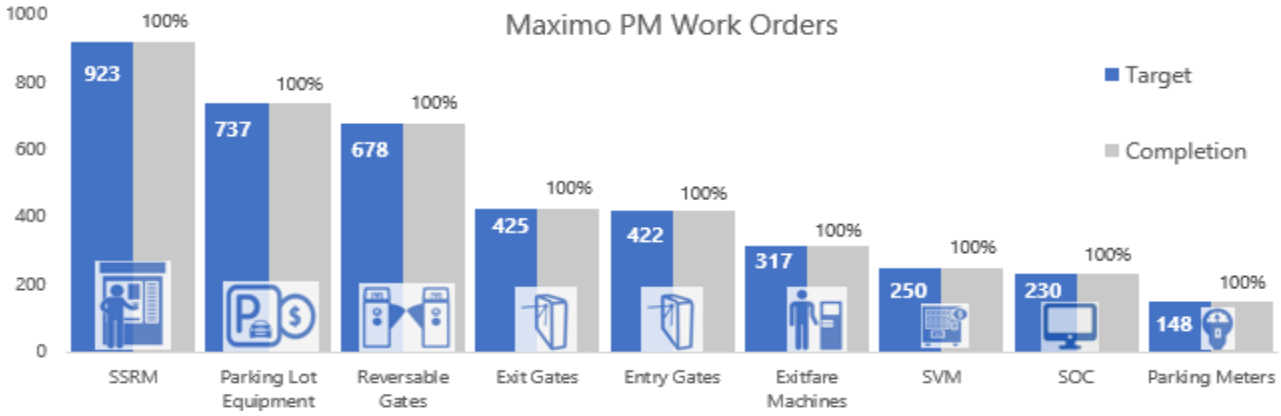


Figure 3: AFCS PM/Mini PM Maximo Work Orders

- Additionally, through interviews with AFCS personnel, QICO noted that if an AFCS asset is found to be consistently underperforming a "Mini PM" is created by the AFCS Maintenance Desk. The "Mini PM" is an additional more frequent preventive maintenance outside of the normal monthly preventive maintenance schedule. Performing the "Mini PM" assures proper functionality of the asset for a more reliable day to day operation and promotes safe and reliable operation of all WMATA assets.
  - QICO reviewed and analyzed the PM Maximo Work Orders from 05/01/2021 to 06/30/2021 and noted these WOs included the following Mini PMs.
    - One (1) Mini PM on Entry Gate,
    - Seven (7) Mini PMs on Exit Gate,
    - Four (4) Mini PMs on Exitfare Machines,
    - Five (5) Mini PMs on Reversable Gates, and
    - 12 Mini PMs on SSRM.

AFCS personnel work diligently to maintain a strict schedule when it comes to their monthly preventive maintenance and their mini preventive maintenance inspections.

1.4 AREAS FOR IMPROVEMENT

Findings are categorized by System Safety Measures and rated by the Risk Assessment

FS-AFCS-21-01 Safety Risk Management -Hazard Resolution and Tracking **3C** **Owner – AFCS**

- **Utilizing proper safety equipment in accordance with approved Preventive Maintenance Inspections (PMIs) promotes safety culture and enhances risk mitigation.**

Discussion

Following current and approved governing documents pertaining to safety equipment minimizes exposure to hazards and reduces injuries while performing maintenance work. PTASP Section 3.6 states that Maintenance Control Policies (MCPs) will describe the standards and requirements for scheduled maintenance.

- AFCS is a sub-department of the Office of Systems Maintenance (SMNT) and is therefore subject to adhere to the SMNT MCP. Per the SMNT MCP Section 16.1, each step of the approved PMI procedure should be performed unless consent from the immediate supervisor is obtained. Additionally, per AFC-SSRM-PMI-20180710 Section 5.1, "Use a protective barricade around work area. Expanding barricades/safety cones/retractable barricade/caution tape."
- A barricade cordons off or blocks a hazardous area to deter the traffic of passengers and WMATA employees. From the three (3) inspections QICO observed, AFCS technicians didn't use any safety barricades/cones while performing the maintenance inspections on electrical equipment (including Faregates and SmarTrip Sale and Reload Machines). Without the safety barriers, the public is exposed to electrical hazards. Elimination of risk is a combined effort from Engineering control (isolate technician from the hazard in the design phase), Administrative control (provide and manage adequate safety equipment for use) and frontline employee's compliance with proper Personal Protective Equipment (PPE) and safety equipment (See Figure 4).

Figure 4: Risk Controls

  - QICO conducted three (3) field assessments and noted that AFCS technicians failed to use protective barricades at the following locations:
    - Metro Center (A01/C01) on 08/26/2021
    - Huntington (C15) on 09/02/2021
    - Branch Avenue Station (F11) on 09/13/2021
  - On 09/24/2021, QICO received notification that safety cones were purchased (PO #0000160513) by AFCS.

Proper use of safety equipment is the foundation of a safe working environment. It is the responsibility of AFCS technician, management, and engineers to mitigate and reduce both safety and quality issues concurrently.

FS-AFCS-21-02 Safety Management Policy -Documentation **4B Owner – AFCS**

- **Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner**

Discussion

PMIs are essential to the reliable operation of equipment as they provide detailed instructions for AFCS technicians to follow when performing routine maintenance. Per QMSP Section 3.2, WMATA departments and projects must include procedures for receiving, transmitting, reviewing, approving, disseminating, and archiving critical documents in their respective Quality Management Plan (QMP). Regular revision of PMI documents would support the implementation of any manufacturer updates to assets and incorporate industry best practices which results in improved maintenance and techniques.

- SMNT MCP Section 16.1 requires updating PMI documents bi-annually; however, while reviewing documents received from AFCS, QICO noted the following: (Figure 5)

Document Title	Revision Date	Document Status
*WMATA Non-Smoking Policy PI 7.18/2	11/1/2000	Obsolete
Money Spills SOP 204-01 Rev. 01	04/17/2017	Out of date
Access to High Voltage AC Switchgear Rooms	07/21/1999	Out of date
Individual Tool Kit Requirements Document	None	03/09/2011
AFCS Ticket Vending Machine PMI Procedure Rev. 01	07/10/2018	Out of date
AFCS SmarTrip Sale and Reload Machine PMI Procedure Rev. 01	07/10/2018	Out of date
AFCS Station Operator Console PMI Procedure Rev. 01	07/09/2018	Out of date
AFCS Faregate PMI Procedure Rev. 01	07/05/2018	Out of date
AFCS Parking Lot Equipment PMI Procedure Rev. 01	10/04/2018	Out of date
AFCS Exitfare PMI Procedure Rev. 01	6/27/2018	Out of date

*PI 7.18/2 has been obsoleted and replaced by PI 7.7.5/2; however, it is referenced in AFCS governing procedures.

Figure 5: AFCS Reviewed Documents

Utilizing outdated PMIs and procedures while performing maintenance tasks increases safety risks and contributes to inconsistent work standards and rework.

FS-AFCS-21-03 Safety Assurance-Compliance **3C Owner – AFCS**

- **Adherence to the SMNT's MCP, AFCS governing documents and QMSP promotes consistent maintenance practices and quality records.**

Discussion

Checklists are an important aspect to the maintenance process as they provide a step-by-step instruction to perform pertinent preventive maintenance accurately and efficiently. PTASP incorporates the requirements of WMATA QMSP in Section 3.3. Per QMSP Section 3.10, Quality records are the documented evidence that work has been performed in accordance with the specifications, policies, procedures, and requirements of the office/department QMP's. In addition, the PTASP Section 3.5 describes the requirements and activities to be monitored, overseen, verified, and documented for safety assurance.

- Per the SMNT MCP Section 16.1 – "Shift supervisors are responsible for reviewing and certifying both the acceptable performance of inspections and the accuracy of the documentation in Maximo." Although checklists are included with each PM procedure, there is no specific direction or guidelines within the PM. Utilizing the checklist would further support section 16.1 of the MCP by providing the shift supervisor additional evidence of a completed PMI.
  - During this Internal Safety Review, QICO conducted three (3) field assessments and observed the following inconsistencies:

- PM of the SmarTrip Sale and Reload Machine (SSRM), 08/26/2021.
  - Steps 3-23 of the checklist were marked completed before maintenance activities were conducted on the SSRM (See Figure 6).
  - AFCS technician did not have a vacuum cleaner on site; however, step 17 of the PMI states, "Clean the general cabinet interior, sub-assemblies, cables and floor with a yellow cloth, soft brush, and vacuum cleaner" and was marked as completed.
  - Completing a PM checklist prior to the initiation of maintenance activities creates confusion when using the checklist as a reference. A pre-filled checklist creates an opportunity to skip important PM steps and lacks assurance that an inspection was performed appropriately
- PM of Parking Lot Equipment (PLE), 09/02/2021.
  - Completion of checklist progressed concurrently with PMI completion (See Figure 7).
  - Upon completion of the PMI, the AFCS technician signed and dated completed checklist for supervisor review and signature to verify PMI completion.
- PM of Faregates, 09/13/2021.
  - Checklist used as a reference only while performing PM (See Figure 8).
  - AFCS technician stated checklist completion during the PMI is no longer required by AFCS management.

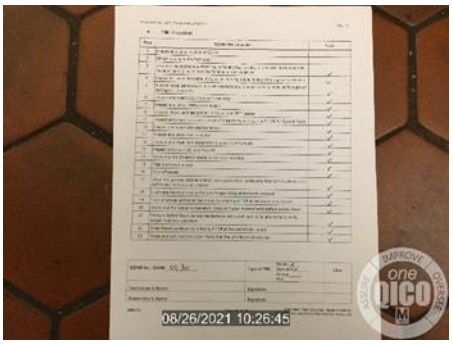


Figure 6: 08/26/2021's checklist

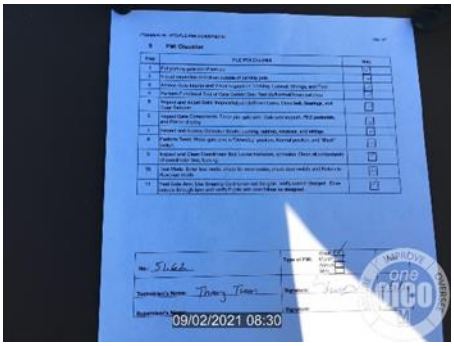


Figure 7: 09/02/2021's checklist

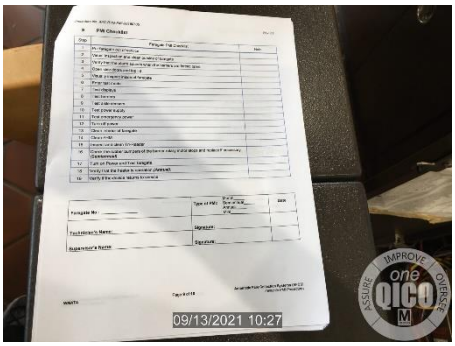


Figure 8: 09/13/2021's checklist

  - During interviews with AFCS personnel, QICO noted that although checklists are included in the current PM procedure in Maximo, AFCS management is not requiring these checklists to be completed during the PMI.

The inconsistencies identified by AFCS technicians at each field assessment presented different understanding and utilization of the checklist for the particular PM (pre-populated to include technician signature, populated during performance of PM, and not used at all during PM). This presents an opportunity for missed PM steps and the potential for poor asset reliability. QICO recommends that AFCS reinstates the requirement of completing checklists to include signatures from both the technician performing the maintenance and the supervisor verifying completion of the work.

FS-AFCS-21-04 Safety Promotion-Training	3D Owner – AFCS

- **Maintaining and complying with an accurate training matrix for AFCS assures compliance with governing documents, the SMNT MCP hazard management, and promotes safety.**

Discussion

According to SMNT MCP Section 28.2, "On an annual basis, the SMNT Branch Superintendents will review and update the training matrix for the training requirements of their staff. As part of this process, all employee training records will be reviewed to ensure their records are current and in adherence to their training requirements." In addition, per PTASP 4.1, "Supervisors and employees are required to review training records periodically for verification that required training and certifications are being completed by employees."

- The AFCS training matrix requires AFCS Mechanics to complete the following trainings:
  - Introduction to AFCS Training
  - AFCS Refresher
  - AFCS PM Procedures
  - SMNT MCP training
- Through document review and interviews with AFCS personnel, QICO noted the following (Figure 9):
  - Of the 68 AFCS Mechanics' training records reviewed:
    - 89% are missing Introduction to AFCS Training
    - 60% are missing AFCS Refresher Training
    - 31% are missing AFCS PM Procedures Training
  - Of the 12 AFCS personnel interviewed, 25% (3) were not aware of the SMNT MCP.
    - Detailed within the SMNT MCP is Section 6: Hazard Management Program, which outlines the process for identifying, investigating, and mitigating hazards.
    - Maintaining 100% awareness of the SMNT MCP promotes a safer working enivironment and provides personnel with the tools necessary to identify hazards and report them accordingly.

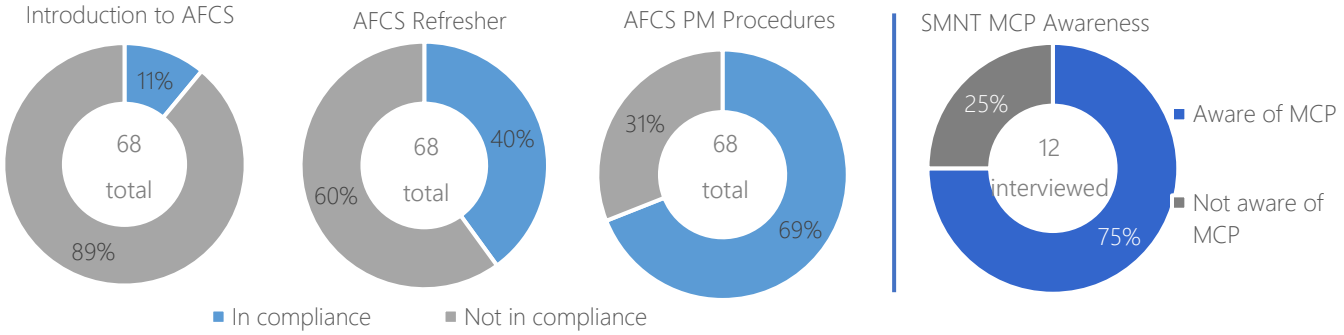


Figure 9: AFCS training records

- Additionally, the AFCS Training Matrix submitted to QICO does not accurately depict the required training. PTASP 4.6 states: "Per the QMSP, it is the responsibility of each department head or their designee to develop and maintain a required training matrix for each position and employee within their department and to verify that the matrix is updated and maintained."

Updating the training matrix and complying with all required training to include awareness of governing documents is vital to promote a culture of safety.

FS-AFCS-21-05 Safety Promotion-Training **3D Owner – AFCS**

- **Maintaining current Roadway Worker Protection (RWP) training safeguards WMATA personnel from the hazards on and around the roadway and promotes a safe working environment.**

Discussion

The Metrorail Safety Rules and Procedures Handbook (MSRPH) section 5.1.3 General RWP Guidelines states that "All WMATA employees are responsible for understanding and compliance with all RWP associated rules in the MSRPH."

- Per the AFCS Training Matrix in the SMNT MCP, Version 3.1, Appendix A-7: Training Matrix indicates that all personnel within AFCS (except Parts Runner) from the Assistant Superintendent through Mechanic Helper are to be RWP trained (Figure 10).

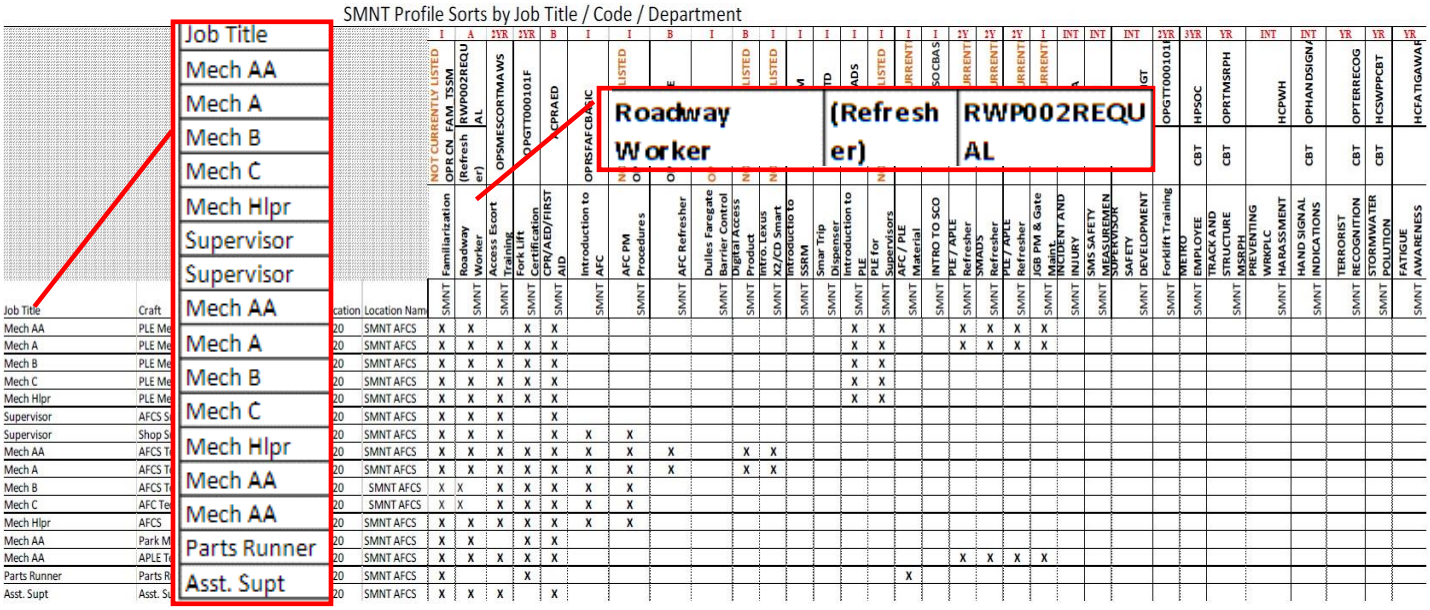


Figure 10: Appendix A-7: Training Matrix

- During field assessments on 08/26/2021, 09/02/2021, and 09/13/2021, QICO observed the following:
  - There was no form of safety briefing performed by AFCS personnel prior to the commencement of maintenance work.
  - There was no RWP training certification sticker on AFCS personnel One Badge.
- Through interviews, AFCS personnel mentioned that RWP training and requalification are no longer required for any position within AFCS due to the nature of their work. No information was provided as to who authorizes the change or when the change occurred.

While accessing or working in the vicinity of the roadway, which may be a rarity within AFCS, maintaining a RWP certification in accordance with the SMNT MCP training matrix would promote compliance and safety.

FS-AFCS-21-06 Safety Management Policy-Documentation	3D Owner – AFCS

- **Mitigating hazards and retaining electronic records to include backups of personnel records safeguards from accidents and accidental loss of documents due to flooding or fire and protects the privacy of AFCS personnel.**

Discussion

QMSP Section 3.10 Quality Records, Storage states that "QMPs will describe the method by which quality records are stored to prevent damage or loss. This shall include the surfaces security and back-up of electronic data."

- Record retention and electronic storage of documents in a manner that they are protected from accidental losses such as fire, flooding, or misplacement would improve traceability and promote agency and regulatory compliance. This process helps in the safeguarding of important information, and easy retrieval and dissemination of important documents such as departmental procedures, policies, training records etc.
  - During the assessment of AFCS Field Office at L'Enfant Plaza on 09/21/2021, QICO observed the following:
    - Hard copies of AFCS employees' training records are locked inside a file cabinet that is not fire proofed. There are no electronic backups of these records.
    - Equipment calibration records are maintained manually in handwritten logbooks which impedes traceability and efficiency.
  - OSHA 29 CFR 1910.22 states that "All places of employment, passageways, storerooms, service rooms, and walking-working surfaces are kept in a clean, orderly, and sanitary condition." In addition, "The floor of each workroom is maintained in a clean and, to the extent feasible, in a dry condition."
    - The office location is prone to water intrusion and previous flooding had caused some damage to the office floors (Figure 8). Maximo work orders have been created in the past and water intrusion mitigation attempts by the Office of Plant Maintenance (PLNT) have been unsuccessful. There are no current open work orders and this issue has been removed as a discussion item from the monthly Branch Safety Committee Meeting without a resolution.
  - OSHA 1910.159(c)(10) states that "The minimum vertical clearance between sprinklers and material below shall be 18 inches (45.7 cm)."
    - Materials were stacked over the cabinets and within 18 inches of ceiling mounted fire sprinklers (Figure 11).
    - Access to a fire extinguisher was blocked by cardboard trash.
    - These present hazards in mitigating fires and increase the risk of losing records.

Figure 11: Hazards identified in AFCS field office

QICO recommends implementing the use of electronic resources such as Metrodocs and AFCS "T" drive for the storage of records.

FS-AFCS-21-07 Safety Management Policy-Documentation 4D **Owner – AFCS**

- **Periodically updating AFCS job descriptions to comply with the Human Resources (HR) procedure fulfills qualifications' accuracy and job performance.**

Discussion

Having current and accurate job description facilitates the effective recruitment and fulfillment of open positions.

- Per HR-TA-P02-00, a job description should be reviewed and evaluated with the Office of Compensation (COMP) minimally every three years to ensure relevance and accuracy of the minimum qualifications, essential functions, knowledge, skills, abilities, and technology/tools.
- QICO sampled 13 AFCS job descriptions and noted seven (7) out of 13 are out-of-date and listed below:

Title	Job code	Revision Date
AFCS Supervisor	5214	3/10/1983
Mechanic AA	5217	3/10/1983
Mechanic AA (Parking Meter Servicer)	5376	7/6/1988
Mechanic A	5218	3/10/1983
Mechanic B	5219	3/10/1983
Mechanic C	5225	3/10/1983
Mechanic helper	5226	12/3/1998

Figure 12: list of out-of-date AFCS job descriptions

Regularly updating job descriptions would ensure the accuracy of job performance, incorporate the job function changes in a timely manner and improve the efficiency of recruitment.

1.5 SUMMARY OF REQUIRED ACTIONS

QICO-AFCS-21-01 | **Action Owner – AFCS** | **Overall Risk – 3C**

Required Action: Enforce implementation of quality control and compliance checks to include PPE, tools and equipment, and PMI checklist population.

Applicable Findings

- **FS-AFCS-21-01: Utilizing proper safety equipment in accordance with approved Preventive Maintenance Inspections (PMIs) promotes safety culture and enhances risk mitigation.**
  - **Measure:** Safety Risk Management -Hazard Resolution and Tracking **Risk:** Safety – Yellow (3, C)
- **FS-AFCS-21-03: Adherence to the SMNT's MCP, AFCS governing documents and QMSP promotes consistent maintenance practices and quality records.**
  - **Measure:** Safety Assurance-Compliance **Risk:** Safety – Yellow (3, C)

QICO-AFCS-21-02 | **Action Owner – AFCS** | **Overall Risk – 4B**

Required Action: Develop and implement a review and revision process for AFCS governing documents.

Applicable Findings

- **FS-AFCS-21-02: Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner.**
  - **Measure:** Safety Management Policy -Documentation **Risk:** Safety – Yellow (4, B)

QICO-AFCS-21-03 | **Action Owner – AFCS** | **Overall Risk – 3D**

Required Action: Update the training matrix to reflect the current business practice.

Applicable Findings

- **FS-AFCS-21-04: Maintaining and complying with an accurate training matrix for AFCS assures compliance with governing documents, the SMNT MCP hazard management, and promotes safety.**
  - **Measure:** Safety Promotion-Training **Risk:** Safety – Yellow (3, D)
- **FS-AFCS-21-05: Maintaining current Roadway Worker Protection (RWP) training safeguards WMATA personnel from the hazards on and around the roadway and promotes a safe working environment.**
  - **Measure:** Safety Promotion-Training **Risk:** Safety – Yellow (3, D)

QICO-AFCS-21-04 | **Action Owner – AFCS** | **Overall Risk – 3D**

Required Action: Create and utilize an electronic repository for handwritten training and personnel documentation.

Applicable Findings

- **FS-AFCS-21-06: Mitigating hazards and retaining electronic records to include backups of personnel records safeguards from accidents and accidental loss of documents due to flooding or fire and protects the privacy of AFCS personnel.**
  - **Measure:** Safety Management Policy -Documentation **Risk:** Safety – Yellow (3, D)

QICO-AFCS-21-05	Action Owner – AFCS	Overall Risk – 4D

Required Action: Update AFCS job descriptions to fulfill qualifications' accuracy and job performance.

Applicable Findings

- **FS-AFCS-21-07: Periodically updating AFCS job descriptions to comply with the Human Resources (HR) procedure fulfills qualifications' accuracy and job performance.**
  - **Measure:** Safety Management Policy -Documentation **Risk:** Safety – Green (4, D)

Internal Corrective and Preventive Actions (iCAPAs) are designated to address each Required Action listed above.

(2) Office of Vehicle Program Services (CENV)

Key Takeaway:
Adherence to systemwide safety policies and procedures fosters proper planning and implementation of engineering responsibilities and support activities that drives WMATA's safety culture.

Wins:

- ✓ Documentum, a centralized electronic repository is well maintained and updated.
- ✓ Approved CENV engineering documentation spreadsheet is sent out weekly.

Items Resolved During the Review:

- ✪ CENV promptly addressed the workplace safety concerns identified at Greenbelt Building H such as tripping hazards and missing labels on chemicals

Areas for Improvement:

- Performing regular workplace inspections helps reduce incidents, injuries, and illnesses through identification, recording, analysis and mitigation of hazards.
- Maintenance of Test, Measurement, and Diagnostic Equipment (TMDE) calibration is important to promote accurate and reliable data collection.
- Maintaining current policies and procedures results in consistent process control.
- Use of standardized templates is crucial in the creation of controlled records.
- Availability of formal training courses for routine employee tasks and update of training logs improves operations, compliance, safety, and engagement.
- A continuously updated hazard log/risk register contributes to the identification, recording, assessment, and mitigation of potential hazards.
- Participating in all mandatory safety committee meetings helps reinforce safety standards, disseminate new safety requirements, and promote safety culture.
- A reliable Vehicle Monitoring System (VMS)/Event Recorder (ER) is essential for a complete data download and thorough analysis of a railcar systems' operation.

Required Actions:

- **QICO-CENV-21-01:** Meet or exceed standards for workplace safety inspection, safety committee participation, and hazard management processes defined in the Public Transit Agency Safety Plan (PTASP). (Overall Risk – 3B).
- **QICO-CENV-21-02:** Align training, inspection, process control, measuring & testing equipment, and document control management with organization-wide quality management system plan standards. (Overall Risk – 3B).
- **QICO-CENV-21-03:** Develop a solution to improve reliability of 2K/3K event recorder systems to comply with requirements of National Transportation Safety Board recommendation NTSB R-10-21. (Overall Risk – 3D).

What is QICO?

- The Office of Quality Assurance, Internal Compliance & Oversight (QICO) is an internal management function that partners with other departments to provide an objective review, proactively identifying safety concerns and assuring compliance with rules and regulations. QICO's Internal Safety Review process is authorized by the General Manager as outlined in the Public Transit Agency Safety Plan (PTASP), and required per the Washington Metrorail Safety Commission (WMSC) Program Standard.

Why QICO Performed This Review:

- This internal safety review is intended to provide Metro senior management and WMSC with an assessment of CENV's compliance with local, state, and federal safety regulations and Metro's PTASP, and promote the actions needed to address any concerns.

QICO's Methodology:

- Review relevant activities by identifying and assessing any processes subject to Safety Management Policy, Safety Risk Management, Safety Assurance, and Safety Promotion requirements as defined in the PTASP.
- Review documentation, observe processes, and interview personnel.
- Issue findings and required actions based on risk rating utilizing the MIL-STD-882E standard.

Note: An itemized internal Corrective and Preventive Action (iCAPA) is developed for each required action to achieve effective and measurable resolution of identified concerns. To check the status of iCAPA implementation go to https://www.wmata.com/initiatives/transparency

2.1 FUNCTIONAL OVERVIEW AND STRUCTURE

Vehicle Program Services (CENV)

The Office of Vehicle Program Services (CENV) is responsible for providing engineering services for Metrorail passenger vehicles and non-revenue roadway maintenance machines. Its services are grouped in two main categories: the New Car Program Office covering both Program Management, which oversees the lifecycle of new passenger rail vehicle acquisitions and Capital Improvement which leads initiatives to leverage new technologies for driving improvements within existing fleets; and Vehicle Engineering, responsible for providing technical support, facilitating configuration changes, and performing miscellaneous routine engineering tasks.

CENV incorporates inputs from customers such as the Office of Car Maintenance (CMNT) as well as information from the Office of Reliability Engineering and Performance Analysis (REPA) to develop and implement engineering initiatives based on statistical performance analysis.

The objective of this Internal Safety Review (ISR) is to internally validate the existence of documented safety related processes and conformance to those established processes, performed under the purview of CENV and owned and maintained by WMATA in accordance with the Public Transit Agency Safety Plan (PTASP) 2020, the Washington Metrorail Safety Commission (WMSC) Program Standard, the Federal Transit Administration (FTA) 49 CFR part 674, and other applicable federal and regional requirements.

WMATA's PTASP establishes the requirements for systematically identifying, evaluating, and minimizing safety risks throughout all elements of the Metrorail system in accordance with the Federal Transit Administration (FTA) 49 CFR Part 673 and other applicable federal and regional requirements. Additionally, WMATA incorporates the similar requirements for Metrobus and MetroAccess, although not required by the FTA.

This activity involved a broad safety review of railcar engineering services that includes programs and projects, inspection and maintenance documentation, associated policies, procedures, and training.

WMATA's PTASP defines seventeen (17) specific safety management components, of which fifteen (15) are identified as applicable for the scope of this review:

1. Responsibilities
2. Emergency Management
3. Documentation
4. Hazard Risk Assessment
5. Hazard Identification
6. Hazard Reporting
7. Hazard Resolution and Tracking
8. Safety Data Analysis
9. Compliance
10. Analysis and Risk Mitigation
11. *Configuration Management**
12. Procurement
13. Training
14. Hazardous Materials
15. Environmental Management

* Engineering Modification Instructions (EMI) that was reviewed in connection with the Parts authorization process, has an upcoming systemwide assessment to commence on the 2nd quarter of FY2022 and was not included in this assessment.

With WMSC completing an audit of WMATA's Roadway Maintenance Machine (RMM) Inspection, Maintenance and Training last March 2021, Class 2 vehicles were not included in this assessment.

WMSC recently completed and released a final report for an audit of the WMATA's Revenue Vehicle (Railcar) Programs, dated September 14, 2021. Some of the elements examined by WMSC, overlapped with the scope of this assessment.
Some areas identified by WMSC that require action are:

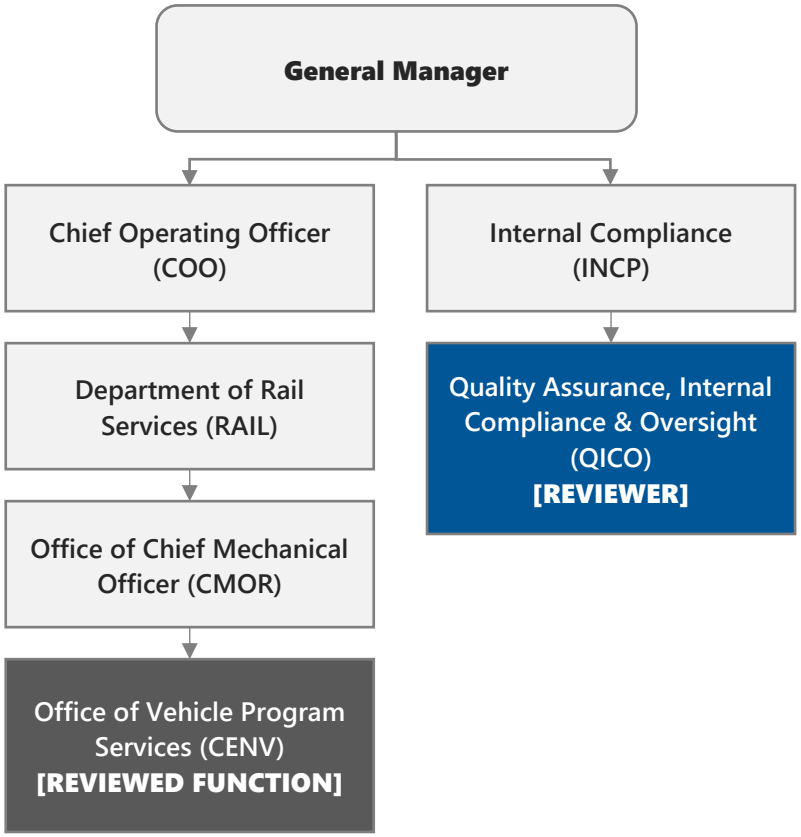
- Safety certifications and approvals requirements for railcars rehabilitation and subsystems overhaul program.
- Contract requirements to assure that all necessary OEM documentation, parts, or tools are identified and supplied.
- Defined roles and responsibilities between the Incident Investigation Team and CENV, including the coordination processes between the IIT, other CENV groups and SAFE.
- Training requirements to conduct each specific type of work on each specific railcar series, perform regular supervisory checks of those certifications and determine if refreshers or recurring training are necessary.
- Procedure for reporting and addressing wheels out-of-round, including processes to identify and mitigate root causes and to prevent cars with wheels out-of-round from operating, and provide training to personnel.
- Defined use, review and approval process of engineering modification instructions, service bulletins and other engineering change management documents.
- Multiple versions of the same PI checklists form and existence of written criteria.

QICO will not issue additional findings and corrective actions for required actions already issued by WMSC and will consider the concerns resolved upon satisfying WMSC CAPs.

Organizational Structure and Background

Within WMATA, the Office of Vehicle Program Services (CENV) reports to the Chief Operating Officer (COO) through the Office of Chief Mechanical Officer, Rail (CMOR) and the Department of Rail Services (RAIL). As shown in the organization chart, QICO is independent of this function, reporting to the General Manager through Internal Compliance (INCP).

CENV is divided amongst two (2) sub-groups. The New Car Program group, which leads and coordinates with Metrorail vehicle stake holders (e.g., CMNT, PRMT, QICO, SAFE, COUN, RTRA and CSCM) the delivery and acceptance of railcars which meet the specification requirements, and the Engineering Railcar Vehicles group which is dedicated to increasing reliability and safety through engineering improvement of all revenue and non-revenue vehicles.



2.2 REVIEW SCOPE

Documentation Review

- WMATA Documents:
  - WMATA Public Transit Agency Safety Plan (PTASP), October 2020
  - Metro Safety Rules and Procedures Handbook (MSRPH), December 2020
  - Roles and job descriptions of CENV personnel
  - CENV Contractor List & Roles
  - 2000-3000 Series Task 40 Interior A and B Inspection Manuals, Rev 9.0 11/30/2020
  - 2000-3000 Series Task 40 Interior C Inspection Manual Rev 10.0 11/30/2020
  - 6000 Series Task 40 Interior A and B Inspection Manuals, Rev 9.0 11/30/2020
  - 6000 Series Task 40 Interior C Inspection Manual Rev 10.0 11/30/2020
  - 7000 Series Task 40 Interior A, B and C Inspection Manuals Rev 10.0 11/30/2020
  - SOP 202-14 Class 1 Periodic Inspection & Class 2 Preventive Maintenance Procedures (review due 12/2/2022)
  - SOP 25 Parts Qualification Process (review due 1/9/2021)
  - SOP 6 Rail Drawing Guidelines and Procedures (review due 10/5/2018)
  - SOP 7 Parts Actions Form (PAF) (review due 7/9/2021)
  - SOP 12 Thermal Imagery (review due 2/7/2019)
  - SOP 13 Management Methodologies (review due 3/7/2019)
  - SOP 15 Rail Vehicle Retirement Disposal (review due 9/8/2018)
  - SOP 17 Railcar Parts, Assemblies and Processes Standard Specifications (last reviewed 1/25/2017)
  - SOP 18 Greenbelt Facility Building H, Safety & Emergency Procedures (review due 8/14/2017)
  - SOP 19 Data Collection, Measurements, Validation (review due 3/8/2021)
  - SOP 2 Engineering Request (ER) (review due 3/4/2021)
  - SOP 202-01 Engineering Modification Instruction (review due 4/20/2023)
  - SOP 202-03 Engineering Test Plan (ETR) (review due 4/20/2023)
  - SOP 202-08 Engineering Change Notice (review due 9/25/2022)
  - SOP 202-10 Daily Inspection - formerly DST (review due 10/5/2022)
  - SOP 202-11 CENV Incident Investigation Procedure (review due 7/7/2023)
  - SOP 202-16 Equipment Configuration Change (ECC) (review due 6/24/2023)
  - SOP 202-31 Mandatory Safety Training (review due 9/29/2022)
  - SOP 205-01 Test Track Use and Operation (review due 1/15/2018)
  - SOP 21 MSRPH Rule Compliance Checks of CENV Personnel (review due 11/14/2021)
  - SOP 22 CENV Computer Software Installation (review due 7/28/2018)
  - SOP 23 Capital Improvement Projects (review due 2/13/2020)
  - SOP 27 Configuration Management (review due 3/11/2021)
  - SOP 4 Maintenance Service Instructions (MSI) (review due 8/13/2021)
  - SOP 5 Engineering Service Bulletin (SB) (review due 1/17/2022)
  - SOP 202-09 Calibrations (review due 1/10/2019)
  - SOP 24 Managing Portable Test Units (PTU) Software Changes (review due 8/26/2020)
  - SOP 29 Vehicle Program Services (CENV) Incident Video Extraction and Archiving (last reviewed 6/5/2020)
  - SOP 30 Railcar Incoming Material Inspection (last reviewed 6/9/2020)
  - Draft SOP 201-31 Scheduled Maintenance Document (SMD) (Under development by ODCM)
  - SOP 503-01 Brentwood MRO Shop Building B Safety and Emergency Procedures (last reviewed 2/25/21)
  - SOP 503-01 New Carrollton S&I Shop Building E Safety and Emergency Procedures (last reviewed 7/10/20)
  - SOP 503-01 Shady Grove S&I Shop Building C Safety and Emergency Procedures (last reviewed 12/17/20)
  - SOP 503-01 West Falls Church S&I Shop Building B Safety and Emergency Procedures (last reviewed 12/10/20)
  - SOP 503-01 Alexandria S&I Shop Building 3201 Safety and Emergency Procedures (last reviewed 2/19/21)

- OAP 201-05 Policies for Controlling the Assignment and Utilization of WIBU Keys (review due 1/26/2023)
- OAP 606-01 New Vendor Qualifications for existing or new Railcar Parts to be inducted within the Vendor Qualification List (review due 1/9/2020)
- OAP 206-01 Equipment Testing and Performance Evaluation (last reviewed 10/26/2000)
- OAP 205-07 Procurement of All Fixed Rail and Non-Highway Use Rail Equipment (review due 11/23/2017)
- OAP 105-01 Railcar Engineering Change Documents & Reference Documents (review due 9/10/2016)
- OAP 101-01 Procedures for Inspection of Contractor Rail Vehicles for Roadway Usage (review due 1/8/2023)
- Derailment Investigation Procedure (originated 1/6/2014)
- List of CENV Approved Documents for all Rail Car series spreadsheet
- Forty-nine (49) CENV Rule Compliance Checks
- Twenty-seven (27) Monday Staff Meeting Minutes
- Calibration log spreadsheet
- List of CENV proper PPE per location for WMATA employees and contractors
- New Carrollton New S&I Shop floor plans
- Branch Avenue Fire Control System and Emergency Exit Location Map (no Rev, no date)
- SOP 202-18 Greenbelt Commissioning Building H Emergency Exit Routes and Layout, Rev0.0 (no date)
- COOP Annex Rail (updated 6/19)
- CENV COOP Plan, Phone Tree and Locations (updated 7/23/21)
- CENV Responsibilities Greenbelt Yard Commissioning Building H COOP Plan Activation Checklist (no date)
- Weekly Walkabout Checklist, Rev5, 9/26/19
- Monthly Environmental Compliance Checklist, Rev9, 9/26/19
- CENV Organizational Chart (updated 7/21)
- CENV Training Matrix (updated 7/20/21)
- Open and Close Maximo Work Orders for GBLT Commissioning Shop Safety Inspection spreadsheet (last entry 5/21/19)
- Excerpt of the awarded TMDE Calibration Contract from PRMT 06/15/2021
- WMSC's Audit of Revenue Vehicle (Railcar) Programs 09/14/2021
- PeopleSoft Enterprise Learning Management (ELM) database queries
- CENV Job Description in WMATA's Job Description Library
- HR-TA-P01-01 Competitive Recruitment Procedure Rev. 1, 09/27/19

Personnel Discussions

- Two (2) CENV Deputy Chief Mechanical Officers
- One (1) CENV Deputy Chief Engineer
- Two (2) CENV Assistant Manager
- One (1) CENV Sr. Program Manager
- Three (3) CENV Sr. Engineers
- Three (3) CENV Engineers
- One (1) CMNT Asst. General Superintendent (Safety Risk Coordinator)

Field Assessments

- Field assessments were conducted at the following locations:
  - Building H, at Greenbelt facility (Only areas of CENV's responsibility) – 9/3/2021
  - VMS Verification of railcars at Greenbelt and New Carrollton facilities – 9/28/2021

Applicable CAPs & iCAPAs Reviewed			
Open	- FTA-RED-16-003-B (September 2021)	- WMSC-21-C0084 (July 2024)	- WMSC-21-C0085 (July 2022)
Open	- WMSC-21-C0086 (January 2022)	- WMSC-21-C0087 (August 2022)	- WMSC-21-C0098 (June 2025)
Open	- WMSC-21-C0094 (February 2022)	- WMSC-21-C0096 (October 2021)	- WMSC-21-C0097 (October 2021)
Closed	- QICO-7K-17-01	- QICO-7K-17-02	- QICO-7K-17-03
Closed	- QICO-CENV-19-01	- QICO-CENV-19-02	- QICO-CENV-19-03
Closed	- QICO-CENV-19-04	- QICO-CRP-17-01	- QICO-CTE-17-01
Closed	- QICO-MRO-17-02	- QICO-NRKM-18-01	- QICO-RVCM-19-02
Closed	- FTA TOC-CMT-15-002	- FTA TOC-CMT-15-003	- FTA TOC-FIR-15-003
Closed	- CAP-R-4-27-a	- FTA-17-1-15	- NTSB R-10-20
Closed	- NTSB R-10-21	- NTSB R-10-22	- WMSC-21-C0092

2.3 WHAT WORKED WELL (WINS)

Wins are categorized by the System Safety Measures and rated by the Risk Assessment

W-CENV-21-01 Safety Management Policy **Owner – CENV**

✓ **Documentum, the application that CENV utilizes as their centralized documents repository, is well maintained, and updated, granting easy consultation and retrieval of documents.**

Discussion

- Documentum, the application that CENV utilizes as their centralized documents repository, is maintained, and updated by Overhaul Support and Document Configuration Management (ODCM). A workflow is also established within the application for proper transmission, distribution, signature approvals and tracking of documents.
- CENV's SOPs as verified by QICO reflects that all engineering documentation are stored and maintained in Documentum. Information gathered during interviews with CENV personnel, confirmed this.
- CENV stakeholders have utilized the application for needed reference documentation as well as providing signature approvals to engineering documentation processed in its workflow.
- Having an electronic repository for documentation provides assurance that only the latest documents are available for circulation.
- The use of SharePoint application in Documentum made it possible for ease of documentation access to anyone within WMATA.

W-CENV-21-02 Safety Management Policy **Owner – CENV**

✓ **Approved CENV engineering documentation spreadsheet is sent out weekly by CENV to its stakeholders, providing them with up-to-date information.**

Discussion

- ODCM provides weekly distribution of "Approved CENV Engineering Documents in Documentum" through email, keeping stakeholders informed of recent updates and modifications.
- The approved CENV Engineering Documents in the Documentum spreadsheet is a living document containing all approved CENV manuals and documents equipped with hyperlinks to their source documents in Documentum.
- QICO verified that no Documentum user account is required to access the files, as the SharePoint application was utilized to make it accessible to everyone within WMATA for read only access.

2.4 ITEMS RESOLVED DURING REVIEW

Items resolved are categorized by System Safety Measures

R-CENV-21-01 Safety Assurance **Owner – CENV**

CENV promptly addressed the workplace safety concerns, such as tripping hazards, missing labels on chemicals and expired eyewash solution at Greenbelt Building H.

Discussion

- Friday, September 3, 2021, QICO performed a field assessment at the Greenbelt facility on the areas under CENV responsibility within Building H, specifically the 2nd and 3rd floors and the ground floor in the area occupied by Kawasaki.
- Following the inspection, a report listing the identified safety issues was sent to CENV management to provide comments and address the hazards.
- On Thursday, September 23, 2021, CENV responded, listing the actions taken to correct the findings detailed on the report. CENV directly addressed most of the findings, however, the resolution of some of the hazards is responsibility of other departments/groups and CENV notified the entities accountable for the specific hazard.
- Timely identification and mitigation of hazards and properly maintained facilities, are essential elements to achieve a safe work environment.

2.5 AREAS FOR IMPROVEMENT

Findings are categorized by System Safety Measures and rated by the Risk Assessment

FS-CENV-21-01 Safety Assurance **3B Owner – CENV**

- **Performing regular workplace inspections helps reduce incidents, injuries, and illnesses, through the identification and recording of hazards for adequate analysis and timely mitigation.**

Discussion

- Monthly workplace safety inspections are required per PTASP section 3.7 "Facilities Management".
- The purpose of monthly safety inspections is to assure that hazards that may arise, are promptly identified, and the risk is mitigated through reporting it to the appropriate department (E.g. fire extinguisher missing the inspection sheet) or direct intervention (E.g. replenishing empty water container on eye wash stations or eliminating a tripping hazard).
- It is CENV responsibility to perform monthly inspections at the Greenbelt Building H facility, on the 2nd and 3rd floors and on the ground floor in the area occupied by Kawasaki. On July 2021, Kawasaki started operating out of the West Falls Church facility, and the shop area, on the ground floor of Building H, at Greenbelt is now utilized by CMNT. Kawasaki only kept a small portion of the ground floor space as storage.
- Applicable internal and external policies and requirements are:
  - PTASP 3.7 Facilities Management.
  - SOP 200-05 Hazard Communication.
  - Occupational Safety and Health Administration (OSHA) 1910.157 Portable Fire Extinguishers.
  - American National Standards Institute (ANSI) Z308 Class B First Aid Kit.
  - WMATA PTASP 4.8 Safety Communications.
- A CENV vehicle engineer had been performing those inspections at Greenbelt Building H, in their role as DCO (Deputy Environmental Compliance Officer), until mid-2019. Due to personnel availability and subsequently teleworking during COVID-19, they were unable to keep performing inspections, and, since then, nobody has been appointed as the responsible individual to take their place. As a consequence, since 2019, safety inspections have not been completed on the 2nd and 3rd floors and on ground floor in the area occupied by Kawasaki at Greenbelt Building H.
- The last entry on the spreadsheet used to track both safety and maintenance issues "Open & Close Maximo Work Orders for GBLT Commissioning Shop Safety Inspection", is dated May 21, 2019.
- Discussions with CENV personnel, revealed that there is some uncertainty regarding the role of CENV in performing safety inspections at Building H, not all managers or engineers were aware that it is CENV responsibility.
- During a field assessment performed at Greenbelt Building H, on Friday, September 3, 2021, QICO identified safety concerns, such as:
  - Improper labeling of chemical storage containers (Figure 1).
  - Expired and/or empty cartridge on eye wash stations (Figure 2).

Figure 1

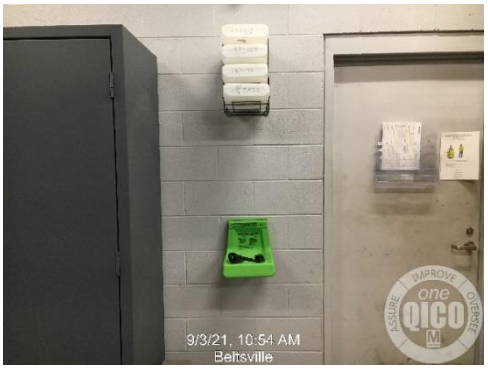


Figure 2

FS-CENV-21-01 Safety Assurance	3B Owner – CENV

- CENV management was aware of the discrepant eyewash stations, noting that the refill cartridges were out of stock across all WMATA storerooms at the time of the field assessment.
- Performing safety inspections on an established schedule is crucial to assure the safety of all employees. Through inspections, hazards are promptly identified and addressed, and it is assured that safety equipment are operating properly.

FS-CENV-21-02 Safety Assurance **3B Owner – CENV**

- **Proper Test, Measurement and Diagnostic Equipment (TMDE) calibration is important to promote the accuracy and reliability of the instrument. Accurate measurements are essential to the quality and safety of the activities performed by CENV.**

Discussion

- CENV engineers rely on precision test, measurement, and diagnostic equipment (TMDE) in performing their daily activities; specifically, in the development of engineering testing, modifications, and performance of incident/accident investigations to include derailments.
- TMDE is defined as "any system or device used to evaluate the operational condition of systems or equipment in order to identify or isolate any actual or potential malfunctions."
- To assure that any measurement/information collected with a TMDE is reliable, and the device can be trusted, the equipment must be periodically inspected and calibrated by a certified technician.
- A contract for the calibration of TMDE to fully meet the requirements of ISO 10012 or ANSI Z540.1 and/or ANSI Z540.3, had been awarded on June 15, 2021, to Electronic Laboratory (Contract ID: C20159-E-ER) and Tra-Cal, LLC (Contact ID: C20159-F-ER).
- CENV management, in response to the field assessment, prioritized engineering lab items to be sent for calibration.
- Per SOP 202.09 "Inspection and Calibration for Precision Measuring Devices" each device must show a label indicating the date of the last calibration and the date that a new calibration is due. A new revision of this SOP is in the process of being reviewed and approved. The new revision also requires a "No Cal Required" label if the device does not have a current calibration as defined in the inventory listing (this requirement was not present on the old revision of the policy). Additionally, CENV must maintain an inventory log of all the devices, with the following information:
    - Make, model and serial number of the device.
    - Whether or not calibration is required.
    - Date of last inspection.
    - Date of last calibration.
    - Time interval beyond which a new calibration is required for use for formal testing
- During a field assessment performed on Friday, September 3, 2021, at the Greenbelt facility, Building H, QICO inspected a sample of test, measurement and diagnostic devices stored in the CENV lab. Several devices were observed with a label indicating an expired calibration or without the label.
- CENV provided a calibration log with a list of one hundred (100) devices regularly utilized by CENV engineers. The log is missing crucial information required under CENV SOP 202.09, such as:
    - Whether or not calibration is required.
    - Date of last inspection.
    - Date of last calibration.
    - Time interval beyond which a new calibration is required for use for formal testing.
- If equipment is not properly inspected and calibrated, it will not give accurate measurements and its reliability will be compromised. The potential consequences are poor quality of the process, harm to other equipment and employees, costs and maintenance increase and unsatisfied customers.

FS-CENV-21-03 Safety Management Policy **3D Owner – CENV**

- **Maintaining current and controlled policies, procedures, and standards provide clear direction and result in more consistent process control.**

Discussion

- Maintaining controlled policies and procedures is essential for dependable outcomes and continued safe work practices. Additionally, they provide an invaluable resource for employees in performing their tasks.
  CENV stores their SOPs and OAPs on their website to be easily accessible and to provide clear instruction to employees.
- In reviewing CENV documentation, QICO identified twenty (20) documents, listed below with due dates in parenthesis, as past due for review. Some of these were due for review between 2016 and 2018, with one document last reviewed in 2000.

SOP 25 Parts Qualification Process (1/9/2021)	SOP 6 Rail Drawing Guidelines (10/5/2018)
SOP 12 Thermal Imagery (2/7/2019)	SOP 13 Management Methodologies (3/7/2019)
SOP 15 Rail Vehicle Retirement Disposal (9/8/2018)	SOP 17 Railcar Parts, Assemblies and Processes (1/25/2019)
SOP 18 Greenbelt Bldg H, Safety & Emergency (8/14/2017)	SOP 19 Data Collection, Measurement, Validation (3/8/2021)
SOP 2 Engineering Request (ER) (3/4/2021)	SOP 205-01 Test Track Use and Operation (1/15/2018)
SOP 22 CENV Software Installation (7/28/2018)	SOP 23 Capital Improvement Projects (2/13/2020)
SOP 27 Configuration Management (3/11/2021)	SOP 202-09 Calibrations (1/10/2019)
SOP 13 Management Methodologies (3/7/2019)	SOP 24 Managing PTU Software Changes (8/26/2020)
OAP 606-01 New Vendor Qualifications (1/9/2020)	OAP 205-07 Procurement of Rail Equipment (11/23/2017)
OAP 206-01 Equip. Testing & Performance Eval (10/26/2002)	OAP 105-01 Railcar Eng. Change Docs & Reference (9/10/2016)

- Of these eighteen (18) documents, CENV provided eleven (11) draft copies of documents in the process of being reviewed and updated, however some procedures have been outdated for up to 4 years, leaving a substantial gap.
- On CENV SharePoint webpage, QICO located a "Derailment Investigation Procedure", originated on January 6, 2014. No revision nor review dates are indicated on the document and there is no control number.
- Component and Overhaul Service (COS) and Schedule Maintenance Documents (SMD) are found in Documentum, however there is no procedure for the creation and management of these documents.
- The benefits of being able to rely on updated and easy to access processes, procedures and policies are the elimination of ambiguity in the practices to follow to complete a task, easier hiring and onboarding process, streamlined core processes and improved time management.

FS-CENV-21-04 Safety Assurance	3D Owner – CENV

- **Use of standardized templates is crucial in the creation of controlled records to verify all necessary information is registered.**

Discussion

- Proper records management gives clear guidelines to follow a defined and standardized process to produce documents as evidence of activities performed by CENV.
- Records must be standardized for easy completion and documentation that the work has been performed in accordance with established policies and procedures, and for easy retrieval of information.
- The incident/accident/derailment investigation reports, provided by CENV, are not completed using a controlled document nor do they follow a standard template to enter all the information collected during the investigation. This leads to reports not having a control number, revision and date, not following the same order in listing the information, having the same information listed under different titles or discrepancies in what information are listed between reports.
- Monday morning staff meeting minutes are not recorded using a controlled document. Attendance is not registered and occasionally some information is missing (E.g. Safety and Customer contacts for meeting on June 14, 2021).
- CENV's SOP 21 "MSRPH Rule Compliance Checks of CENV Personnel" aims to ensure standardized practices and responsibilities in carrying out Roadway Workers Protection (RWP) and Metrorail Safety Rules and Procedures Handbook (MSRPH) Compliance Checks are being complied with the CENV personnel.
  Though CENV had been conducting compliance checks based from the documents submitted and the interviews, QICO observed that records were not performed on a controlled document.

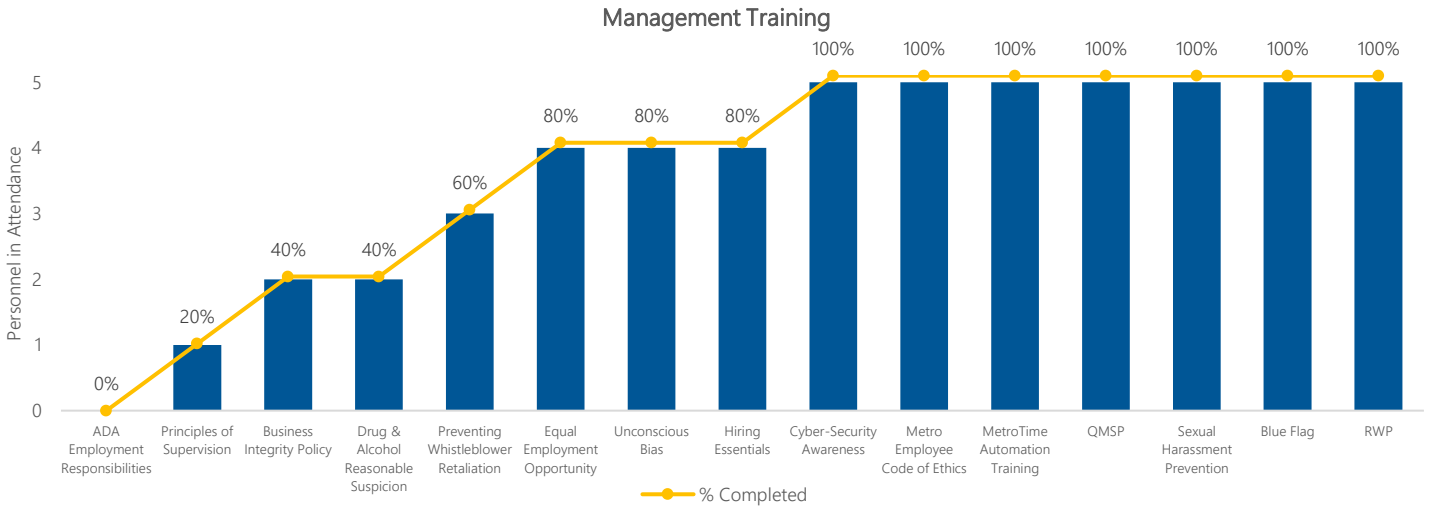
FS-CENV-21-05 Safety Promotion **3D Owner – CENV**

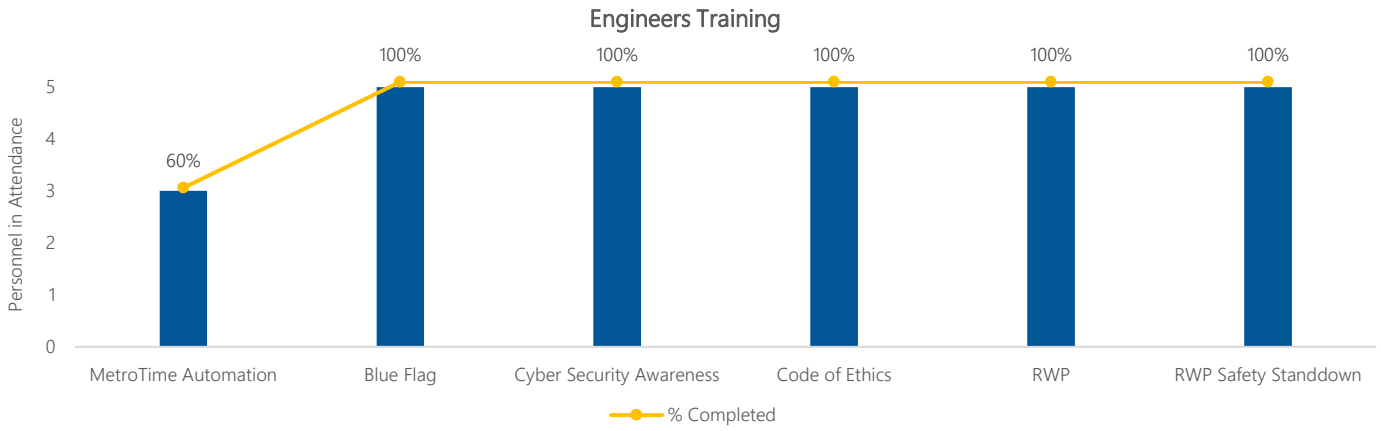
- **Availability of formal courses for employees to be trained for the specific tasks they perform, and maintaining an updated employee training log, helps improve operations, compliance, safety, and employee engagement.**

Discussion

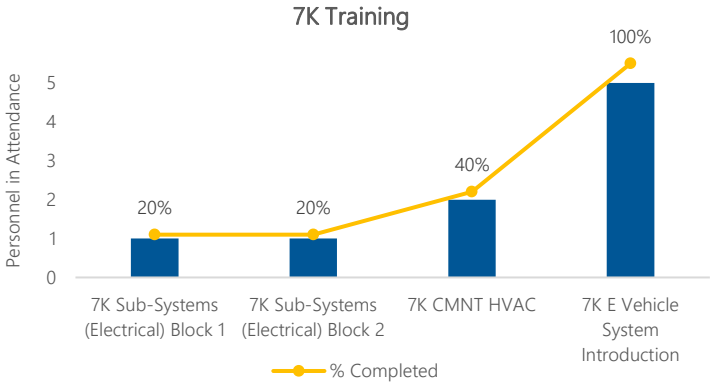
- Defining mandatory training that is applicable to CENV personnel and contractors promotes compliance to WMATA safety policies and procedures, helps expand employee's knowledge, develop and improve skills, and provides supervisors the ability to identify personnel qualified to perform specific tasks.
- The PTASP section 4.3 "Safety Rules and Procedures Training", strongly recommends management to attend WMATA Safety Management Course to provide knowledge of OSHA regulations, WMATA safety policies, procedures, and practices to develop effective safety programs at their facilities and work areas.
  QICO observed that no documentation of this training being completed is available, no communication nor a follow through from CMOR's Safety Risk Coordinator was in place and it is not listed as required training.
- CENV's SOP 202.31 "Mandatory Safety Training" requires that:
  - Personnel (employees and contractors) comply with Roadway Workers Protection (RWP) and Blue Flag Training as directed by the Authority.
  - A quarterly training audit is to be performed at a minimum to identify any overdue training. Its documentation is maintained and stored in CENV's electronic repository called Documentum with audit records kept for five years.
  - Training status for RWP and Blue Flag trainings must be recorded in a Training Log and it will be updated quarterly noting RWP or Blue flag compliance/non-compliance at the time of review.

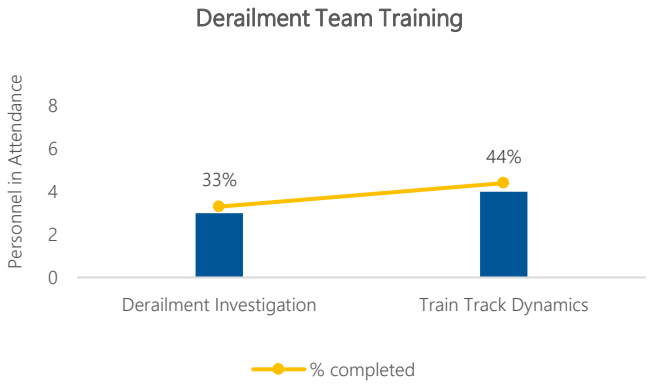
  Based on documents received and reviewed, no quarterly audit documentation had been provided and that only one employee was not compliant due to military leave.
- Training Log provided by CENV is missing some information (employee ID, ID expiration date, RWP sticker date on badge as well as contractors' RWP and Blue Flag).
- QICO randomly selected ten (10) CENV employees, five (5) engineers, of which two (2) are members of the derailment investigation team, and five (5) in management positions and reviewed their training records in Enterprise Learning Management (ELM). It was discovered that two (2) engineers have not attended the MetroTime Automation CBT yet (due March 5, 2021) and the remaining three (3) have not completed it on time. All five (5) engineers were in compliance with the required safety trainings.
  Likewise, although all the CENV employees in management positions were in compliance with the required safety trainings, some didn't complete all the WMATA mandatory required courses for supervisors/managers, as shown in the following charts.





- Training log provided does not contain any legacy fleet training.
- CENV provided a document listing nine (9) engineers members of the derailment investigation team and attendance records for a Derailment Investigation training and a Train Track Dynamics training, held respectively on March and October 2016. Through the review of these documents it was observed that only three (3) members of the derailment team attended the Derailment Investigation training and only four (4) attended the Train Track Dynamics training. Five (5) of the nine (9) derailment team members didn't receive any formal derailment training, as shown in the chart below. CENV management stated that after the 2016 trainings, there were some efforts to arrange for more derailment trainings sessions, however after the 2016 courses no additional training was available for employees.
- Through interviews with CENV personnel, it emerged that only few formal 7K training sessions have been offered, either provided by the vendor or internally. This information was confirmed through the examination of ELM data for the five (5) randomly selected CENV engineers. The outcome of the analysis of ELM data is shown in the chart on the left:





- Following an internal review performed by QICO in 2017, required action QICO-7K-17-02, states: "Establish a comprehensive strategy for training of maintenance techs and engineers. One that includes training on the use of on-board vehicle diagnostic and on-the-job training (OJT) from Kawasaki."
- The iCAPA was closed in 2020; however, many engineers did not have the opportunity to attend a formal training for the majority of 7K systems and they improved their competences by experimenting or sharing knowledge between employees.
- CENV stated that Kawasaki started a pilot training program, comments and feedback have been provided to Kawasaki and once the training program is finalized, engineers as well as WMATA maintenance employees will be scheduled to receive formal 7K training.

FS-CENV-21-06 Safety Risk Management	3D Owner – CENV

- **Development and continuous update of a Hazard Log/Risk Register contributes to the proper recording and assessment of all potential hazards and their associated risks, so that all responsible parties are identified, and effective mitigation responses are achieved.**

Discussion

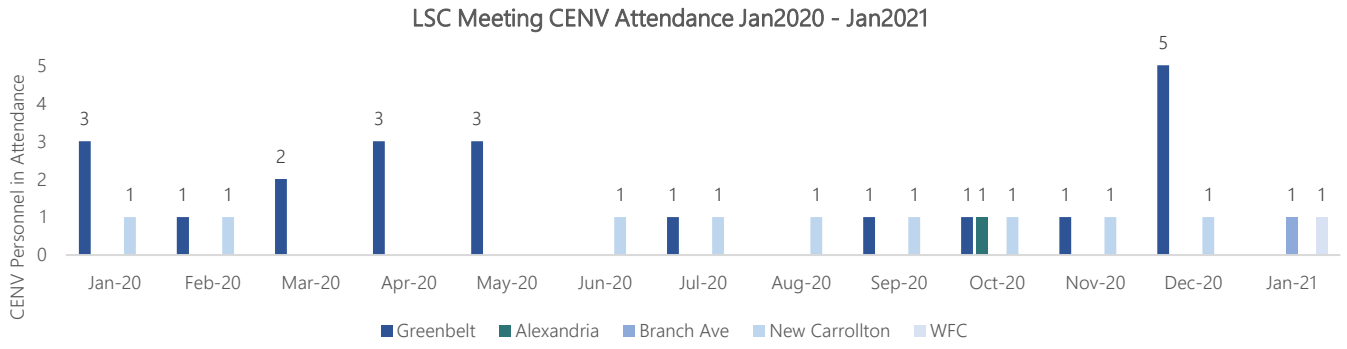
- Under the requirements of 49 CFR 673.25(a), transit agencies must develop and implement a Safety Risk Management (SRM) Process for all elements of the system. The Safety Risk Management process must be comprised of the following activities: Safety hazard identification, safety risk assessment, and safety risk mitigation.
- SRM applies to all elements of the public transportation system, including employees and contractors, infrastructure, vehicles and equipment, revenue, and non-revenue service activities. It may also include others who interact with the system, such as first responders or other local agency employees. SRM also feeds into the Safety Assurance process by evaluating changes that may impact safety performance. A periodic safety risk assessment can identify changes to operations and maintenance procedures, existing systems configuration or service, organization structure or resources, new capital projects, and other changes due to WMATA's internal and external environment.
- The Transit Agency Safety Plan (PTASP) section 2.10 states that each department is responsible for maintaining a hazard log or risk register for the following reasons:
  - Document its hazard and risk activities.
  - Track its risk and mitigations to ensure that no unacceptable risk is assumed due to error or omission.
  - Ensure that corrective action is developed, approved, and implemented as required by statute and the WMSC Program Standard.
  - Ensure the corrective action is adequate and appropriate by monitoring the mitigations to assure they effectively reduce risk and no new hazards are created.
- Through interviews with the Safety Risk Coordinator, CENV managers and engineers and reviewing the documents provided by CENV, it was determined that CENV does not maintain a Hazard Log or Risk Register.
- Although the PTASP has not been fully implemented, a Hazard Log or Risk Register was already a requirement in the System Safety Program Plan (SSPP).
- There was also no hazard or risk documentation provided for projects related to the legacy cars or the 7K series. The only document provided is a "8000 Series Railcar Risk Register" which clearly was in its early stages of development. The project risk register provided does not satisfy the requirements of the PTASP.
- An updated Hazard Log or Risk Register is an invaluable tool to identify and record hazards, its potential risk, associated severity of the consequences of the hazards, and prioritization of the hazards based on the safety risk to appropriately monitor and effectively minimize risk and the introduction of new hazards. Furthermore, a Hazard Log or Risk Register serves as a reference point to address recurring hazards with proven and effective mitigation strategies.

FS-CENV-21-07 Safety Risk Management **3D Owner – CENV**

- **Participating in all mandatory Safety Committee meetings helps reinforce safety standards, introduce new safety requirements, increase employee awareness of potential risks, and promote WMATA's safety culture.**

Discussion

- Local Safety Committee (LSC) meetings are held monthly at a shop, yard, building or operational groups level, and involve all departments operating in the facility, as well as representatives from the Department of Safety & Environmental Management (SAFE). The scope of the meetings is to discuss and address any safety or maintenance issues and as a way for employees to bring to the management attention any hazard, through their LSC representative.
- The Safety and Security Certification Review Committee (SCRC) meets monthly and is accountable for the overall implementation and approval of the certification documentation, as well as the oversight of program implementation to ensure that certifiable levels of operational safety and security items (i.e. system, subsystem and programs) are completed and verified prior to the start of new revenue service.
- Following an Internal Review that QICO performed in 2019, iCAPA QICO-CENV-19-02 was created. The iCAPA requires CENV Chief, Vehicle Program Services or designee to attend all SCRC meetings either in person or via conference call, and that LSC meetings will be attended by CENV management and non-management at yards with CENV representation (Greenbelt and New Carrollton). The requirements of the iCAPA were satisfied and consequently, it was closed in January 2020.
  However, based on information received from the Project Manager, Vehicles RAIL RQAW, we learned that "once the Office of Chief Mechanical Officer, Rail (CMOR) was created, that office assumed responsibility to attend the SCRC meetings and represent all offices under that umbrella". Consequently, CENV is not a voting member of SCRC any longer and does not have a requirement to attend their meetings. CMOR is regularly attending on behalf of CENV.
- Through the review of attendance logs from January 2020 to January 2021, QICO noted that CENV personnel did not attend all required LSC meetings at Greenbelt and New Carrollton facilities per iCAPA QICO-CENV-19-02.
  CENV attended 77% of the LSC meetings at Greenbelt and 70% at New Carrollton.
  QICO also took note of CENV's attendance in other shops with a CENV presence, as shown in the following chart. Brentwood and Shady Grove are not included in the chart due to no CENV personnel attendance.



- **A reliable Vehicle Monitoring System (VMS)/Event Recorder (ER) is essential for a complete data download and thorough analysis of a railcar systems' operation, particularly for incident/accident investigation.**

Discussion

- NTSB R-10-21 states that lead married pair of each train consist shall be equipped with an operating event recorder while NTSB-R-10-22 required to "develop and implement a program to monitor the performance of onboard event recorders and ensure they are functioning properly."
- SOP 202.11 for Rail Vehicle Incidents defines the incident investigation protocol for the minimum actions to be taken by the Vehicle Program Services (CENV) Back-up On-Call Vehicle & Offload Engineer in response to being notified of an incident or Offload/Delay involving Class 1 Rail Vehicles.
    - Section 6.3.4 states that except for the failure listed below, CMNT shall download the "extended" (.EXT) VMS (or ER data) files from each A-car of the Offload consist. The VMS files shall be uploaded into the Q://Offloads folder and CENV notified upon completion. NOTE: If unable to download the "extended" (.EXT) files, the .DAM and .FRA files must be downloaded from each VMS unit (located in A & B cars) in the consist.
        - No Brakes Off/Released failure – 2K/3K fleet only.
        - VMS (EXT Files).
        - H1-A Event Logs (*.EVT) from suspected cars, before running any self-test.
        - H1-A Stuck Brake (code 12) logs (*.DLT).
        - Any other logs (*.DLT) that have a count higher than 5 in the event log for codes '01' through '55'.
- Through information gathered during interviews with CENV personnel and the review of recent unusual occurrences investigation, QICO was made aware of the following:
    - All class 1 vehicles should have the event recorder or VMS.
    - VMS are currently being monitored on their performance routinely as part of the Preventive Inspection (PI) Procedure.
    - There are communication issues between certain railcar subsystems most predominantly the WABCO friction brake and the on-board Vehicle Monitoring System/Event Recorder on the unified 2K3K series railcars.
- On September 28, 2021, QICO performed a field assessment at Greenbelt and New Carrollton railyards confirming 10 out of 10 3K rail cars assessed were experiencing VMS communication issues on Doors, Heating Ventilation and Air Conditioning (HVAC), Propulsion and Friction Brake with the latter topping the list. Shown in Figure 3 below is a sample Vehicle Control Unit (VCU) display of the communication issue.

A. VCU Display Unit

B. Vehicle subsystems communicating properly with VMS (in blue)

C. Vehicle subsystems not actively communicating (in red)

Figure 3

- It was also found out that there were steps taken by CENV in collaboration with the manufacturer to address the concern however it was left unproductive in knowing that there was no guaranteed fix despite the proposed cost.
- Figures 4, 5, and 6 depict example e-mail communication for incident investigations showing the communication issue or missing input signals encountered:

Subject: RE: OFFLOAD #2, DELAY #2, 9-14-21, ID# 408, NO BRAKES OFF WHITE LIGHT CAR 3222 TRUCKS C/O, DELAY 12/9

After reviewing VMS and friction brake data, CMNT tech and CENV verified stuck brake failure occurred on front truck of car 3222. Failure was unable to be duplicated during troubleshooting.

Please perform the following:

- Inspect all connection points (pins and terminals) and wiring from H1-A to the front Digitrol.
- Report any issues with downloading VMS EXT files from 3222, as technician was unable to at the time of troubleshooting.

Please reestablish and verify VMS communications with the following systems:

- Friction Brakes – 3129, 3222, 3223, 3150, 3151
- ATC – 3128, 3150

Figure 4

Subject: RE: Unusual Occurrence - Station Overrun

Dear All.

IIT has completed the required VMS Data download and uploaded the data to Documentum. According to the initial review, there was no fault in the Logs that would have contributed to this incident.

Initial review also shows the following Front and Rear Friction Brakes were not communicating with the VMS at the Time of the Incident and CMNT must establish communication with the Friction Brake as follows;; BRFA-BCP, BRRA-BCP(Front and Rear Friction Brakes of A-Car not communicating) BRFB-BCP(Front Friction Brake of B-Car) not Communicating. Only (Rear Friction Brake of B-Car)BRRB-BCP was communicating.

Figure 5

Subject: RE: OFFLOAD # 2 / DELAY # 2, 10-4-2021, NO BRAKES RELEASE ATP ACTIVATED ON CAR 3166, DELAY 6/2

All,

VMS Data was reviewed for the consist, on 10/4 @ 10:40 the operator made many attempts to release the Brakes, but 3166 remained in B4. At this time, the R1-R4 rate lines remained low when the powering trainline transitioned to high. All prerequisite signals such as Doors Closed &Lock, Brake Applied, BP charged, Speed command present with no over speed detected checked good, and no ATC faults were detected. So, the interfacing circuits that may impact the R1-R4 rate lines should be further investigated.

Recommendations:

1. Move the master controller through all positions and verify all rate line responds correctly.
2. Troubleshoot the Master Controller input circuit, focusing on the KAEMR contact 2H & 2F and KADCKR contacts B5 & B6 which provides power to the R1-R4 rate lines. Check for improper voltage readings, abnormal resistance, loose connections and any other abnormalities.
3. Verify that the FSBR, KAEMR and KADCKR are seated properly.
4. Multiple Brake systems were not communicating, please reestablish communications with brake and all other sub-systems
5. **3154** TL 22 signal always remains low. Please troubleshoot signal going to the Dam Digital Input Board #1 replace if necessary and verify signal reports to VMS after replacement.
6. **No failures were found with 3044. Car can be released after communications has been reestablish with all systems and a successfully DI is completed.**

Figure 6

FS-CENV-21-08 Safety Assurance	3D Owner – CENV

- Though an alternative solution is in place in getting the data logs directly from the friction brake subsystem when it is unable to communicate with the VMS, it adds additional strain on the manpower to gather this information especially when all cars in the consist may have the same issue.
- Furthermore, not all CENV engineers are familiar nor trained on this Portable Test Unit (PTU) function as railcar training is not mandatory.
- Though the VMS VCU equipment has a crash hardened memory module, the other railcar subsystem equipment communicating to it doesn't which leaves equipment vulnerable to damage in a collision or other incidents potentially rendering the data inaccessible.

2.6 SUMMARY OF REQUIRED ACTIONS

QICO-CENV-21-01 | **Action Owner – CENV** | **Overall Risk – 3B**

Required Action: Meet or exceed standards for workplace safety inspection, safety committee participation, and hazard management processes defined in the Agency Safety Plan (PTASP).

Applicable Findings

- **FS-CENV-21-01: Performing regular workplace inspections helps reduce incidents, injuries, and illnesses, through the identification and recording of hazards for adequate analysis and timely mitigation.**
  - **Measure:** Safety Assurance. **Risk:** 3B
- **FS- CENV-21-06: Development and continuous update of a Hazard Log/Risk Register contributes to the proper recording and assessment of all potential hazards and their associated risks, so that all responsible parties are identified, and effective mitigation response are anticipated.**
  - **Measure:** Safety Risk Management. **Risk:** 3D
- **FS-CENV-21-07: Participating in all mandatory Safety Committee meetings will further engage personnel and promote WMATA's safety culture.**
  - **Measure:** Safety Risk Management. **Risk:** 3D

QICO-CENV-21-02 | **Action Owner – CENV** | **Overall Risk – 3B**

Required Action: Align training, inspection, process control, measuring & testing equipment, and document control management with organization-wide quality management system plan standards.

Applicable Findings

- **FS- CENV-21-02: Proper Test, Measurement and Diagnostic Equipment (TMDE) calibration is important to promote the accuracy and reliability of the instrument. Accurate measurements are essential to the quality and safety of the activities performed by CENV.**
  - **Measure:** Safety Assurance. **Risk:** 3B
- **FS- CENV-21-03: Current and controlled policies, procedures, and standards provide clear direction and result in more consistent process control.**
  - **Measure:** Safety Management Policy. **Risk:** 3D
- **FS- CENV-21-04: Proper documentation and use of standardized templates are crucial in the creation of controlled records to verify all necessary information is registered.**
  - **Measure:** Safety Assurance. **Risk:** 3D
- **FS- CENV-21-05: Availability of formal courses for employees to be trained for the specific tasks they perform, and maintaining an updated employee training log, helps improve operations, compliance, safety, and employee engagement.**
  - **Measure:** Safety Promotion. **Risk:** 3D

QICO- CENV-21-03 | **Action Owner – CENV** | **Overall Risk – 3D**

Required Action: Develop a solution to improve reliability of 2K/3K event recorder systems to comply with requirements of National Transportation Safety Board recommendation NTSB R-10-21.

Applicable Findings

- **FS- CENV-21-08: A reliable Vehicle Monitoring System (VMS)/Event Recorder (ER) is essential for a complete data download and thorough analysis of a railcar systems' operation, particularly for incident/accident investigation.**
  - **Measure:** Safety Risk Management. **Risk:** 3D

Internal Corrective and Preventive Actions (iCAPAs) are designated to address each Required Action listed above.

(3) Offices of Environmental Management and Compliance (EMAC) & Occupational Safety and Health (OSH)

Key Takeaway:

Documenting and implementing departmental processes that define existing core functions in alignment with the Public Transportation Agency Safety Plan (PTASP), will provide common understanding and consistent execution of essential departmental activities.

What is QICO?

- The Office of Quality Assurance, Internal Compliance & Oversight (QICO) is an internal management function that partners with other departments to provide an objective review, proactively identifying safety concerns and assuring compliance with rules and regulations. QICO's Internal Safety Review process is authorized by the General Manager as outlined in the Public Transit Agency Safety Plan (PTASP), and required per the Washington Metrorail Safety Commission (WMSC) Program Standard.

Why QICO Performed This Review:

- This internal safety review is intended to provide Metro senior management and WMSC with an assessment of EMAC and OSH operations, compliance with local, state, and federal safety regulations and Metro's PTASP, and promote the actions needed to address any concerns.

QICO's Methodology:

- Review relevant activities by identifying and assessing any processes subject to Safety Management Policy, Safety Risk Management, Safety Assurance, and Safety Promotion requirements as defined in the PTASP.
- Review documentation, observe processes, and interview personnel.
- Issue findings and required actions based on risk rating utilizing the MIL-STD-882E standard.

Wins:

- ✓ EMAC and OSH actively support the COVID Clean program.
- ✓ EMAC proactively engages external services for environmental permit regulatory inspections.
- ✓ EMAC conducts preparatory internal reviews prior to state and federal audits.

Areas for Improvement:

- Development of documented departmental procedures is necessary for consistent safety oversight within all processes.
- Conducting further investigations after identifying chemical hazards can lead to identification of root cause and lead to mitigation or elimination of the hazards.
- Implementing all aspects of the Fatigue Risk Management Policy can lead to a reduction of fatigue related incidents across all job functions.
- A documented training matrix which includes required departmental safety training is essential to ensure personnel are incorporating safe practices within their assigned work.
- Performing internal SMS compliance audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.
- Creating and maintaining a comprehensive collection of Job Hazard Analyses will promote a safe work environment by identifying specific hazards and mitigations prior to the start of the task.

Required Actions:

- **QICO-SAFE-22-01:** Develop and implement documented processes for all EMAC core functions. (Overall Risk 3D)
- **QICO-SAFE-22-02:** Identify and define all OSH core functions; develop and implement documented processes for each. (Overall Risk 3D)
- **QICO-SAFE-22-03:** Develop and implement a root cause analysis investigative requirement and process. (Overall Risk 3D)
- **QICO-SAFE-22-04:** Develop an OSH specific training matrix. (Overall Risk 4D)
- **QICO-SAFE-22-05:** Revise PTASP (Rev. 2.0), section 4.1.2, to clarify SMS audit requirements. (Overall Risk 3D)
- **QICO-SAFE-22-06:** Facilitate the development and maintenance of a library of JHAs that are available to all employees. (Overall Risk 3C)

Note: An itemized internal Corrective and Preventive Action (iCAPA) is developed for each required action to achieve effective and measurable resolution of identified concerns. To check the status of iCAPA implementation go to https://www.wmata.com/initiatives/transparency

3.1 FUNCTIONAL OVERVIEW AND STRUCTURE

Offices of EMAC and OSH Internal Safety Review (ISR)

The Offices of Occupational Safety and Health (OSH) and Environmental Management and Compliance (EMAC) are within the Department of Safety (SAFE), responsible for establishing and maintaining a safe environment for all employees and customers through the direction, oversight, development, and implementation of a system safety program utilizing a Safety Management System (SMS) approach.

EMAC oversees Metro's environmental management programs and compliance with federal, state, and local environmental laws and regulations. All Metro employees are responsible for environmental compliance and expected to incorporate this commitment into daily activities and functions.

OSH supports the Metro organization through occupational safety and training oversight, safety committee support, safety communications, and promotes compliance with applicable codes, regulations, and laws. The office assists in developing safety policies, programs, and performing hazard analyses. OSH also has a Safety Training team responsible for scheduling and facilitating Occupational Safety and Health Act (OSHA) and National Safety Council-recognized training courses for all offices at Metro, with additional safety training through Metro's Enterprise Learning Management (ELM) system.

Due to a recent reorganization (effective Nov. 2021) the SAFE Data Team was relocated from OSH to the Safety Assurance Office. This office manages safety performance metrics, regulatory reporting requirements, and hazard management for Metro. The SAFE Data team also includes a team of data analysts that support offices across the agency with managing and understanding potential trends and hazards within their organization. As part of this ISR, QICO conducted interviews as an overview of these former OSH functions.

Figure 1

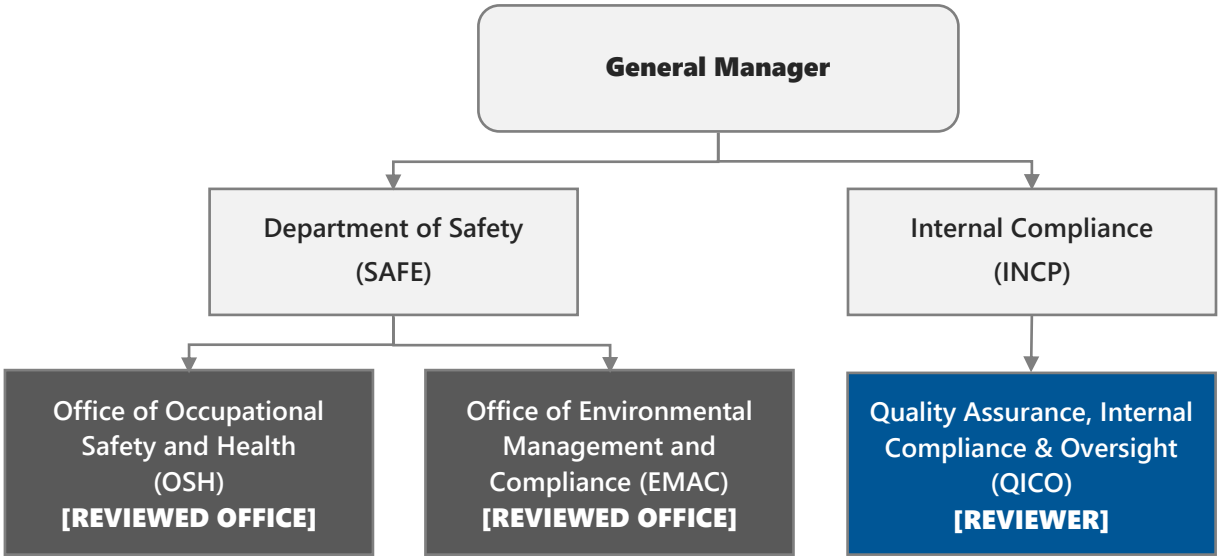
The objective of the Environmental Management and Compliance (EMAC) & Occupational Safety and Health (OSH) ISR is to internally validate the existence of documented safety-related processes and conformance to those established processes, performed under the purview of EMAC and OSH, and owned and maintained by Metro in accordance with the standards mentioned above.

Metro's Public Transit Agency Safety Plan 2020 (PTASP) establishes the requirements for systematically identifying, evaluating, and minimizing safety risks throughout all components of the Metrorail, Metrobus, and MetroAccess systems. This ISR will be conducted in accordance with the PTASP 2020, the WMSC Program Standard, the Federal Transit Administration (FTA) 49 CFR part 674, and other applicable federal and regional requirements.

WMATA's PTASP defines specific safety management, safety risk, safety assurance and safety promotion components, all of which are identified as applicable for the scope of this review.

Organizational Structure and Background

Within Metro, the Offices of Environmental Management and Compliance (EMAC) & Occupational Safety and Health (OSH) report to the General Manager through the Department of Safety and Environmental Management (SAFE). As shown in the organization chart, QICO is independent of this function, reporting to the General Manager through Internal Compliance (INCP).



3.2 REVIEW SCOPE

Documentation Review

- Metro Public Transit Agency Safety Plan (Ver 1.0, 10/2020)
- Metro Public Transit Agency Safety Plan (Rev. 2.0, 10/2021)
- Offices of OSH and EMAC organizational charts, 11/2021
- SAFE departmental organizational chart, 11/2021
- Local Safety Committee trackers 8/2021-10/2021
- Standard Operating Procedure (SOP) 200-03 Rev 1 Confined Space Entry Program, 3/6/2020
- SOP 200-04 Rev 0 Lockout Tagout Program, 4/16/2020
- SOP 200-05 Rev 0 Hazard Communication, 4/15/2020
- SOP 200-06 Rev 0 Exposure Control Plan, 4/17/2020
- SOP 200-07 Rev 1 Contractor Roadway Worker Protection (CRWP) Training, 3/6/2020
- SOP 700-ROCC-ADM-21-00 Rail Operations Control Center (ROCC) Safety Management System Manual, 7/23/2021
- SOP 700-ROCC-ADM-26-00 ROCC Internal Assessment Process, 7/23/2021
- 2021 CRWP attendance records
- 2021 Transportation Safety Institute (TSI) attendance records
- Fiscal Year 2021 OSHA Recordable Injuries & Rate Comparison
- Executive Safety Committee Meeting Minutes and roster, 7/2021–9/2021
- Scope of work, task 21-05 Air Quality Compliance Support, 7/2021
- Annual Stormwater reports, 7/2020-6/2021
- 2019 Hazardous Waste Biennial Reports
- Environmental Compliance Officer (ECO) monthly reports, 8/2021-9/2021
- ECO/DCO training records, 2019-2020
- Facility chemical usage records, 5/2021- 7/2021
- Hazardous material disposal records, 8/2021
- 2021 Environmental Management Policy and Manual
- Environmental Standard Operating Procedures for ECOs and DCOs, 10/2021
- Air quality compliance report, 5/2021
- Appendix H, IDDE Inspection Materials, WMATA Maryland MS4 Permit.
- Safety Bulletin (SB) #21-12b- Requesting Cleaning/ Disinfection after COVID-19 Exposure.
- SAFE COVID Clean Process Management System (CCPMS) Reviewer Guide Dec 2021

Personnel Discussions

- Deputy Chief, Safety Risk Management
- Deputy Chief, ENV Industrial Hygiene
- Deputy Chief, Safety Assurance
- Deputy Chief, Safety Certification
- Director, Safety Data Analytics
- Director, Operations Safety
- Manager, Construction Safety
- Manager, Corporate Safety/Analytics
- Manager, Environmental Engineering
- Manager, Environmental Services
- Chemical Safety Liaison
- Environmental Services Engineer
- Environmental Technician
- Environmental Compliance Officer
- Safety Officer, Rail
- Facility Environmental Compliance Officers

Field Assessments

- Field assessments were conducted at the following locations:
  - Dupont Circle Metrorail Station, 12/21/2021 – safety officer inspection and oversight
  - Landover Bus, 12/16/2021 – underground storage tank overview
  - Landover Metrorail Station, 12/22/2021 – stormwater management inspection
  - Telegraph Road support facility, 12/07/2021 – chemical usage spot-checks
  - Rockville Metrorail Station, 1/10/2022 – safety survey walkthrough with manager of construction safety

Applicable CAPs & iCAPAs Reviewed

Open	- **WMSC-19-C0008a** - **Metrorail does not currently have an effective hours of service policy** - **Issued 11/2019** - **Due 9/2020**	- WMSC-19-C0008b - Metrorail must develop and implement an effective hours of service policy as part of an overall fatigue management program. - Issued 11/2019 - Due 8/2022	- **QICO-MATM-19-01** - **Develop a documented process pertaining to storage, handling, and transportation of hazardous materials.** - **Issued 4/2019** - **Due 12/2021** ***(Change request for date extension currently under review)***
Closed	- TOC-OSP-15-004 - Monitor air quality within battery charging room at West Falls Church CMNT facility. - Closed 9/2016	- TOC-RWP-15-015 - Monitor air quality before, during, and after welding operations. - Closed 12/2016	

3.3 WHAT WORKED WELL (WINS)

Wins are categorized by the System Safety Measures and rated by the Risk Assessment

W-SAFE-22-01 Safety Risk Management **Owner – SAFE**

✓ **EMAC and OSH actively support the COVID Clean program.**

Discussion

- The COVID Clean program is a leadership-driven joint effort between SAFE and the Office of Plant Maintenance (PLNT) for the notification, cleaning, and disinfection of work areas after an employee or contractor reports COVID-19 infection. This program began in April 2020.
- SAFE established a standard for when to perform additional disinfection based on Centers for Disease Control (CDC) guidelines and performs the review on incoming requests for disinfection. PLNT then dispatches contractors to perform disinfection.
- EMAC and OSH (along with others throughout SAFE) perform the review of incoming notifications and/or requests.
- This procedure is documented as SAFE CCPMS Reviewer Guide Dec 2021. Organizational-wide notice for employee information circulated as SB #21-12b: Requesting Cleaning/Disinfection after COVID-19 Exposure.

W-SAFE-22-02 Safety Assurance **Owner – EMAC**

✓ **EMAC proactively engages external services for environmental permit regulatory inspections.**

Discussion

- The Maryland Department of the Environment (MDE) issues an environmental permit for state and federal non-industrial facilities (over five acres) for stormwater discharge/runoff. Metro has 23 rail stations within Maryland subject to this permit requirement. There are no similar requirements in Virginia or DC.
- EMAC/SAFE retains a contractor (KCI) to conduct annual inspections of these stations. The inspection process consists of observing stormwater runoff during a short-term drought at various locations on the property. Any runoff is noted, sampled, and tested to determine if this water is the result of an illicit discharge.
- As part of this ISR, QICO observed this inspection at the Landover Metrorail station on December 22, 2021.
  - Both KCI personnel were current with their CRWP certification.
  - QICO observed KCIs' process of opening a manhole, sampling the observed water flow, and testing this sample to determine if it constituted an illicit discharge.
  - This sample was determined to be normal groundwater seepage and had been noted in previous inspections.
  - The procedure for this inspection is documented as Appendix H, IDDE Inspection Materials, WMATA Maryland MS4 Permit.
- KCI reports directly to the EMAC group. They do not report to any external agency. EMAC provides results and observations to MDE as part of its annual Stormwater Report, as required by permit.

W-SAFE-22-03 Safety Assurance	Owner – EMAC

✓ **EMAC conducts preparatory internal reviews prior to state and federal audits**

Discussion

- When notified of an upcoming inspection or audit by an external regulatory agency (ex. MDE) EMAC will conduct a pre-inspection at that location to identify and rectify any apparent issues.
- EMAC will also be on-site during the inspection/audit to provide any technical support that may be required.
    - This includes EMAC Subject Matter Experts (SMEs) for the areas of Underground Storage Tanks (USTs), Stormwater Management, Environmental Services, Hazardous Materials (HazMat) storage/disposal, and chemical usage approvals.
- EMAC personnel conduct spot-checks at facilities to ensure that the resident Environmental Compliance Officers (ECOs) and Deputy Compliance Officers (DCOs) are maintaining all required on-site records and other documentation as required by permit or other regulation.

3.4 AREAS FOR IMPROVEMENT

Findings are categorized by System Safety Measures and rated by the Risk Assessment

FS-SAFE-22-01 Safety Assurance **3D Owner – EMAC and OSH**

- **Development of documented departmental procedures is necessary for consistent safety oversight within all processes.**

Discussion

- Maintaining and controlling a set of processes is readily recognized as an essential activity for departments that perform inspections or directly operate transit service and are subject to strict regulatory requirements (QMSP 3.5).
- The responsibilities, procedures, and documents comprising the Quality Management System (QMS) apply to all offices, departments, and projects within the Metro's responsibility (2020 PTASP 3.3; 2021 PTASP 4.1.1)
- Through key personnel interviews and document reviews, QICO observed that EMAC creates and provides Standard Operating Procedures (SOPs), programs, manuals, and guidelines for external departments, but do not have current processes or procedures specifically for functions within their offices.
- Examples of core functions observed:
- EMAC:
  - *Approved chemical products*: QICO accompanied an EMAC Environmental Technician as they conducted a spot-check inspection for approved chemicals in use at the Telegraph Road facility. This was an unannounced inspection.
    - A random sample of chemical products were selected from a storage cabinet and checked through the EMAC Safety Data Sheet (SDS) approval portal.
    - Any unapproved products were listed, and a report was sent to the facility Environmental Compliance Officer (ECO). The ECO is then expected to submit the product for approval or properly dispose of the product.
    - Follow up may include verification of the SDS request for approval or verification of a Hazardous Materials Disposal request.
    - All the steps required to conduct the inspection were explained and demonstrated to QICO. The process was well-executed; however, there is no documented procedure or work instruction that details this process.
  - *Environmental compliance oversight*: Environmental Compliance Officers (ECOs) and Deputy Compliance Officers (DCOs) are required to complete an initial ECO training module, then an annual refresher training.
    - This training is monitored but not enforced by EMAC. The individual ECO/DCO is responsible to maintain their own compliance by attending the annual refresher training.
    - If an ECO/DCO misses the refresher training, they are expected to re-take the initial ECO/ DCO training class.
    - The Monthly Environmental Compliance Checklists are completed by the ECOs and submitted to EMAC for their review. A tracker is maintained and reviewed by EMAC to monitor progress and promote resolution.
    - QICO observed these processes, but they are not documented.
  - *Spill reporting*: When any type of hazardous material is spilled on any Metro property, it is reported to the Maintenance Operations Center (MOC).
    - Spills may be reported by the first person at the scene, supervisors, or facility ECO, dependent on the material or size of spill.
    - MOC then arranges with PLNT for cleanup, and EMAC for support. Dependent on the type of material or size of spill, external agencies may need to be notified.
    - EMAC maintains records of all notable spills, which include work orders opened by MOC for cleanup activities, and any external agency notifications and further correspondence.
    - These documents are retained in a local "spill binder"; EMAC is looking into creation of SharePoint sites to archive data for review and trend analysis.
    - There is no documented procedure or work instruction that details this process.

FS-SAFE-22-01 Safety Assurance **3D Owner – EMAC and OSH**

- OSH- As previously described, SAFE has restructured to better align with the core principles of SMS. During this process, many of the functions previously under the purview of OSH have moved to other offices within SAFE. OSH is currently redefining their roles and responsibilities as it relates to its remaining core functions. Once these tasks are completed, documented processes for each function can be developed.
- Documented processes for EMAC and OSH core functions would define specific roles, responsibilities, process steps, timelines, and records retention that would foster consistency and accuracy of essential job activities and to assure repeatability over the course of time.

FS-SAFE-22-02 Safety Assurance **3D Owner – EMAC**

- **Conducting further investigations after identifying chemical hazards can lead to identification of root cause and in turn mitigation or elimination of the hazards.**

Discussion

- As part of the chemical spot check inspections, EMAC reports to the facility ECOs with a listing of unapproved products that were found. QICO reviewed the documentation of four spot check inspections (May, June, July, and December 2021) from separate facilities and noted the following data (Figure 2):

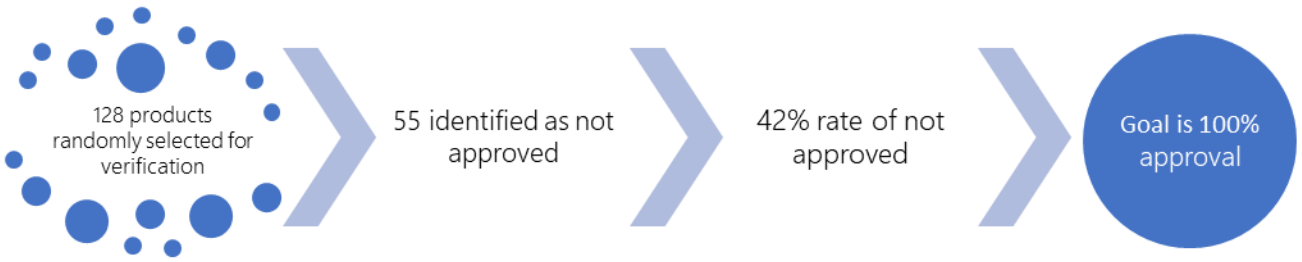


Figure 2

- According to Operations Administrative Procedure (OAP) 200-05, the responsibility falls on:
  - PRMT to assure all chemical products procured meet SAFE approval
  - Site level managers and supervisors to procure only chemical products that have been approved by SAFE and ensure that all chemical products used by contractors have been approved by SAFE.
- The monthly ECO compliance checklist has a section for hazardous material storage, but it does not require checking for SDS approval for each product. (Figure 3).

2.	MATERIAL STORAGE AREAS			
a. Are all materials stored properly and labeled correctly?				
i.	Flammables stored in flammables cabinets?	Yes	No	N/A
ii.	Liquid containers labeled, closed, and on spill pallets?	Yes	No	N/A
iii.	Incompatible chemicals segregated (e.g., acids/bases)?	Yes	No	N/A
iv.	Spray bottles labeled?	Yes	No	N/A

Figure 3

- The PTASP section 4.11 (2021 PTASP 5.2.3) states that "SAFE may conduct site visits where chemicals are being used to ensure that workers are aware of the hazards and that they are using the proper PPE."

  - Non-conformances that arise during these inspections do not require a root cause analysis as to the origin of the non-approved product(s).
- Creation and implementation of a root cause investigation process conducted jointly with SAFE, PRMT, and the affected departments would serve to identify and eliminate the origin path of non-approved products.

FS-SAFE-22-03 Safety Risk Management 2C **Owner – OSH**

- **Implementing all aspects of the Fatigue Risk Management Policy can lead to a reduction of fatigue related incidents across all job functions.**

Discussion

- Under the WMSC finding being addressed through CAPs C0008-A and C0008-B, WMATA is required to develop and implement an effective hours of service policy as part of an overall fatigue management program.
- Fatigue Risk Management Policy P/I 10.6/1 was released in August 2020 and is currently the governing document.
- The WMSC completed and released a Safety Audit of Fitness for Duty Programs (August 31, 2021) which includes Fatigue Risk Management (FRM). This audit noted deficiencies in the areas of:
  - The FRMS Steering Committee referenced in Section 5.01 has not convened.
  - Section 5.04 specifies that individual departments must establish processes for self-reporting fatigue, but no departments yet have this policy.
  - There is no collection of fatigue data for analysis and action as described by Section 5.05.
  - WMATA has ceased the fatigue management training (Dec. 2020) outlined in Section 5.06 that was provided to the WMSC.
  - Overall reports on hours-of-service compliance and trends listed in Section 5.07 are not available.
- Through interviews and document reviews, QICO determined:
  - FRM oversight tasks are no longer directly under the purview of OSH. Due to a recent restructure of SAFE, FRM oversight will be conducted in the office of Safety Risk Management. Fatigue Data analysis will be conducted by the Office of Safety Assurance.
  - The position of Fatigue Risk Manager is currently vacant.
  - The FRM Steering Committee has not yet convened.
- FRM data analysis is not yet fully implemented. For hours-of-service data, SAFE is working with IT to define metrics for reporting. SAFE will also analyze fatigue-related incident data and events flagged by the WMSC.
  - Analysis results were previously distributed through Cognos; however, this has currently ceased. SAFE is currently looking to setup a dashboard system in near future, featuring an automated retrieval system.
  - There is currently no mechanism in place to collect, analyze, or track contractor FRM data.
  - An FRM program is not being implemented at this time, partially due to ongoing union arbitrations for conflicts between 2020 policy and current Collective Bargaining Agreements (CBAs).
- This finding will be addressed by closure of previous issued WMSC CAP WMSC-19-C0008, and new CAPs issued from the aforementioned *Fitness for Duty* Audit, WMSC-21-C0120 & WMSC-21-C0121.

FS-SAFE-22-04 Safety Promotion **4D** **Owner – OSH**

- **A documented training matrix which includes required departmental safety training is essential to ensure personnel are incorporating safe practices within their assigned work.**

Discussion

- As stated in the PTASP section 4.6, (2021 PTASP 5.1.5) it is the responsibility of each department head (or designee) to develop and maintain a training matrix for each role within their department. Periodic notifications are sent to supervisors if required courses are not completed within the required period.
- QICO requested a training matrix for EMAC and OSH positions. While EMAC was able to provide a training matrix for review, OSH did not furnish one to QICO.
- Existence of a departmental safety training matrix identifies the various staff roles and the relevant training needs for each role. Maintaining an established training matrix promotes a culture of safety and validates the qualifications of all personnel.

FS-SAFE-22-05 Safety Management Policy **3D** **Owner – SAFE**

- **Performing internal SMS compliance audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.**

Discussion

- Per PTASP 3.4.3, each department and functional area will annually audit its own SMS compliance (i.e., its safety policy compliance) to ensure that hazards are identified and addressed through the SRM process.
- Safety risk mitigations are monitored through this audit process by persons trained and qualified to do so through safety promotion activities, including progress toward achieving safety targets. Each department must have a procedure to perform this activity, which is implemented by its properly trained and qualified Safety Risk Coordinators, with the assistance of SMEs, and the oversight and assistance of QICO or SAFE to ensure compliance (2020 PTASP 3.4.3, 2021 PTASP 4.1.2.3)
- During interviews with OSH and Safety Data Analytics, and through the absence of any supporting documentation, QICO determined that this internal audit process does not yet exist. SAFE has recently restructured to better align with the principles of SMS. As such, the various offices within SAFE are working to develop the internal processes that will collect and analyze safety data. These offices stated that once these processes are in place, the internal auditing process can be developed and implemented.
- Through further discussions and feedback during the closing meetings with the stakeholders, it was determined that the intent of this PTASP requirement is that the departmental Safety Risk Coordinators (SRCs) will conduct these audits within their respective departments and offices, with SAFE providing guidance and oversight. SAFE's office of Operations Safety Oversight will provide this function. SAFE has agreed that clarification of this section of the PTASP is warranted.
- Internal compliance auditing can help departments identify weaknesses in regulatory compliance and create paths for continuous improvement, with the goal of reducing or mitigating safety risk.

FS-SAFE-22-06 Safety Risk Management **3C** **Owner – OSH**

- **Creating and maintaining a comprehensive collection of Job Hazard Analyses will promote a safe work environment by identifying specific hazards and mitigations prior to the start of the task.**

Discussion

- Information on hazards and safety risks relevant to employees' roles and responsibilities is primarily conveyed through Job Hazard Analyses (JHAs).
- JHAs are conducted by SAFE and operational departments using the Occupational Health and Safety Administration's (OSHA) methodology, in concert with SMEs and/or the Safety Risk Coordinator of that area. JHAs are maintained on the

SAFE internal website and are reviewed and updated whenever new processes are introduced (2020 PTASP 4.9, 2021 PTASP 5.2.1)

- A review of the available Job Hazard Analyses, as found on the SAFE web page, shows that there are a limited number of documents stored, all outdated. The following JHAs were identified by QICO:
  - 30 JHAs for jobs related to Automatic Train Control Maintenance (ATCM), created in November 2017.
  - 23 JHAs for jobs related to Track and Structures Maintenance (TRST), created between November 2017 and April 2018.
- During interviews with OSH, QICO found that available JHAs were created as a project in 2017. They were initially created by a contracted source and posted on the SAFE page. The project stalled and has not progressed beyond this point. OSH stated that this is known area for improvement, but no further actions have taken place to date.
- QICO did find construction contractor related and project specific JHAs retained on the web application ProCore. The construction safety group verifies the presence of job specific JHAs for each project and will attach copies of the JHA as supporting documentation when documenting (via inspection reports) job site discrepancies.
- Job Hazard Analysis is a technique that focuses on job tasks as a way to identify hazards before they occur. Supervisors can use the findings of a job hazard analysis to eliminate and prevent hazards in their workplaces.
- Formal hazards and resulting mitigations identified as part of the Safety Risk Management component should be available for employees to query by location and/or department through the risk register/hazard management database. This will foster increased safe practices while conducting any jobsite activities throughout the WMATA system.

3.5 SUMMARY OF REQUIRED ACTIONS

QICO-SAFE-22-01 | **Action Owner – EMAC** | **Overall Risk – 3D**

Required Action: Develop and implement documented processes for all EMAC core functions

Applicable Findings

- **FS-SAFE-22-01: Development of documented departmental procedures is necessary for consistent safety oversight within all processes.**
  - **Measure:** Safety Assurance **Risk:** 3D

QICO-SAFE-22-02 | **Action Owner – OSH** | **Overall Risk – 3D**

Required Action: Identify and define all OSH core functions; develop and implement documented processes for each

Applicable Findings

- **FS-SAFE-22-01: Development of documented departmental procedures is necessary for consistent safety oversight within all processes.**
  - **Measure:** Safety Assurance **Risk:** 3D

QICO-SAFE-22-03 | **Action Owner – EMAC** | **Overall Risk – 3D**

Required Action: Develop and implement a root cause analysis investigative requirement and process

Applicable Findings

- **FS-SAFE-22-02: Conducting further investigations after identifying chemical hazards can lead to identification of root cause and lead to mitigation or elimination of the hazards.**
  - **Measure:** Safety Assurance **Risk:** 3D

QICO-SAFE-22-04 | **Action Owner – OSH** | **Overall Risk – 4D**

Required Action: Develop an OSH specific training matrix

Applicable Findings

- **FS-SAFE-22-04: A documented training matrix which includes required departmental safety training is essential to ensure personnel are incorporating safe practices within their assigned work.**
  - **Measure:** Safety Promotion **Risk:** 4D

QICO-SAFE-22-05	Action Owner – SAFE	Overall Risk – 3D

Required Action: Revise PTASP (Rev. 2.0), section 4.1.2, to clarify SMS audit requirements

Applicable Findings

- **FS-SAFE-22-05: Performing internal SMS compliance audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.**
  - **Measure:** Safety Management Policy **Risk:** 3D

QICO-SAFE-22-06	Action Owner – OSH	Overall Risk – 3C

Required Action: Facilitate the development and maintenance of a library of JHAs that are available to all employees

Applicable Findings

- **FS-SAFE-22-06: Creating and maintaining a comprehensive collection of Job Hazard Analyses will promote a safer work environment by identifying specific hazards and mitigations prior to the start of the task.**
  - **Measure:** Safety Risk Management **Risk:** 3C

Internal Corrective and Preventive Actions (iCAPAs) are designated to address each Required Action listed above.

(4) Track Maintenance and Inspection

Key Takeaway:

Following established Standard Operating Procedures and Work Instructions would enhance work production, product delivery and a safer work environment.

Wins:

- ✓ Creation and appointment of an investigation manager position helped in streamlining the SMS log closeout process and increased efficiency.
- ✓ Completion of RWP quality control checks by TRST supervision assures employee safety in the roadway.

Items Resolved During the Review:

- ✪ Performing regular inspections of temporary support structures assures safety for personnel and customers

Areas for Improvement:

- Following established safety protocols and procedures when operating or working around track equipment reduces risk to employee safety
- Consistent communication between the Equipment Operator and the Vehicle Flag Person while operating on track equipment supports a safe working environment
- Following track repair work instructions would support quality work and consistent results
- Utilizing a specific tool for a particular job activity reduces the risk of work-related injuries
- Completing exception forms for Heat Ride inspections according to governing documentation provides traceability and verification of compliance
- Performing regular tool and equipment inspections prior to work initiation demonstrates effective hazard mitigation and reduces the potential for injuries
- Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner
- Verifying safety equipment certification before use would maintain compliance and validate equipment performance

Required Actions:

- **QICO-TRMN-21-01:** Enforce safety procedures in the MSRPH and SOPs to protect employees, passengers, and WMATA property. (Overall Risk – 1C)
- **QICO-TRMN-21-02:** Enforce established work instructions and SOPs when performing routine maintenance and inspections to provide a safer work environment and support quality standards. (Overall Risk – 3C)
- **QICO-TRMN-21-03:** Assure the availability of the proper tools for specific jobs and routine inspections. (Overall Risk – 3C)
- **QICO-TRMN-21-04:** Revise and update TRST governing documents as per OAP-108-02. (Overall Risk – 4C)

What is QICO?

- The Office of Quality Assurance, Internal Compliance & Oversight (QICO) is an internal management function that partners with other departments to provide an objective review, proactively identifying safety concerns and assuring compliance with rules and regulations. QICO's Internal Safety Review process is authorized by the General Manager as outlined in the Public Transit Agency Safety Plan (PTASP), and required per the Washington Metrorail Safety Commission (WMSC) Program Standard.

Why QICO Performed This Review:

- This internal safety review is intended to provide Metro senior management and WMSC with an assessment of TRST's compliance with local, state, and federal safety regulations and Metro's PTASP, and promote the actions needed to address any concerns.

QICO's Methodology:

- Review relevant activities by identifying and assessing any processes subject to Safety Management Policy, Safety Risk Management, Safety Assurance, and Safety Promotion requirements as defined in the PTASP.
- Review documentation, observe processes, and interview personnel.
- Issue findings and required actions based on risk rating utilizing the MIL-STD-882E standard.

Note: An itemized internal Corrective and Preventive Action (iCAPA) is developed for each required action to achieve effective and measurable resolution of identified concerns. To check the status of iCAPA implementation go to https://www.wmata.com/initiatives/transparency

4.1 FUNCTIONAL OVERVIEW AND STRUCTURE

Track Maintenance and Inspections

The Office of Track and Structure (TRST) is responsible for inspecting, maintaining, and rehabilitating all revenue and yard tracks. WMATA employs a multifaceted strategy involving both automated and manned track inspection methods to ensure the track integrity for over 485 miles of mainline track, 327 mainline switches and 365 of yard switches (Figure 1). WMATA track inspections focus on detecting and categorizing defects in the roadway including defects to the track components, track-bed, third rail assets and tunnel water ingression issues. Other assets which naturally reside in the track (e.g. switch machines, station platforms, aerial structures, etc.) are maintained by other groups (e.g. ATC maintenance, structures maintenance, etc.). Track maintenance focuses on maintaining the track components, track-bed, third rail assets and tunnels to ensure a safe and reliable system.

This Internal Safety Review (ISR) is an assessment of the track maintenance and inspection activities and does not include the Switch Machine activities as they were covered in the Switch Machine Internal Review performed in June 2021.

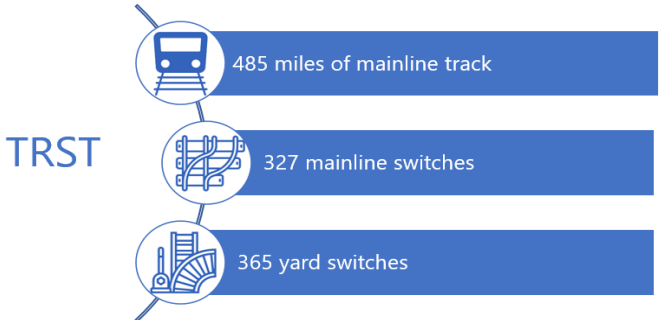


Figure 1: TRST Assets

To ensure a safe and a timely daily commute for WMATA customers and enhance the condition of the tracks and structures, TRST comprehensively perform the following activities (Figure 2):

- Track Walkers: Track Walkers inspect the entire Metrorail system on-foot twice weekly to detect track defects and tunnel water ingression.
- Track Geometry Vehicle (TGV) inspection: Maintenance of Way Engineering (MOWE) utilizes TGV which is a staffed inspection vehicle that precisely logs track geometry and ultrasonically tests (UT) every linear foot of track. The entire Metrorail system is currently scanned twice yearly for track geometry issues. In addition, TGV ultrasonically tests the entire Metrorail system's running rail annually. MOWE provides the UT and Non-Testable Rail data to TRST for their use and action.
- Track Components: track components such as switches, fasteners, running rail and crossties, and direct fixation track are replaced throughout the Metro Rail System.
- Track Rehabilitation: Track rehabilitation is performed to address major backlogs of Corrective Maintenance (CM).

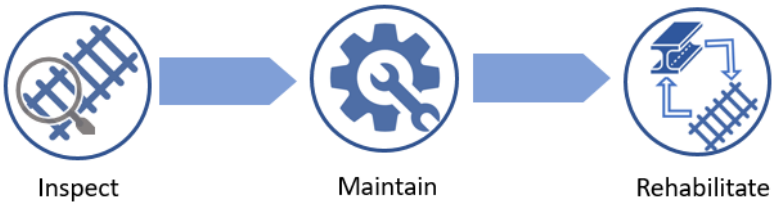


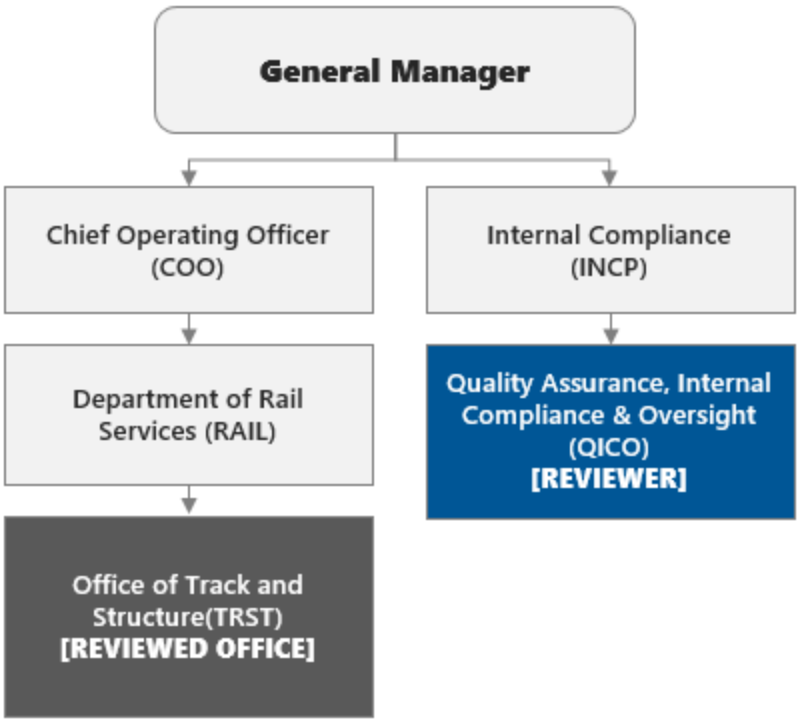
Figure 2: TRST business functions

The objective of this TRST ISR is to internally assess the identification and mitigation of hazards, promote safety and validate compliance of maintenance and inspection practices and procedures for track components in accordance with but not limited to the following:

- WMATA Public Transportation Agency Safety Plan (PTASP) Rev. 2(10/08/2021)
- WMATA Quality Management System Plan (QMSP) Rev. 1.3 (08/07/2018)
- WMATA Quality Management System Plan (QMSP) Rev. 2.0 (09/20/2021)
- SOP 208-04_TRST Track Inspection Rev.1.0 (01/16/2020)
- SOP 208-05_TRST Internal Safety Equipment Calibration Rev. 0 (02/09/2016)
- SOP 208-15_TRST Quality Control Procedures Rev. 0 (12/08/2020)
- OAP 108-02_TRST Document Control Policy Rev.0 (04/28/2020)

Organizational Structure and Background

The department of TRST reports to the Chief Operating Officer (COO) through the Department of Rail Services (RAIL). As shown in the Organization Chart, QICO is independent of this function reporting to the General Manager through Internal Compliance (INCP).



4.2 REVIEW SCOPE

Documentation Review

- RAIL Continuity of Operations Plan (COOP) (Rev 1, 10/01/2021)
- TRST Organizational Chart (05/26/2021)
- TRST-1000 Track Inspection Safety Standards (Rev. 1, 03/19/2021)
- TRST-2000 Maintenance Control Program (MCP) (Rev. 7, 01/21/2021)
- SOP 108-01_TRST Roadway Workers Protection Compliance Check Procedure (Rev. 0.0, 02/09/2016)
- SOP 108-03_QA – Track Inspection (Rev. 2.0, 09/10/2018)
- SOP 208-03_Ultrasonic Testing Defects and Non-Testable Rail (Rev. 0.0, 05/12/2020)
- SOP 208-04_TRST Track Inspection Procedures (Rev. 1.0, 01/16/2020)
- SOP 208-05_TRST Internal Safety Equipment Calibration (Rev. 0, 02/09/2016)
- SOP 208-06_TRST Heat Ride Inspection Procedures (Rev. 1.0, 01/12/2021)
- SOP 208-09_TRST Rail Lubricator Preventive Maintenance (PMI) and Inspection Procedure (Rev. 0.0, 09/15/2020)
- SOP 208-11_TRST Roadway Maintenance Machine Radio Intercom Headset System Testing (Original, 03/28/2017)
- SOP 208-12_Temporary Roadway Equipment, Material and Debris Storage and Removal (Rev. 2.0, 04/23/2021)
- SOP 208-14_Establishing and Maintaining Positive Communication Between Equipment Operator and Flag Person of Class II Vehicles (Original, 04/24/2017)
- SOP 208-15_TRST Quality Control Procedure (Rev. 0, 12/08/2020)
- SOP 208-18_TRST Track Bed Cleaning Preventive Maintenance (PMI) Procedure (Rev. 0.0, 09/25/2020)
- SOP 23_Class II Vehicle (Work Trains) Operations (Ver. 1.2, 10/12/2013)
- OAP 108-02_TRST Document Control Policy (Rev. 0.0, 04/28/2020)
- OAP 121-01_Track Asset Condition Data Management (Rev. 02, 09/20/2019)
- SOP 800-01 Incident and Accident Investigations of RAIL and BUS (Rev.4 06/30/2021)
- WITK 700.3.1_CWR Rail Installation on Direct Fixation Track (Rev. 0, 05/22/2020)
- WTIK 700.4.1_CWR Rail Installation on Ballasted Track (Rev. 0, 05/21/2020)
- WITK 700.4.3_Destressing of Existing CWR (Rev. 0, 05/15/2020)
- WITK 700.4.7_Destressing Procedures for 3-Inches or Less Pull-Aparts or In-Track Rail Break Gaps-Thermite Welds (Rev. 0, 4/10/2020)
- WITK 700.5.1_Thermite Welding of Running Rail (Rev. 0, 06/23/2020)
- WITK 701.1_Torque Studs and Clip Bolts on Direct Fixation Track (Rev. 6, 02/20/2020)
- WITK 701.2_Stud Replacement Core Drilling and Setting of New Anchor Studs on Direct Fixation Track (Rev. 0, 05/21/2020)
- WITK 701.6_Replacement of Grout Pads – Bottom Up Construction (Rev. 1, 07/15/2020)
- TRST Training Records for 5 employees (12/13/1999 – Current)
- TRST Track Inspection Records (07/01/2021 – 07/30/2021
- TRST Division I and Division II Personnel List (07/01/2021)
- TRST 6 Month SMS Injury Report (07/01/2021)
- TRST QC Reports (08/05/2021)
- TRST Lube and Interlocking Inspections (08/05/2021)
- TRST RWP Compliance Checks; June – October 2021
- TRST Quality Control Level I and Level II Checks July – October 2021
- TRST Heat Ride Inspection Spreadsheets June – Aug 2021
- LVEM Preventative Maintenance Inspection (PMI) Lighting Inspection and Re-lamping of WMATA Facilities Quarterly and Annually Inspection (Rev. 4, 07/19/2021)

Personnel Discussions

- Two (2) TRST Assistant General Superintendents
- Two (2) TRST Superintendents
- One (1) TRST 689 Equipment Operator
- One (1) TRST 689 Track Repairer
- Two (2) TRST 689 Track Inspectors
- One (1) TRST Compliance Manager

Field Assessments

- Bethesda (A09) to Friendship Heights (A08) (08/26/2021)
- Naylor Rd (F09) (08/31/2021)
- Largo Town Center (G05) (09/24/2021)
- Stadium Armory (D08) – Benning Road (G01); D&G Junction (D98) – Deanwood (D10) (09/30/2021)
- D&G Connector (D98) (10/01/2021)
- Cheverly Station (D11) (10/14/2021)
- Congress Heights (F07) (10/15/2021)
- Branch Avenue Yard (F99) (11/18/2021)
- New Carrolton Yard (D99) (11/18/2021)

Applicable CAPs & iCAPAs Reviewed

Closed	- WMSC-19-C0023 Due Date: 11/04/2020	WMATA must assign a specific person (and an alternate) to record actual ambient temperatures every day of the late spring, summer, and early fall to ensure that the agency conducts and documents heat-ride inspections.
Closed	- WMSC-19-C0031 Submitted Date: 04/16/2021 (under WMSC review)	TRST must institute a step for regular management review of the Supervisor quality control checks to ensure they are being completed as required.
Open	- WMSC-19-C0033 Submitted Date: 12/10/2021 (under WMSC review)	WMATA must adjust TGV data spreadsheets and/or Maximo to log the repair of any detected defects and open work orders for any outstanding defects that need to be repaired or monitored.
Open	- WMSC-20-C0042 Due Date: 06/24/2022	WMATA must develop a procedure or checklist to ensure all work equipment is checked and inspected prior to use and ensure that there is enough certified safety equipment available to meet all RWP requirements for each work crew.
Open	- WMSC-21-C0071 Submitted Date: 12/23/2021 (under WMSC review)	Metrorail must develop and implement procedures that ensure all department work together to establish uniform procedure and to identify and fully rectify issues.
Open	- WMSC-21-C0088 Due Date: 11/18/2022	Metrorail must institute sufficient, specific, specialized certification training and standards to operate each type of RMM and must provide that training and certification to each equipment operator for the type(s) of RMM that operator uses.
Open	- WMSC-21-C0091 Due Date: 02/23/2023	Metrorail must conduct an analysis to determine the necessary number of fully trained and certified operators on each type of RMM for safe operations and continued safety-related maintenance or construction work.

4.3 WHAT WORKED WELL (WINS)

Wins are categorized by the System Safety Measures and rated by the Risk Assessment

W-TRMN-21-01 Safety Risk Management – Hazard Resolution and Tracking **Owner – TRST**

✓ **Creation and appointment of an investigation manager position helped in streamlining the Safety Management System (SMS) log closeout process and increased efficiency.**

Discussion

The Safety Management System (SMS) log tracks accidents and incidents from the time they are reported until the investigation is completed. The purpose of SMS is to identify unsafe and safe working conditions, locate and investigate hazards, and identify and analyze trends. Per SOP 800-01 Incident and Accident Investigations of RAIL and BUS, "Investigations in SMS must be completed within 30 days from the occurrence of the event, provided all necessary investigatory evidence is available."

- Through employee interviews and TRST SMS data reviewed of incident records and witness statements from 01/01/2021 through 06/30/2021, QICO noted the following:
  - SMS indicates that TRST investigations are completed and closed within 20 days or less. Data reviewed indicated that the average SMS log closure was 8.7 days over a 6 months period (Figure 3).
- TRST created the Investigation Manager Position in 2019 to perform the following activities which has helped the SMS closure rate.
  - Obtain recordings surrounding the incident
  - Review all witness statements
  - Interview all involved employees
  - Develop findings and lessons learned

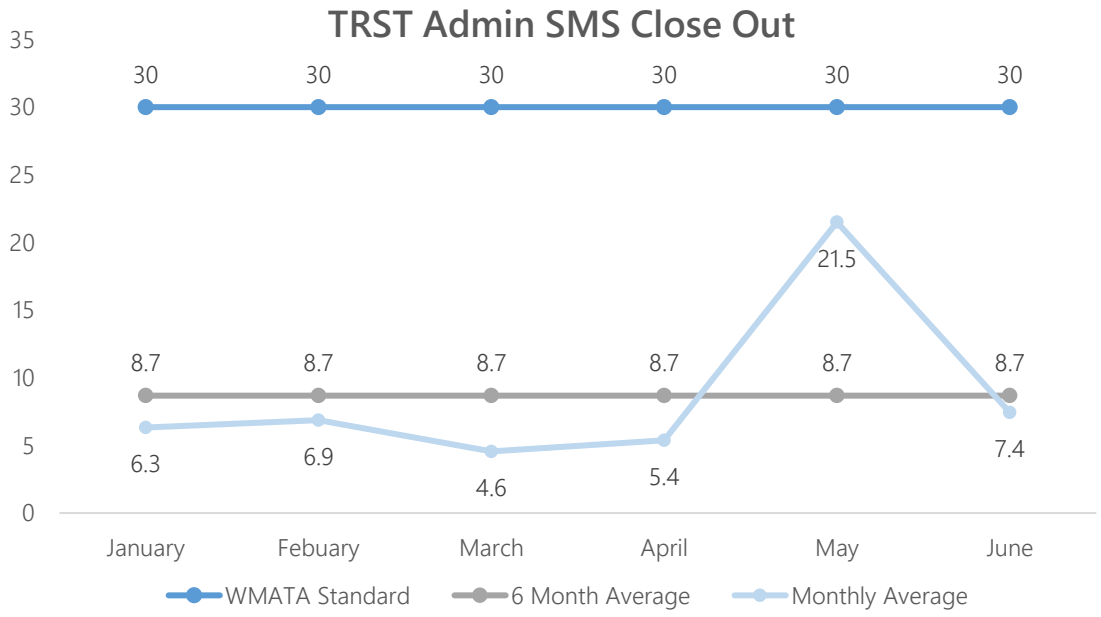


Figure 3: SMS Close-out data

Closing SMS logs earlier than the standard requirements promotes and reflects the department's commitment to safety in the workplace.

W-TRMN-21-02 Safety Assurance – Compliance	Owner – TRST

✓ **Completion of Roadway Worker Protection (RWP) quality control checks by TRST supervision assures employee safety in the roadway.**

Discussion

SOP 108-01 and SOP 208-15 list the requirements for TRST management to maintain compliance with Roadway Worker Protection (RWP) and Quality Control (QC) checks, respectively. The requirements are based on rank and/or division and performed on a weekly and monthly basis.

QICO evaluated TRST's RWP Level I, II, and III compliance check entries from 07/01/2021 to 11/01/2021 and verified entries were made to fulfill the number and frequency requirements in accordance with SOP 108-01

Corrective Action Plan (CAP) WMSC-19-C0031: This CAP identifies the issue of quality control checks and the proper review to make sure they are completed as required and has issued Required Actions to be completed no later than 04/16/2021. This CAP was submitted for closure on 12/10/2021 and is under review by WMSC.

4.4 ITEMS RESOLVED DURING REVIEW

Items resolved are categorized by the 15 Core QMS Standards

R-TRMN-21-01 Safety Risk Management – Hazard Resolution and Tracking Owner –TRST

Performing regular inspections of temporary support structures assures safety for personnel and customers.

Discussion

Hazard identification and analysis is an important part of WMATA's Public Transit Agency Safety Plan (PTASP) and is the responsibility of all WMATA employees. Per the PTASP Section 2.4, proactive hazard identification "involves actively seeking to identify hazards and mitigating them effectively before adverse events occur."

- During a field assessment evaluating TRST maintenance practices on 10/14/2021 at Cheverly Station, QICO observed the following:
  - A series of 6 jacks and 2" x 6" boards used to support a deteriorating section of the platform edge at Cheverly Station, Track 1. The temporarily supported granite edges included granite edges 40 and 41 on the outbound platform (Figure 4). QICO noted there are other locations at Cheverly Station platform on similar temporary supports which are still intact. QICO requested immediate attention for this particular section to prevent a potential failure of the support system and the granite edge it is supporting.
- QICO drafted and disseminated a report of the field assessment to the stakeholders and followed up with Structural Inspections (STIN) team to perform a special inspection and rectify the issue. QICO noted that STIN performs frequent special inspections of all platform edges that are still on temporary supports until the platforms are rehabilitated.
- On 12/23/ 2021, QICO was informed that STIN performed a special inspection of the platform edges at Cheverly station on 12/21/2021. While STIN is in the process of creating Maximo work orders to mitigate similar issues at other locations on the platform, photo evidence (Figure 5) was provided to QICO verifying granite edges 40 and 41 were repaired and stabilized until planned rehabilitation of the platform.

Figure 4: Cheverly Station platform as of 10/14/2021

Figure 5: STIN evidence of temporary structures support reinforcement (photo courtesy of STIN)

The Cheverly Station platform is scheduled for rehabilitation in Phase 4 of the WMATA Platform Project to begin in the Summer of 2022.

FS-TRMN-21-01 Safety Risk Management - Compliance 1C Owner – TRST

- **Following established safety protocols and procedures when operating or working around track equipment reduces risk to employee safety.**

Discussion

Working around stationary or moving track equipment without mitigating hazards beforehand could lead to serious injury or fatal incidents. Per Metrorail Safety Rules and Procedures Handbook (MSRPH) Section 5.2.1, WMATA Cardinal Rule #3 states "There shall be a dedicated Watchman/Lookout any time there is rail vehicle movement within any work zone."

- While conducting a night shift field assessment of TRST maintenance on 10/14/2021 outside Cheverly Station (D11), QICO observed the following (Figure 6):
  - Personnel were loading removed sections of rail onto a flat car using a Prime Mover (PM) and a crane. The PM operator was controlling vehicle movement from the rear station and operating the crane simultaneously. Dividing the operator's attention with personnel working around moving equipment increases the potential of an accident.
    - QICO reviewed the existing MRSPH, TRST governing documents and equipment operating rules, and found no guidance to verify what distance personnel must keep from moving equipment in a work zone.
  - During the equipment move, there was no dedicated Watchman/Lookout in place to warn personnel of any other moving or incoming equipment.
  - TRST upper management was notified of these safety concerns at the IR monthly update meeting held on 10/19/2021. The issue was discussed in further detail and feedback was provided before QICO distributed the daily observation report for those field activities.

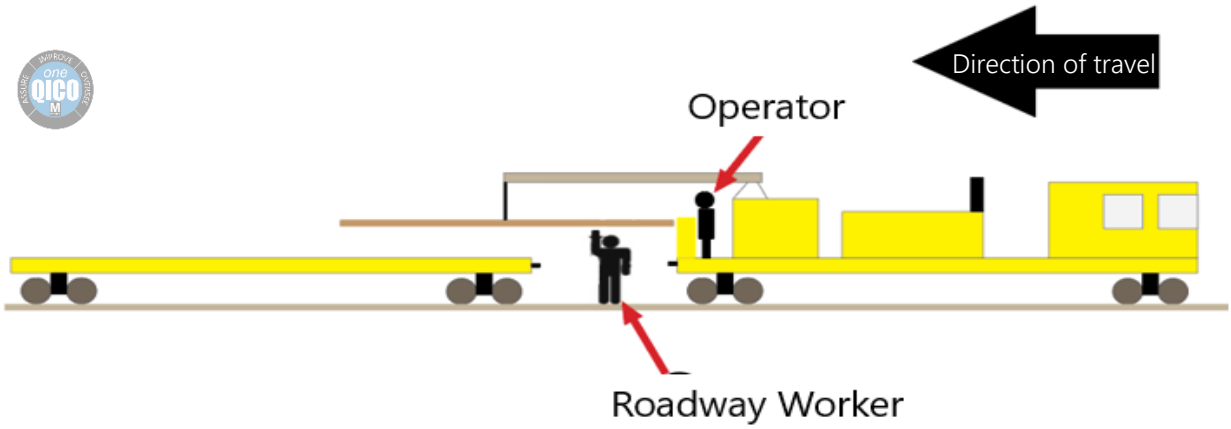


Figure 6: Illustration of the operation

Exposing personnel to hazardous situations may be avoided by following established procedures in assigning the proper number of personnel to perform all required duties to safely complete necessary maintenance work.

- **Consistent communication between the Equipment Operator and the Vehicle Flag Person while operating on track equipment supports a safe working environment.**

Discussion

While operating on track equipment it is crucial that the operator is continually aware of track conditions ahead of them. It is just as important that personnel working in the area are aware of the approaching on-track equipment. SOP 208-14 Equipment Operator/Flag Person Positive Communication, Section 6 details the procedures for an Equipment Operator and Vehicle Flag Person when a piece of on track equipment is operated from other than the lead end. Specifically, it states regular communication from the Vehicle Flag Person to the Operator that the track ahead is clear and confirmation from the Operator to the Vehicle Flag Person that communication is received and understood. Should communication be lost, either the Equipment Operator or Vehicle Flag Person would bring the vehicle to a complete stop.

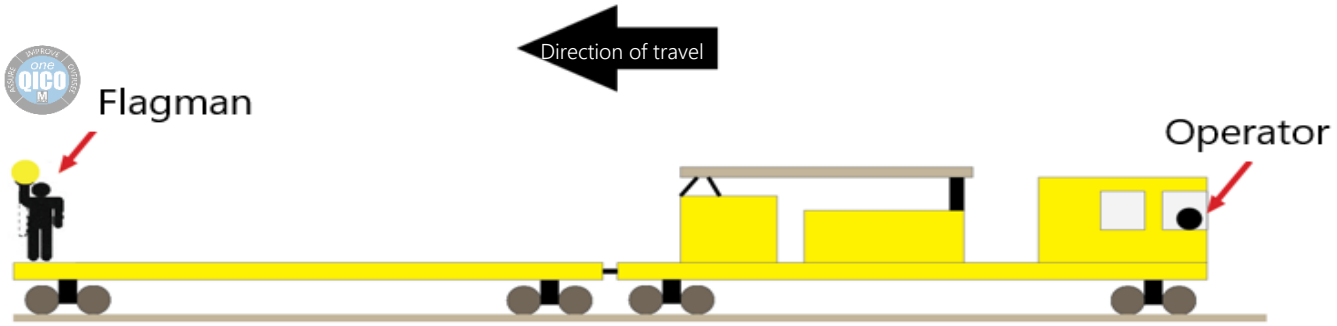


Figure 7: Illustration for the Flagman and Operator

- SOP 23 Class II Vehicle (Work Trains) Operations Section 23.5.5.3 states, "Class 2 Operators shall sound horns through stations." This notification gives advance warning to any personnel on the station platform that equipment is approaching the station.
- While conducting night shift field assessments of TRST maintenance during 10/14/2021 on the Orange Line(D-Line) and 10/15/2021 on the Green Line (F-Line), QICO observed the following:
  - Throughout the shift, communication was not regularly maintained between the Operator and Vehicle Flag Person when the Prime Mover (PM) and flat car were operated from a direction other than the lead end (i.e. in reverse). When communication was established, it was only conveyed periodically through the use of hand signals using a WMATA flashlight (Figure 8).
  - QICO observed a radio system installed on the PM that would enable the Operator and Flag Person to establish positive communication (i.e. communication that is confirmed by the receiving party with a verbal repeat back) using a wireless headset; however, there were no headsets on board the PM at the time of QICO's assessment.
  - During the course of the shift, QICO noted that neither the Operator nor the Flag Person would consistently sound the horn when approaching a station platform.

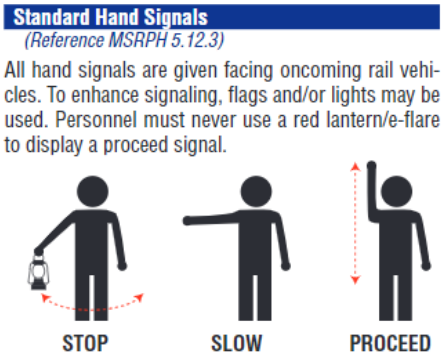


Figure 8: WMATA Hand Signals

Positive communication between the Operator and the Flag Person when moving/operating on track equipment from other than the lead end of the PM would be maintained to ensure the safety of all personnel both on and off the equipment as referenced in SOP 208-14. Without positive communication, the operator is unable to verify a path free of hazards including obstacles and personnel. Furthermore, sounding the horn on approach to a station alerts personnel in or around the station platform of the arrival of equipment to the platform area.

- **Following track repair work instructions would support quality work and consistent results.**

Discussion

Assuring personnel follow work instructions when performing maintenance is vital to ensure that maintenance is performed correctly, safely, and consistently across the system.

QICO conducted a night shift field assessment of TRST maintenance on 10/15/2021 outside of Congress Heights Station (F07), Track 1, between Chain Markers F1 255+00 – 300+00 and observed the following:

- Per WTIK-701.2 Stud Replacement Core Drilling and Setting of Anchor Studs on Direct Fixation Track, Section 12.3 specifies that core drilled holes are to be filled to ½ the total depth. Additionally, Section 12.3.25 states that personnel are to "Allow 1-hour for the adhesive epoxy to cure before torqueing the anchor stud nuts, allow for a strong bond between the inserted studs and existing core drilled concrete base."
    - TRST personnel noted nonconsecutive multiple fasteners with loose nuts during inspection (by tapping the assembly to check for movement). When an impact wrench was used to attempt to tighten the nut the entire assembly (nut and stud) spun in the epoxy filed hole. The assembly was easily removed from the hole by hand. Upon removing the studs, it was noted that the epoxy resin had not cured, leaving it ineffectively secured to the grout pad.
    - TRST personnel also noted a fastener with loose studs. Upon removing the studs from the grout pad, it was noted that only 1" of epoxy had been placed in the core drilled hole for the fastener, leaving it ineffectively secured to the grout pad (Figure 9). WTIK-701.2 specifies that core drilled holes are to be drilled to a depth not greater than 5-1/2" or less than 4-1/2" and to be filled to ½ the total depth.

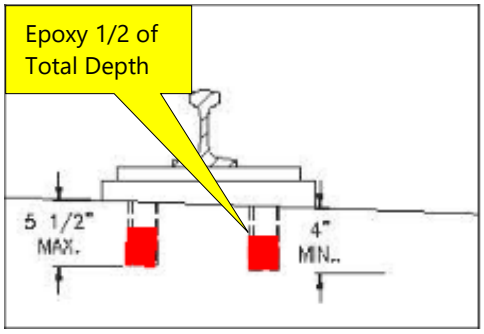


Figure 9: Epoxy fill level

- Per WITK-701.4.1 Fastener Replacement On Direct Fixation Track-Anchor Studs Or Concrete Inserts Section 12.1.4.15 states, "Shims are required when the gap between the rail and fastener or the gap between the fastener and grout pad is 1/16 inch or greater." (Figure 10). This step maintains an even contact between the fastener and concrete base and eliminates any stress on the system or ride quality issues caused by uneven rail heights.
    - Three (3) fasteners installed by TRST personnel were not properly shimmed after installation was complete, leaving a gap between the fastener and grout pad greater than 1/16."

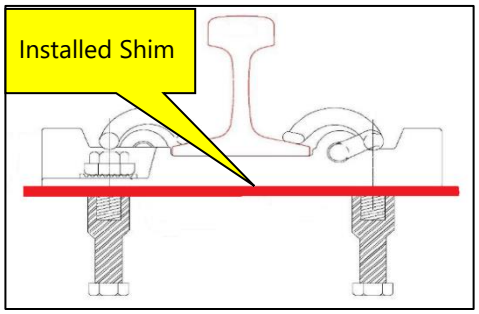


Figure 10: Rail Shim replacement

- Per WTIK-701.1 Torque Studs and Clip Bolts on Direct Fixation Track Section 11.3.3 states, "Mark all studs prior to applying torque to newly installed and existing bolts (Figure 11). This provides a reference to be used to see if the bolt rotates during torqueing operations."
    - Stud bolts were not marked as required prior to torqueing to reference that the bolt is not spinning. Approximately 15 stud bolts were renewed with new hardware throughout a 30' section of track between both running rails. None of the corrected fasteners were consecutively in a row and limited the severity of risk.

Following the current TRST Work Instructions when performing maintenance and repairs to track systems is vital to ensure the work is completed safely, efficiently, and consistently the first time. Additionally, supervisor oversight and Quality Control check would ensure the work is done correctly and the track is safe for train movement.

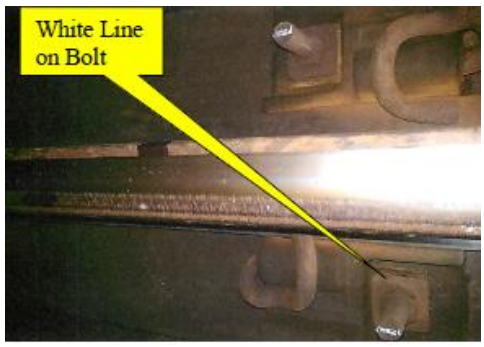


Figure11: Stud indication marks

FS-TRMN-21-04 Safety Assurance - Compliance **3C Owner – TRST**

- **Utilizing a specific tool for a particular job activity reduces the risk of work-related injuries.**

Discussion

Tools used for maintenance are designed and engineered to perform a specific task. When TRST personnel use tools or equipment outside of the intended purpose they may run the risk of injury as well as improper /incomplete maintenance. Work Instruction WTIK-704.1 Section 11.1.2 provides a comprehensive list of the proper tools needed for fastener replacement (Figure 12) such tools as a mechanical jack for raising the rail and sledgehammer to remove and install the Pandrol clips from the rail.

11.1.2 Tools
- 11.1.2.1 Geismar torque wrenches with clip and stud sockets
- 11.1.2.2 Generator, diesel
- 11.1.2.3 Quartz light
- 11.1.2.4 Extension cord
- 11.1.2.5 Electric angle grinder
- 11.1.2.6 Inspection track gauge
- 11.1.2.7 Track wrench
- 11.1.2.8 Gauge rods
- 11.1.2.9 Track hammers
- 11.1.2.10 Large track jacks
- 11.1.2.11 Lining bars
- 11.1.2.12 Sledgehammer
- 11.1.2.13 Wedges

Figure 12: Sample Fastener replacement tool list

- On a night shift field assessment of TRST maintenance personnel on 10/15/2021 outside of Congress Heights Station (F07), QICO observed the following:
  - TRST maintenance personnel were using tools and equipment outside of their intended purpose. A large ratchetting wrench was used to raise and lower the mechanical track jack, when the proper tool would be a large steel bar, commonly called a lining bar.
  - Throughout the shift, personnel were using random objects such as Pandrol clips and other track materials as wedges and striking tools.

Utilizing the specified tools for a particular job activity promotes a safe work environment for the user and those around and satisfies compliance.

FS-TRMN-21-05 Safety Assurance - Compliance **3D Owner – TRST**

- **Completing exception forms for Heat Ride inspections according to governing documentation provides traceability and verification of compliance.**

Discussion

Performing Heat Ride inspections in the events of high temperatures is essential to monitoring track conditions. These inspections are used to identify track imperfections that could cause critical failures.

- Per SOP 208-06 TRST Heat Ride Inspection Procedure, Section 6.2 states: "when ambient temperatures reach 90°F, the following actions will be initiated:
  - Track Inspection Supervisor will distribute a notification email or phone call requesting TRST to begin Heat Ride inspections.
  - TRST Supervisor will notify the Office of Emergency Management (OEM) via email: 'Heat rides have begun' OEM Email: emergencymanagment@wmata.com
  - Maintenance Operations Control (MOC) will create an Incident work order and a Special Inspection (SPIN) work order in Maximo that will be used as a related record for all Heat Ride inspections for this date.
  - TRST Management will add the Job/Plan 'TKIN HEAT' to the SPIN Work Order.
  - TRST personnel shall request permission from Rail Operation Control Center (ROCC) to perform riding heat inspections.
  - When the General Superintendent or designee determines conditions are such that Heat Rides are unnecessary, the TRST Heat Ride Inspection Exception Form must be completed.

- QICO reviewed the data recorded for Heat Ride inspections for June, July, August, and September 2021 and compared the data with weather records from the National Weather Service (NWS) at National Airport and noted the following:
  - There was a total of 39 days where TRST performed Heat Ride inspections. There were six (6) additional days where the NWS data shows an ambient temperature of 92 degrees or higher; however, no Heat Ride inspections were performed on these days according to the data provided by TRST and no Heat Ride Exception forms were provided for the missed dates (Figure 13).

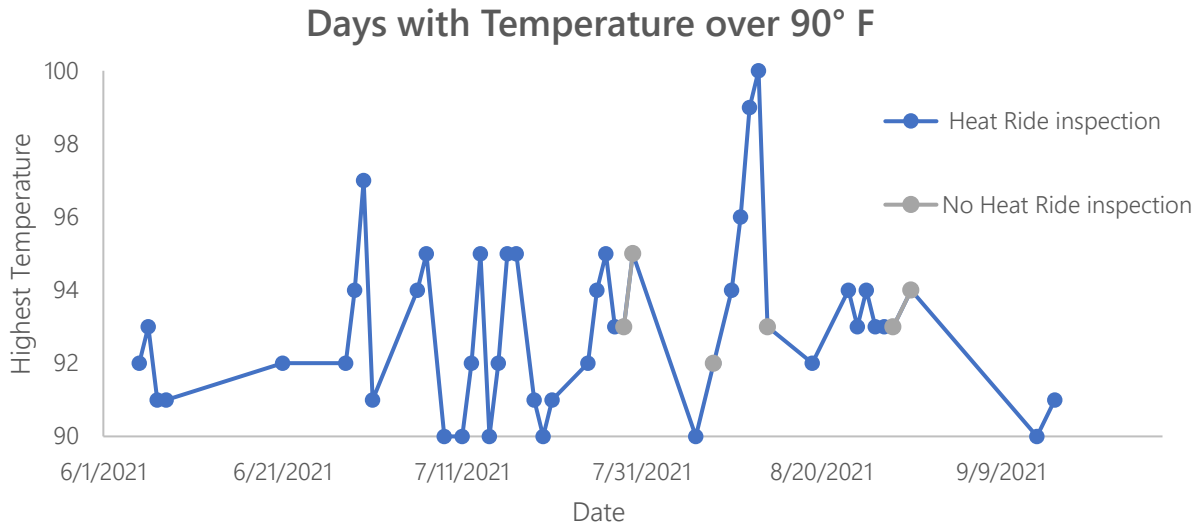


Figure 13: Heat Ride inspection data

- Corrective Action Plan (CAP) WMSC-19-C0023 identifies the absence of a formal heat ride inspection process and the need to develop protocols and document control management. This TRST has a formal process in place and CAP was closed on 09/18/2020. However, the proper documentation has not been maintained when conditions meet the requirements for an exception to heat ride inspections as per SOP 208-06.

- **Performing regular tool and equipment inspections prior to work initiation demonstrates effective hazard mitigation and reduces the potential for injuries.**

Discussion

Utilizing tools or equipment that are beyond their useful life or in need of repair presents a set of risks to the user and those around them. Per SOP 208-15 TRST Quality Control Procedure Section 6.2.2 states, "Level 1 quality control checks are the responsibility of the person assigned for the quality of the work performed on a job. Quality work is defined as 'All equipment used is properly calibrated and in good working order. No expired material is being used.'"

- During night shift field assessments of TRST maintenance on 08/31/2021 and 09/01/2021 of the Green Line(F-Line) and Orange Line (D-Line) respectively, QICO identified the following:
  - At each of the locations, maintenance personnel were observed using a poor-quality lifting cable to move equipment from the Prime Mover (PM) onto the tracks. Both lifting cables were in poor condition and had the following defects (Figure 14):
    1) No tags were attached to the lifting device detailing weight limits, proper use, and date of last inspection.
    2) Cables were deformed and frayed, possibly from previous overloading.
    3) Cables showed signs of rust in multiple places.
    4) Safety clips on lifting hooks, which ensure that the hooks remain attached to the object being lifted, were defective.
  - Following this observation, the Supervisor assured QICO that the lifting cable would be taken out of service and would order a replacement. The crew was able to locate a proper lifting device in good condition with a lifting tag attached.

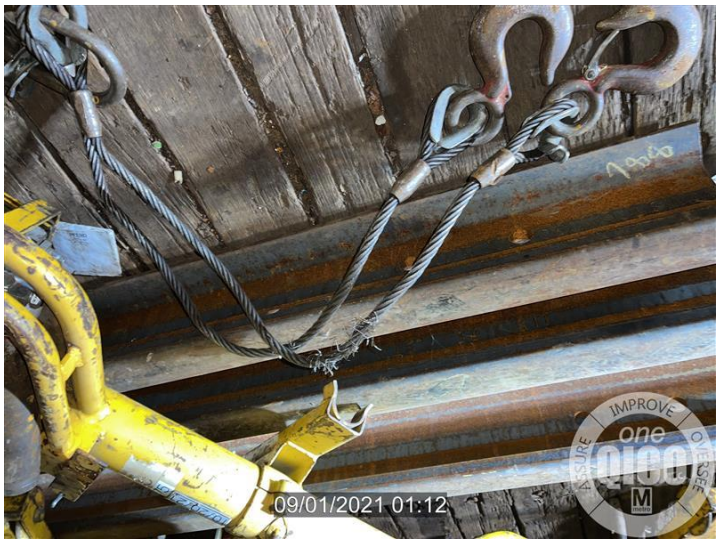


Figure 14: Lifting Cables

- On 11/18/2021 QICO performed a field assessment at the Branch Ave and New Carrollton facilities to inspect Thermite storage. At both locations all protocols and proper storage techniques were followed.

Inspecting tools and equipment prior to use minimizes safety risks and facilitates efficient job performance with no unnecessary down time or rework.

FS-TRMN-21-07 Safety Management Policy -Documentation **4C** **Owner – TRST**

- **Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner.**

Discussion

Standards Operating Procedures (SOPs) and Operating Administrative Procedures (OAPs) are essential to the safe and reliable operation of WMATA as they provide detailed instructions for TRST personnel to follow when performing routine maintenance and other duties. Per QMSP Section 3.2, WMATA departments and projects must include procedures for receiving, transmitting, reviewing, approving, disseminating, and archiving critical documents in their respective Quality Management Plan (QMP). Regular revision of these documents would support the implementation of any manufacturer updates to assets and incorporate industry best practices which results in improved maintenance techniques.

- TRST OAP-108-02 Section 6.3.5 requires all TRST controlled documents to be reviewed every two years (or as needed) to assess their relevance and effectiveness. QICO reviewed 19 documents that are current, 13 of these have been updated and 10 new documents were created since the QMSP implementation. Two (2) documents listed below are past due for review (Figure 15).

Document Title	Revision Date	Document Review Status
SOP 108-03 QA – Track Inspection	09/10/2018	Out of date
SOP 208-14 Establishing and Maintaining Positive Communication Between Equipment Operator and Flag Person of Class II Vehicles	04/24/2017	Out of date

Figure 15: TRST Reviewed Documents

Utilizing outdated SOPs and OAPs while performing tasks increases safety risks and contributes to inconsistent work and rework. TRST began QMSP implementation in August 2019, have identified all required Core Standards and are in the process of developing four (4) SOPs and three (3) work instructions to complete the implementation process.

- **Verifying safety equipment certification before use would maintain compliance and validate equipment performance.**

Discussion

Using properly certified safety equipment minimizes the risk of injury to employees working in the roadway or around the third rail should the third rail become energized inadvertently while work is being performed. SOP 208-05 was developed to assure safety equipment is calibrated on regular interval.

- QICO requested from TRST the calibration logs for handheld radios and Warning Strobe and Alarm Device (WSADs) and noted the following:
  - TRST did not provide a certification list for the WSADs and stated that they don't have an updated list.
  - 125 out of 595 radios are out of compliance as of 11/18/2021. (Figure 17)
- TRST received two (2) notifications: One from SAFE and one from Reliability Management (REAM). QICO reviewed both notifications and identified the following:
  - As of 11/29/2021, on SAFE's WSAD Verification Log, 10 out of 23 TRST WSADs inspected were past due their certification date. SAFE noted the 10 WSADs that were past the certification date were not being used at the time of inspection. Safe notified TRST to assure the WSADs are certified before use.
  - According to a Reliability Engineering and Asset Management (REAM) WSAD Certification Forecast report on 12/14/2021, TRST had 33 WSADs overdue for re-certification. The report did not detail the total number of WSADs owned by TRST.

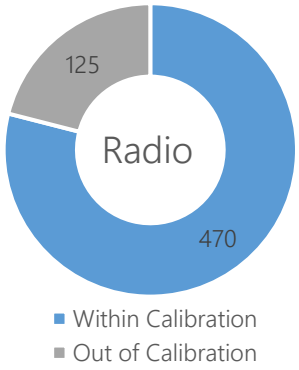


Figure 17: TRST Radio Calibration Compliance

- QICO performed six (6) field assessments with TRST maintenance crews from 08/26/2021 to 11/18/2021 and observed the following:
  - On 08/31/2021 the maintenance crew had a WSAD with current certification, but it was not notated on the Roadway Job Safety Briefing (RJSB).
  - On 10/01/2021, 10/14/2021, and 10/15/2021 the maintenance crews had working and properly certified WSADs and were logged into the JSB correctly.
- In addition, QICO performed checks related to WMSC-20-C0042 and noted the following:
  - On 11/20/2021 QICO observed five (5) WSADs where the crews did not note the certification dates on the JSB.
  - Recent observations have shown WSADs within certification and listed on the RJSBs as required.
  - No observations were made where an expired WSAD was utilized in the field

Corrective Action Plan (CAP) WMSC-20-C0042 identifies the issue of safety related equipment and the need to maintain proper calibration. A Required Actions was issued to be completed no later than 06/24/2022. Therefore, QICO will not issue an additional Internal Corrective and Preventive Action (iCAPA) for this finding, instead QICO will monitor the Corrective Action Plan (CAP) assigned by the WMSC to closure.

4.6 SUMMARY OF REQUIRED ACTIONS

QICO-TRMN-21-01 | **Action Owner – TRST** | **Overall Risk – 1C**

Required Action: Enforce developed safety procedures in the MSRPH and standard operating procedures to protect employees, passengers, and WMATA property.

Applicable Findings

- **FS-TRMN-21-01: Following established safety protocols and procedures when operating or working around track equipment reduces risk to employee safety.**
  - **Measure:** Safety Risk Management - Compliance **Risk:** Safety – Red (1, C)
- **FS-TRMN-21-02: Consistent communication between the Equipment Operator and the Vehicle Flag Person while operating on track equipment supports a safe working environment.**
  - **Measure:** Safety Risk Management - Compliance **Risk:** Safety – Yellow (2, D)

QICO-TRMN-21-02 | **Action Owner – TRST** | **Overall Risk – 3C**

Required Action: Enforce established work instructions and standard operating procedures when performing routine maintenance and inspections to provide a safer work environment and support quality standards.

Applicable Findings

- **FS-TRMN-21-03: Following track repair work instructions would support quality work and consistent results.**
  - **Measure:** Safety Assurance - Compliance **Risk:** Safety – Yellow (3, C)
- **FS-TRMN-21-05: Completing exception forms for Heat Ride inspections according to governing documentation provides traceability and verification of compliance.**
  - **Measure:** Safety Assurance - Compliance **Risk:** Safety – Yellow (3, D)

QICO-TRMN-21-03 | **Action Owner – TRST** | **Overall Risk – 3C**

Required Action: Assure the availability of the proper tools for specific jobs and routine inspections.

Applicable Findings

- **FS-TRMN-21-04: Utilizing a specific tool for a particular job activity reduces the risk of work-related injuries.**
  - **Measure:** Safety Assurance - Compliance **Risk:** Safety – Yellow (3, C)
- **FS-TRMN-21-06: Performing regular tool and equipment inspections prior to work initiation demonstrates effective hazard mitigation and reduces the potential for injuries.**
  - **Measure:** Safety Assurance - Compliance **Risk:** Safety – Yellow (3, D)

QICO-TRMN-21-04	Action Owner – TRST	Overall Risk – 4C

Required Action: Revise and update TRST governing documents as per OAP-108-02.

Applicable Findings

- **FS-TRMN-21-07: Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner**
  - **Measure:** Safety Management Policy -Documentation **Risk:** Safety – Green (4, C)

Internal Corrective and Preventive Actions (iCAPAs) are designated to address each Required Action listed above.

INTERNAL REVIEW SUMMARY

September 2021

(5) Restraining Rail Installation and Maintenance

What is QICO?

- The Office of Quality Assurance, Internal Compliance & Oversight (QICO) is an internal management function that partners with other departments to provide an objective review. QICO and the internal review process are authorized by the General Manager as outlined in the Quality Management System Plan (QMSP).

Why QICO Performed This Review:

- This internal review is intended to provide Metro senior management with an assessment of the state of Restraining Rail related processes and promote the actions needed to address any concerns.

QICO's Methodology:

- Develop relevant review activities by identifying and assessing any risks to align with the QMSP 15 Core Standards.
- Review documentation, observe processes, and interview personnel.
- Issue findings and required actions based on risk rating, which range on a scale from "Insignificant" to "High".

Key Takeaway:

Collaboration on design control & document control between Track & Structures, Engineering & Architecture, and Maintenance of Way Engineering is critical for the development of consistent standards and maintenance of Restraining Rail.

Areas for Improvement:

Total	Per Risk Rating		Per Review Measure	
4	High	1	Design Control	1
			Document Control	1
	Elevated	3	Inspection, Testing & Status	1
			Non-Conformance	1

- Implementing modifications through adequate change and configuration management processes, following an Engineering Modification Instruction (EMI) reduces potential errors and promotes compliance.
- Adherence to Restraining Rail installation requirements within design criteria establishes consistency and compliance.
- Alignment of design criteria, maintenance standards, work instructions, and issuance of consistent governing documents would improve efficiency and reduce uncertainty performing inspections and maintenance.
- Documenting Restraining Rail inspections validates data, facilitates proper track maintenance, and promotes traceability.

Required Actions:

- **QICO-RRIM-21-01:** Create and disseminate maintenance bulletins to communicate modifications in standards and maintenance practices. (Overall Risk – High)
- **QICO-RRIM-21-02:** Conduct a curved rail study and update design criteria based upon the results of the study. (Overall Risk – Elevated)
- **QICO-RRIM-21-03:** Update controlled documents to reflect the consistent design and maintenance standards throughout. (Overall Risk – Elevated)
- **QICO-RRIM-21-04:** Review all rail inspection and maintenance documents for alignment of designated tasks with current practices, and conduct quality assurance checks to verify adherence to approved restraining rail maintenance and repair documents. (Overall Risk – Elevated)

Note: An itemized internal Corrective and Preventive Action (iCAPA) is developed for each required action to achieve effective and measurable resolution of identified concerns. To check the status of iCAPA implementation go to https://www.wmata.com/initiatives/transparency

Restraining Rail

In railroad track, as a vehicle moves through a curve, the wheels are pushed against the outside rail by centrifugal forces. The faster the vehicle is moving, the higher the centrifugal forces become. To minimize the effect of the centrifugal forces, superelevation is introduced on a curved segment of the tracks similar to a banked curve on a highway or on/off ramp. Superelevation is the difference in height between the outer and the inner rail in a curve and is provided by gradually lifting the outer rail above the level of the inner rail (Figure 1). The main functions of superelevation include:

- Better distribution of load on both rails,
- Reducing of the wear of the rails and train cars,
- Neutralizing the effect of lateral forces, and
- Providing ride comfort to passengers.

Based on the nature of a curve (curve radius), superelevation is sometimes supplemented by Restraining Rails. Restraining Rail is an additional rail added to a curve and is typically found on curves with a short radius of curvature (sharp curves).
The primary function of the Restraining Rail (Figure 1) is to provide increased structural integrity between the low rail and the high rail in curves with a sharp radius and yields two (2) primary benefits:

- A reduction in wear on the high rail of curves results in lower maintenance costs due to the reduction in frequency of high rail replacement.
- A significant reduction in the likelihood of a high rail flange climb derailments (Figure 2).

Restraining Rail requires periodic repairs and lubrication because it is constantly subject to abrasion and wear from the back of flange of passing wheels. Restraining Rail lubrication systems are installed in order to reduce wear on Restraining Rail face. WMATA's Design Standards sets different requirements/criteria for mainline as well as rail yard restraining rails. The focus of this Internal review is limited to Mainline Retraining Rails.

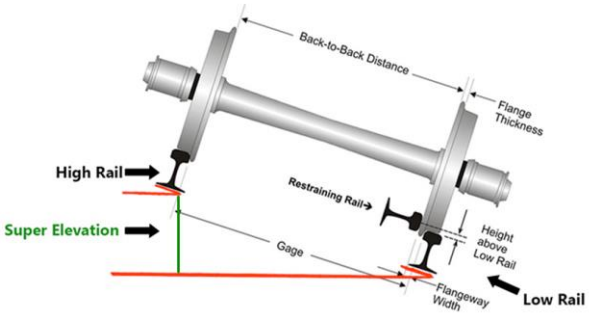


Figure 1: Restraining Rail Illustration

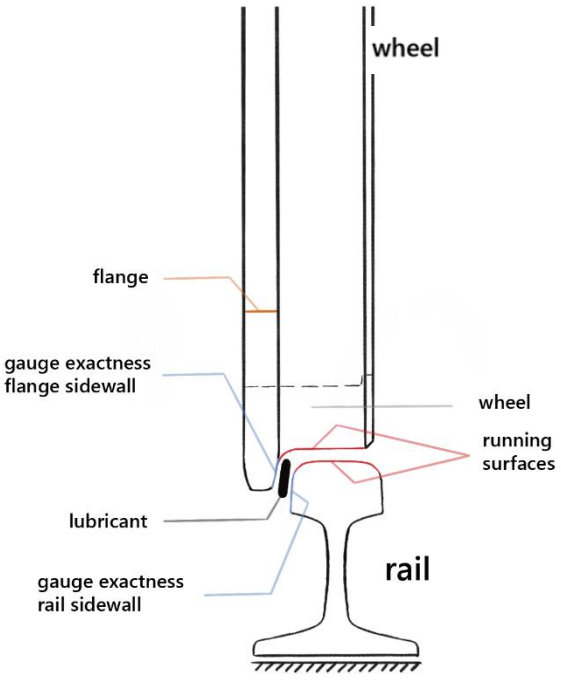


Figure 2: Wheel Flange/Rail Engagement

During the Summer COVID recovery assessments between April and August of 2020, discrepancies in governing documents to restraining rail maintenance were highlighted and communicated to stakeholders. In a follow-up related to the discrepancies observed QICO scheduled a special assessment of Restraining Rail Installation and Maintenance of the mainline. However, based on the nature of the initial findings, this assessment was elevated to an Internal Review and follow up interviews with Maintenance of Way Engineering (MOWE) were conducted from 03/29/2021 through 04/23/2021. WMATA's Design Standards sets different requirements/criteria for mainline as well as rail yard restraining rails. The timeline (Figure 3) below illustrates the activities performed by QICO during the course of this Internal Review. It also shows the updating of TRST-1000-Track Inspection and Safety Standards Volume 1 during mid review, which showed discrepancy and finding with change management without the proper processes in place per governing documents set by ENGA.

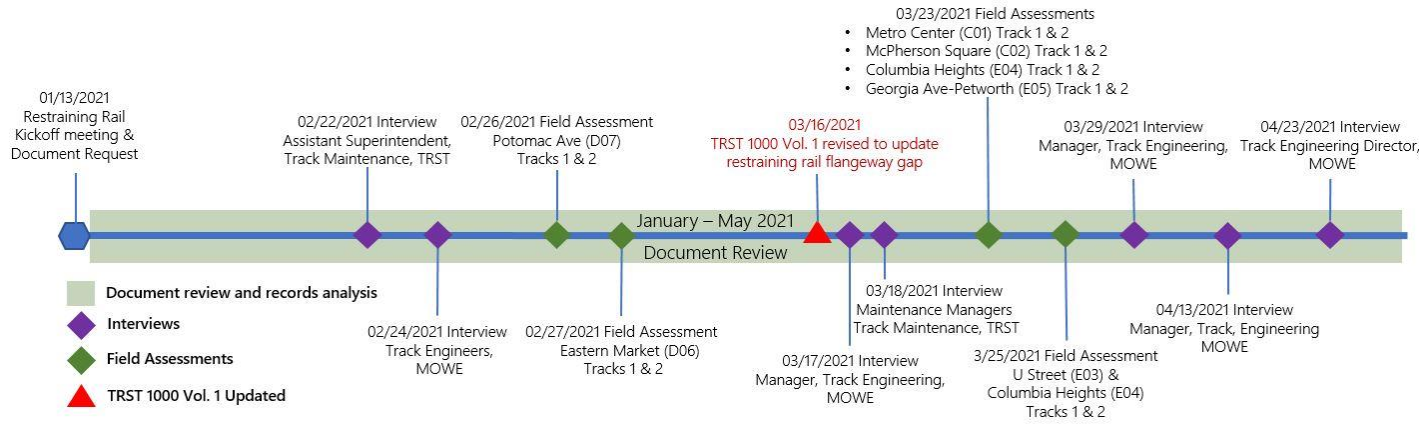


Figure 3: Restraining Rail Inspection and Maintenance Internal Review Timeline

Keeping the Restraining Rail in a State of Good Repair (SOGR) requires collaboration from the following departments based upon the responsibilities outlined in OAP 123-01 (Rev. 0, 03/05/2021) (Figure 4):

- MOWE: Provides design specifications and technical support to TRST.
- ENGA: Provides design criteria support.
- TRST: Performs maintenance, inspections, and repair.

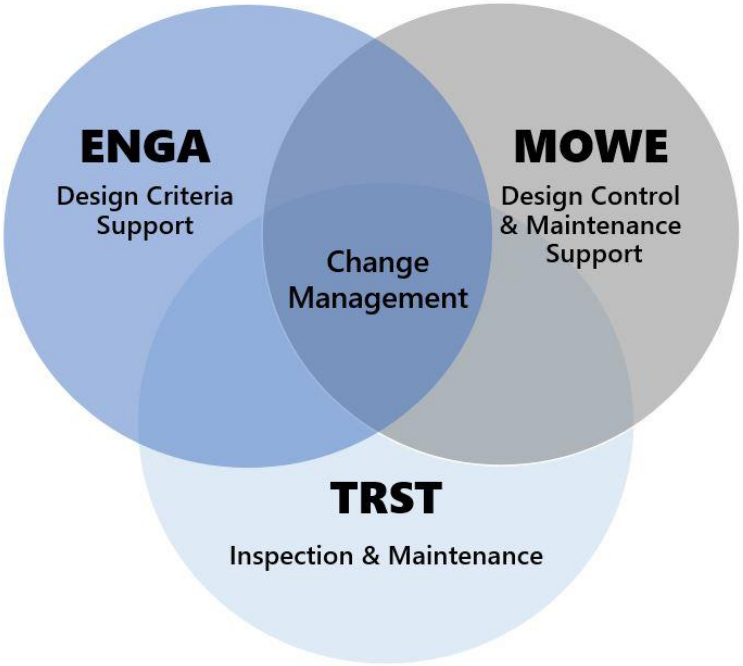


Figure 4: Restraining Rail Roles and Responsibilities

Track and Structures (TRST):

The Office of Track and Structures (TRST) mission is to ensure a positive daily commute for WMATA customers by conducting inspections, maintenance and rehabilitation programs that enhance the condition of the guideways and structures. TRST is also responsible for the maintenance and inspection of Restraining Rails. The guidelines of maintenance activities and inspection frequency to the Restraining Rail is governed by documents and tolerances as established by Maintenance of Way Engineering (MOWE).

Maintenance of Way Engineering (MOWE):

The Maintenance of Way Engineering (MOWE) mission is to ensure balance of track usage maximizing safe and reliable service. MOWE uses technical expertise to maintain existing infrastructure and implement a strategic approach to maintenance that prioritizes work focusing on safety and reliability and maximizes the utility of track time. MOWE is responsible for track design criteria and providing technical support to TRST and all work groups that need track access. MOWE collaborates with Engineering and Architecture (ENGA) to advance technical specifications and Engineering Modification Instructions (EMI).

Engineering and Architecture (ENGA):

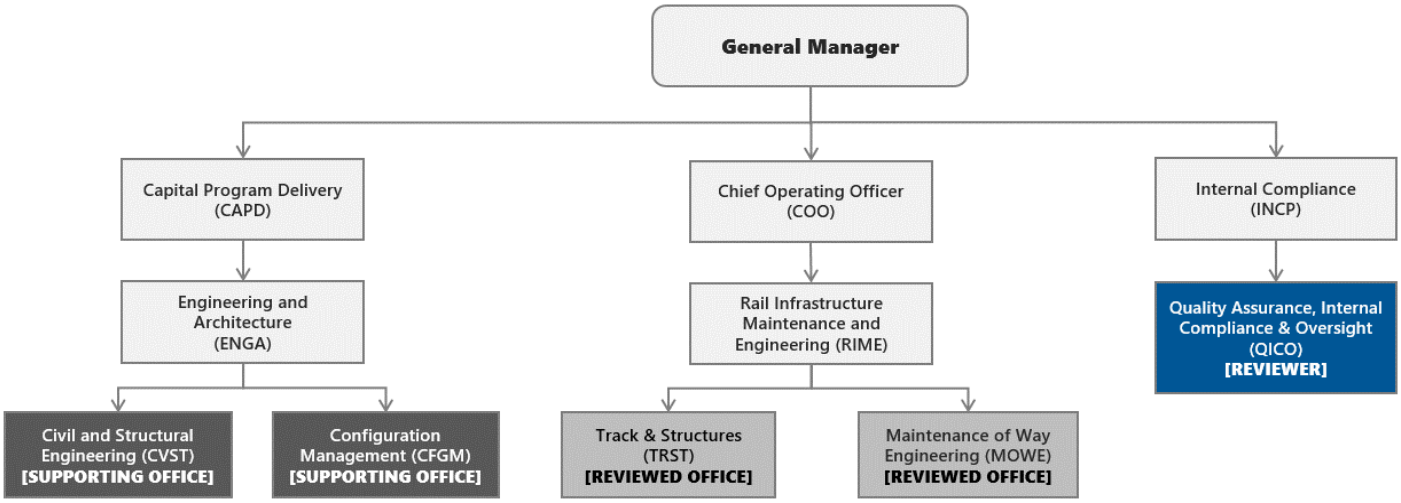
Engineering and Architecture (ENGA) oversees the designs and specifications of WMATA's infrastructure, supporting the overall mission of WMATA to provide safe, reliable, and efficient transportation.

Civil & Structural Engineering (CVST) is the office within ENGA responsible for planning, directing, overseeing, and coordinating engineering programs pertaining to civil and structural infrastructure. CVST manages the divisions of structural engineering, geomatics (surveying), civil and environmental engineering and interfaces with operations and maintenance divisions to address State of Good Repair (SOGR) efforts.
CVST plays a supporting role in track design criteria, specifications and drawings. Restraining Rail guidelines are controlled by MOWE and reviewed by CVST.

Within ENGA, Configuration Management (CFGM) team maintains and monitors configuration, design criteria and standards.

Organizational Structure and Background

The Office of Quality Assurance, Internal Compliance and Oversight (QICO) conducted an internal review of the Restraining Rail during the first and second quarter of CY2021 (January – June 2021). Within WMATA, the Office of TRST and MOWE reports to Rail Infrastructure Maintenance and Engineering (RIME). As shown in the organization chart, QICO is independent of this function, reporting to the General Manager through Internal Compliance (INCP).



5.2 REVIEW SCOPE

Document Review

- OAP 123-01 Rail Infrastructure Asset Maintenance and Engineering (RIME) Roles and Responsibilities
- Track Work Instruction 700.4.8 (Rev. 0, 05/21/2020)
- TRST-1000-Track Inspection and Safety Standards Volume 1 (Rev. 0, 10/25/2018)
- TRST-1000-Track Inspection and Safety Standards Volume 1 (Rev. 1, 03/16/2021 and released on 03/25/2021)
- Track Maintenance Standards TRST-1000 Volume 2 (Rev. 0, 02/28/2020)
- TRST-2000 Maintenance Control Program (Rev. 7, 01/21/2021)
- TRST 1000-Supplemenal Track Concepts Manual TRST-1000 Volume 3 (Rev. 0, 06/12/2020)
- Direct Fixation Track construction 05653 (DFT) - Restraining Rail and Lubricator Section 05660, 34.11.37 (09/2018), and Restraining Rail and Lubricator volume 2 Section 05660, 34.11.37 (01/2019)
- WMATA Manual of Design Criteria (Release 9.3, 2016)
- Curve Data Chart provided by MOWE (uncontrolled document)
- Track charts for C, D and E line where the Restraining Rail is installed (undated/uncontrolled document provided by MOWE)
- As-Built drawings (ENGA), Horizontal Restraining Rail (3/15/1985, Standard Drawing Vertical Restraining Rail [2014])
- P/I 4.10/4: Configuration Control Management (Date Approved 01/11/2019)
- P/I 1.20: Configuration Control Board (Date Approved 02/08/2019)
- P/I 4.14: Design Control Board (Date Approved 01/15/2019)
- APTA Rail Transit Track Inspection and Maintenance (First Revision, 04/07/2017) (external resource)
- U.S Transit Track Restraining Rail Volume 1: Study of Requirements and Practices (12/1981) (external resource)
- Maximo work order reports (January 2020-April 2021)
- Optram database review (January-April 2021)

Personnel Discussions

- Assistant Superintendent, Track Maintenance, TRST (02/22/2021)
- Two (2) Maintenance Managers, Track Maintenance, TRST (03/17/2021 & 03/18/2021)
- Director, Track Engineering, MOWE (04/23/2021)
- Manager, Division Engineering, MOWE (02/19/2021, 03/19/2021, 03/29/2021, & 04/13/2021)
- Four (4) Division Engineers, Track Engineering, MOWE (02/24/2021)

Field Assessments

- Field Assessments were conducted to measure tolerance parameters and look at the condition of the Restraining Rail, and its compatibility with the Restraining Rail lubricator. QICO conducted field assessments between February 26, 2021 and March 25, 2021 at four (4) geographical locations for eight (8) curves:
  - Potomac Ave (D07) & Eastern Market (D06), Track 1 & 2 (02/26/2021, 02/27/2021)
  - Metro Center (C01) & McPherson Square (C02), Track 1 & 2 (03/23/2021)
  - Columbia Heights (E04) & Georgia Ave-Petworth (E05), Track 1 & 2 (03/23/2021)
  - U Street (E03) & Columbia Heights (E04), Track 1 & 2 (03/25/2021)

CAPs & iCAPAs Reviewed

- No applicable CAPS or iCAPAs identified

FQ-RRIM-21-01 Design Control **Service Delivery – High (5, 4)** **Owner – MOWE**

- **Implementing modifications through adequate change and configuration management processes, following an Engineering Modification Instruction (EMI) reduces potential errors and promotes compliance.**

Discussion

- Configuration management plan is a system with a set of tools and data used to establish process control and consistency in design specifications, material selections and work instructions. Clear communication between engineering and maintenance departments is critical for efficient operational performance and design control. Design control supports the consistent development and maintenance of quality design documentation.
- QICO conducted field assessments at four (4) locations on the mainline tracks 1 and 2 (inbound/outbound). When the Restraining Rail assessment kicked off on 01/13/2021, TRST-1000 Vol. 1 (Rev. 0, 10/25/2018) was the controlled document and QICO's field assessments were performed in reference to the aforementioned document. accordingly.
- QICO identified the following four (4) inconsistencies during this internal review:
  - Inconsistency one (1): Discrepancies in maintenance performance
  - Inconsistency two (2): Absence of an effective Restraining Rail inspection
  - Inconsistency three (3): Absence of an EMI process
  - Inconsistency four (4): Absence of Engineering Test Plan (ETP)

Inconsistency one (1):

- The following was observed and communicated to the stakeholders throughout this Internal Review process:
  - Potomac Ave (D07) & Eastern Market (D06), Track 1 & 2 (02/26/2021, 02/27/2021).
    - Excess lubrication grease build-up causing an obstruction between the Restraining Rail and the Running Rail (Figure 5).
    - Poor drainage conditions and debris on the roadbed contribute degradation, and corrosion of Restraining Rail components (Figure 6).

Figure 5: Excess Lubrication Build Up

Figure 6: Debris Covering Track Drain Grate

  - Metro Center (C01) & McPherson Square (C02), Track 1 & 2 (03/23/2021).
    - Flangeway width measured as $1\frac{1}{2}$ inches, which is $\frac{1}{4}$ inch less than the control standard $1\frac{7}{8}(\pm\frac{1}{8})$ inches, as stated in TRST 1000, Revision 0, 10/25/2018 (Figure 7). (Further description on this notation can be found in the glossary)
    - Corrosion of Restraining Rail components, wet conditions and debris on the roadbed causing tripping hazards and degradation (Figure 8).

Figure 7: Flangeway Gap Measurement Under tolerance

Figure 8: Debris on Track Bed and Rail Corrosion

- Columbia Heights (E04) & Georgia Ave-Petworth (E05), Track 1 & 2 (03/23/2021).
  - Flangeway width was $2\frac{1}{4}$ inches, $\frac{1}{4}$ inch larger than the control standard $1\frac{7}{8}(\pm\frac{1}{8})$ inches, as stated in TRST 1000, Revision 0, 10/25/2018 (Figure 9).
  - A combination defect was observed that included an improper joint bar installation on running rail (Restraining Rail side) combined with two (2) loose bolts on one rail end. This weld mate bar is used specifically at weld locations (Figure 10). (TRST 1000 Volume 3 5.4.17.5 & TRST 1000 Volume 1 100.6)

Figure 9: Flangeway gap measurement Over Tolerance

Figure 10: Debris on track bed and rail corrosion

- U Street (E03) & Columbia Heights (E04) Track 1 & 2 (03/25/2021).
  - TRST 1000 Volume 2, Section 204.10.1 states that "When maintenance of the restraining rail is required, care must be taken to ensure that the "restraining rail check" is no more than $54\frac{3}{8}$ inches. However, Restraining Rail Check was measured approximately a ¼ inch more than the maximum of $54\frac{3}{8}$ inches in multiple locations (Figure11).

Figure 11: Rail Check Measurement Over Tolerance

Inconsistency two (2):

- In addition to the discrepancies mentioned above, while this assessment was still in progress, QICO noted that TRST-1000-Track Inspection and Safety Standards Volume 1 (Rev 0, 10/25/2018) was revised on 03/16/2021 and released on 03/25/2021. A copy of the updated standard was provided to QICO by MOWE after an interview on 3/29/2021.
  - In this new revision, the restraining rail tolerances and inspection frequency were revised as follows:

- Flangeway width was increased from $1\frac{7}{8}(\pm\frac{1}{8})$ inches to $1\frac{7}{8}(+\frac{1}{2}, -0)$ inches.
- A specific monthly restraining rail inspection which required individual work order and inspection report for items such as a mainline turnout switch inspection or frog guard checks was eliminated. The restraining rail inspection is to be performed as part of the routine track inspections/walks without detailed documentation or defined Maximo records. The track inspection walks are not detailed enough to capture all conditions and measurements of the track parameters, nor describe the nature of any defects found with the restraining rail based upon standards outlined in all volumes of the TRST 1000.

Inconsistency three (3):

- In addition, QICO reviewed WMATA P/I 4.10/4 Section 4.03 (b) which states that "Request changes in accordance with Engineering Modification Instruction (EMI) Procedure SOP 114-02. An EMI may be prepared by any requesting office with the assistance of ENGA or by ENGA on behalf of the requesting office". TRST 2000 Maintenance Control Program (Rev. 7, 01/21/2021) Section 13 references P/I 4.10/4 and defines the EMI "the process by which any existing system is modified. Relevant documentation is gathered and approved, and completed changes are recorded. TRST, upon consultation with MOWE, will follow PI 4.10/4: Configuration Change Management, EMI procedures as well as PI 1.20: Configuration Control Board, and PI 4.14: Design Control Board".

Inconsistency four (4):

- QICO conducted interviews with MOWE management and identified the following:
  - Upon inquiry, with regards to the change in the flangeway width, MOWE stated that the change in the flangeway width in the newly released TRST 1000 Revision 1 dated 03/16/2021 (released on 03/25/2021) was implemented as a result of a consultant recommendation.
  - Modification to the flangeway width was implemented on the E-Line from 7/12/2020 to 7/19/2020 as a pilot between the stations of Columbia Heights and Georgia Ave-Petworth on track 2, Chain Markers CM E2 133+50 to 143+30 (Total curve length of 980 feet). According to MOWE, the widening of the flangeway on the E-Line was conducted as a pilot in an effort to mitigate bolt failures. MOWE stated that the pilot on the E-Line entire curve could not be widened due to scheduling constraints and evaluations are still ongoing to determine if the flangeway widening has reduced the failure rate.
  - QICO noted that there was an absence of Engineering Test Plan (ETP) and the flangeway width was modified in TRST 1000 without conclusive results from the pilot and without the due process of implementing the modifications through the EMI/configuration change management as outlined in P/I 4.10/4 or TRST-2000 Maintenance Control Program.
  - Modification was completed without consulting with other stakeholders to identify impact of the changes on adjacent assets and other assets that are in direct contact with the rail.
  - The only supporting justification QICO received on April 28, 2021 from MOWE with regards to the above referenced modification and pilot was an email communication between MOWE and a consultant dated June 3-4, 2020 that included two (2) Word documents as attachments. The documents received with the consultant recommendation were unsigned, uncontrolled, and unidentified.

QICO conducted a preclosing meeting with the stakeholder, MOWE, to discuss the findings of this report and below is the feedback QICO received:

- RIME OAP 123-01, March 5, 2021 outlines MOWE's new process in completing modifications/changes. However, The PI 4.10/4 Section 4.03 (b) remains the overarching/governing document and supersedes any OAPs or SOPs.
- ETP data provided to QICO on August 10, 2020 is a current data that is still undergoing quality review. However, there is no data collection prior to the flangeway width modification.
- There is no official communication to document concurrence with the flangeway width modification either internally or externally.

- Enforcing the design control SOP 114-02 as well as WMATA P/I 4.10/4 Section 4.03 (b) by utilizing the Engineering Modification Instruction (EMI) process to modify existing system or subsystem increases efficiency with a defined configuration process that would provide control and improve visibility with tracking.

FQ-RRIM-21-02	Non-Conformance	Service Delivery – Elevated (4, 3)	Owner – MOWE

- **Adherence to Restraining Rail installation requirements within design criteria establishes consistency and compliance.**

Discussion

- According to the WMATA Manual of Design Criteria (Release 9.3, 2016), specifications, and Standard drawings "Restraining Rail shall be installed on all main tracks with curves of radius less than 800 feet. Based on a document review and interviews with MOWE between 02/19/2021 and 04/23/2021, QICO noted the following:
  - Restraining Rails on the mainline within the WMATA system are installed on only eight (8) curves with a radius of less than 800 feet.
  - There are 37 curves that qualify for Restraining Rail installation.
  - Out of the 37 curves 29 curves do not have Restraining Rails installed on them. The locations are provided in the map and chart below (Figures 12 & 13).
  - There is an absence of documentation and justification as to why certain areas have installed Restraining Rails and other curves with similar radius and superelevation do not have Restraining Rail installed.

* *During this Internal Review, QICO reviewed rail incident records in Maximo dating back to 2010 and the historical data indicated no revenue train derailments related to the listed 29 curves without restraining rail installed.*

**Icons are illustrations to represent approximate geographical locations, some curves meeting Restaringin Rail criteria are in the same area and on separate tracks, i.e. Track 1 and Track 2.*

Figure 12: Geographical Locations Meeting Restraining Rail Installation Requirements

#	Line/Chainmarker Location	Restraining Rail	Curve Radius (Feet)	Superelevation (Inches)
1	A2 244+99 to 256+18	No	755	4.00
2	A1 256+21 to 244+96	No	792	4.00
3	B1 38+32 to 45+95	No	770	4.00
4	B2 45+94 to 38+23	No	755	4.00
5	B1 53+33 to 65+54	No	755	4.00
6	B2 65+15 to 52+95	No	755	4.00
7	C1 2+92 to 16+52	Yes	700	4.00
8	C2 3+01 to 16+03	Yes	700	4.00
9	C1 255+59 to 241+41	No	755	4.00
10	C2 241+1 to 255+71	No	755	4.00
11	C2 338+85 to 352+97	No	800	4.00
12	D2 191+22 to 201+90	No	755	4.00
13	D2 161+67 to 167+21	Yes	706	4.00
14	D1 161+71 to 167+34	Yes	706	4.00
15	D1 174+61 to 180+20	No	755	4.00
16	D1 220+90 to 212+80	No	755	4.00
17	D2 180+31 to 174+67	No	755	4.00
18	D1 202+24 to 191+43	No	755	4.00
19	E2 73+7 to 59+2	No	755	4.00
20	E1 59+2 to 73+7	No	755	4.00
21	E2 84+37 to 98+63	Yes	755	4.00
22	E1 84+39 to 99+17	Yes	800	4.00
23	E1 131+53 to 143+07	Yes	755	4.00
24	E2 131+53 to 143+30	Yes	755	4.00
25	F1 85+25 to 69+56	No	800	4.00
26	G2 353+61 to 346+69	No	755	4.00
27	G2 638+98 to 631+15	No	755	4.00
28	G1 631+41 to 639+15	No	755	4.00
29	G1 346+65 to 353+89	No	792	4.00
30	K2 146+61 to 159+66	No	755	4.00
31	K1 160+1 to 146+92	No	755	4.00
32	L1 255+33 to 247+96	No	755	4.00
33	L2 248+21 to 255+58	No	755	4.00
34	L1 107+28 to 98+43	No	755	4.00
35	L2 98+59 to 107+22	No	770	4.00
36	L1 139+93 to 130+35	No	770	4.00
37	L2 57+58 to 73+100	No	800	4.00

Figure 13: Locations Meeting Restraining Rail Installation Requirements

- Enforcing performance in accordance with the Restraining Rail installation requirement assures WMATA's commitment to safety, serviceability and following industry best practices.

- **Alignment of design criteria, maintenance standards, work instructions, and issuance of consistent governing documents would improve efficiency and reduce uncertainty performing inspections and maintenance.**

Discussion

- Document control is a critical tool for consistent work performance and alignment of standards and requirements. It supports the management of documents and minimizes discrepancies.
- WMATA QMSP Section 3.2 states that "WMATA departments and projects must include procedures for receiving, transmitting, reviewing, approving, disseminating, and archiving critical documents".
- TRST-1000 Vol. 1 Section 100.1 specifies that the "manual will be reviewed yearly and revised every other year to accommodate changes in standards".
  - TRST 1000, Volume 1 references TRST-1000, Volume 2, Track Maintenance and Work Instructions Manual, and TRST-1000, Volume 3, Supplemental Track Concepts Manual.
  - Changes to the flangeway width were applied to TRST 1000 Vol 1 only and are not reflected in other governing documents including the Design Criteria, Standard Drawings, Standard Specifications, other TRST 1000 Series Volumes, and Work Instructions
- QICO reviewed the following documents and identified inconsistencies related to the flangeway gap specifications:

Source Document	Flangeway Gap/Width Specification
TRST-1000-Track Inspection and Safety Standards Vol. 1 (Rev. 0, 10/25/2018)	$1\frac{7}{8}\ (\pm\frac{1}{8})$ inches
TRST-1000-Track Inspection and Safety Standards Vol. 1 (Rev. 1, 03/16/2021)	$1\frac{7}{8}(+\frac{1}{2}, -\ 0)$ inches
Track Maintenance Standards TRST-1000 Vol. 2 (Rev. 0, 02/28/2020)	Standard gauge track ($56\frac{1}{2}$ inches) sets the Restraining Rail flangeway gap at a maximum of $2\frac{1}{8}$ inches
TRST 1000-Supplemenal Track Concepts Manual TRST-1000 Vol. 3 (Rev. 0, 06/12/2020)	Gap/width must not be less than $2\ (\pm\frac{1}{8})$ inches.
Direct Fixation Track construction 05653 (DFT) - Restraining Rail and Lubricator Section 05660, 34.11.37 (09/2018)	$1\frac{7}{8}\ (\pm\frac{1}{8})$ inches
Direct Fixation Track construction 05653 (DFT) - Restraining Rail and Lubricator Volume 2 Section 05660, 34.11.37 (01/2019)	$1\frac{7}{8}\ (\pm\frac{1}{8})$ inches
Track Work Instruction 700.4.8 (Rev. 0, 05/21/2020)	$1\frac{7}{8}\ (\pm\frac{1}{8})$ inches
WMATA Manual of Design Criteria, Section 11.10.7 (11/2016)	$1\frac{7}{8}\ (\pm 0\ )$ inches

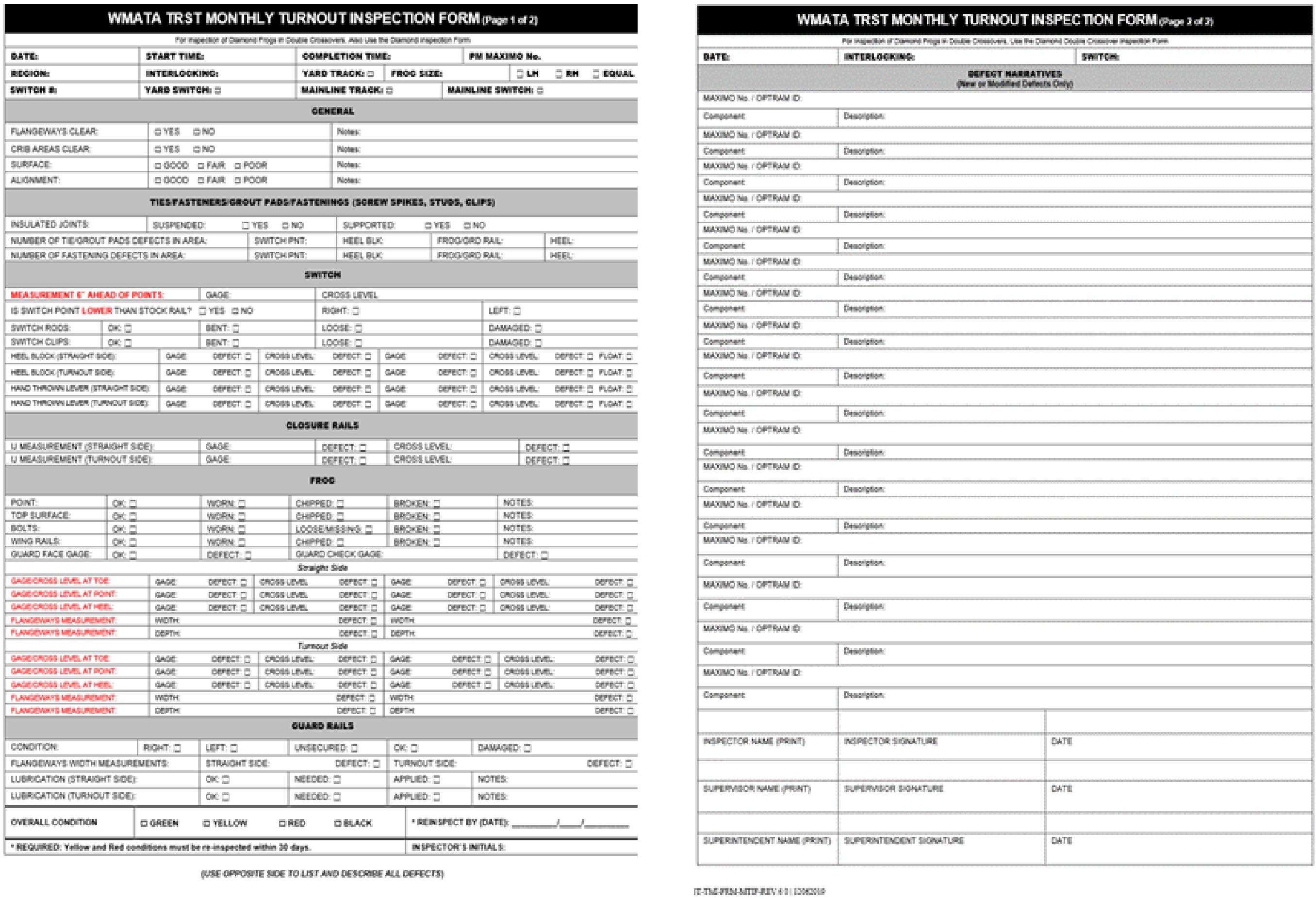
- Utilizing inconsistent standards affects work activities and increases the risk of errors/omissions. Having consistent standards create an opportunity for effective maintenance and support track inspectors in accurate track inspection.

FQ-RRIM-21-04	Inspection, Testing & Status	Service Delivery – Elevated (4, 4)	Owner – MOWE, TRST

- **Documenting Restraining Rail inspections validates data, facilitates proper track maintenance, and promotes traceability**

Discussion

- Inspection and testing are vital to the verification and documentation of assets to confirm that they comply with the applicable procedures, specifications and are in a State of Good Repair (SOGR). Restraining Rail design specifications and work instructions encompass detailed descriptions of tolerances and standards for proper functionality and performance against rail wear that helps in reducing frequency of high rail replacement.
- When the Restraining Rail assessment kicked off on 01/13/2021, TRST-1000 Vol. 1 (Rev. 0, 10/25/2018) was the controlled document for use and QICO's primary field assessments were performed accordingly. While the Internal Review was still in progress, TRST Vol. 1 was updated (03/16/2021) and released on 03/25/2021.
- While comparing TRST 1000 Volume 1 two (2) versions (Rev. 0 and Rev. 1), QICO identified the following:
    - TRST 1000 Volume 1, Revision 0 (10/25/2018) prescribes a specific monthly restraining rail inspection which requires individual work order and inspection report for items such as a mainline turnout switch inspection or frog guard checks. This requirement was eliminated from TRST 1000 Volume 1 Revision 1.
    - TRST-1000 Vol. 1 (Rev. 0, 10/25/2018) states:
        - "Restraining Rail frequency of inspection shall be performed on a monthly basis by qualified track personnel the same as mainline turnout switch inspections as well as for frog guard checks".
        - "These records shall be documented on an Inspection Form and filed for record for the same duration as all other inspection records required to be on file".
    - None of the TRST 1000 Volume 1 revisions include a Restraining Rail inspection form
    - QICO requested Restraining Rail completed monthly inspection records/Forms to assess compliance with TRST-1000 Vol 1 (Rev 0, 10/25/2018).
    - Inspection records of the Restraining Rails as detailed in TRST-1000-Track Vol 1 (Rev 0, 10/25/2018) were not provided to QICO. In the absence of records, QICO could not verify if these monthly inspections were indeed performed.
    - Per TRST 1000 Volume 1 Revision 1 (03/16/2021 and released on 03/25/2021), The Restraining Rail inspection is to be performed as part of the routine track inspections/walks without detailed documentation or defined Maximo records. The track inspection walks are not detailed enough to capture all conditions and measurements of the track parameters, nor describe the nature of any defects found with the restraining rail based upon standards outlined in all volumes of the TRST 1000
    - Both the mainline turnout and the Restraining Rail inspections are critical for safe operation. The mainline turnout inspection was retained as-is in TRST-1000 Vol. 1 (Rev. 1, 03/16/2021 and released on 03/25/2021), whereas the monthly Restraining Rail inspection was eliminated. For comparison, a mainline turnout inspection has detailed instructions in the revised TRST-1000 Vol. 1 regarding inspection process. The mainline turnout inspections are carried out on a monthly basis using a comprehensive form promoting traceability of recorded measurements and tolerances within the system (Figure 14).



WMATA TRST MONTHLY TURNOUT INSPECTION FORM (Page 1 of 2)

For inspection of Diamond Frogs in Double Crossovers, Also Use the Diamond Inspection Form

DATE: | START TIME: | COMPLETION TIME: | PM MAXIMO No.
REGION: | INTERLOCKING: | YARD TRACK: ☐ | FROG SIZE: | ☐ LH ☐ RH ☐ EQUAL
SWITCH #: | YARD SWITCH: ☐ | MAINLINE TRACK: ☐ | MAINLINE SWITCH: ☐

GENERAL

FLANGEWAYS CLEAR: ☐ YES ☐ NO | Notes:
CRIB AREAS CLEAR: ☐ YES ☐ NO | Notes:
SURFACE: ☐ GOOD ☐ FAIR ☐ POOR | Notes:
ALIGNMENT: ☐ GOOD ☐ FAIR ☐ POOR | Notes:

TIES/FASTENERS/GROUT PADS/FASTENINGS (SCREW SPIKES, STUDS, CLIPS)

INSULATED JOINTS: | SUSPENDED: ☐ YES ☐ NO | SUPPORTED: ☐ YES ☐ NO
NUMBER OF TIE/GROUT PADS DEFECTS IN AREA: | SWITCH PNT: | HEEL BLK: | FROG/GRD RAIL: | HEEL:
NUMBER OF FASTENING DEFECTS IN AREA: | SWITCH PNT: | HEEL BLK: | FROG/GRD RAIL: | HEEL:

SWITCH

MEASUREMENT 6" AHEAD OF POINTS: | GAGE: | CROSS LEVEL
IS SWITCH POINT LOWER THAN STOCK RAIL? ☐ YES ☐ NO | RIGHT: ☐ | LEFT: ☐
SWITCH RODS: | OK: ☐ | BENT: ☐ | LOOSE: ☐ | DAMAGED: ☐
SWITCH CLIPS: | OK: ☐ | BENT: ☐ | LOOSE: ☐ | DAMAGED: ☐
HEEL BLOCK (STRAIGHT SIDE): | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ FLOAT: ☐
HEEL BLOCK (TURNOUT SIDE): | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ FLOAT: ☐
HAND THROWN LEVER (STRAIGHT SIDE): | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ FLOAT: ☐
HAND THROWN LEVER (TURNOUT SIDE): | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ FLOAT: ☐

CLOSURE RAILS

U MEASUREMENT (STRAIGHT SIDE): | GAGE: | DEFECT: ☐ | CROSS LEVEL: | DEFECT: ☐
U MEASUREMENT (TURNOUT SIDE): | GAGE: | DEFECT: ☐ | CROSS LEVEL: | DEFECT: ☐

FROG

POINT: | OK: ☐ | WORN: ☐ | CHIPPED: ☐ | BROKEN: ☐ | NOTES:
TOP SURFACE: | OK: ☐ | WORN: ☐ | CHIPPED: ☐ | BROKEN: ☐ | NOTES:
BOLTS: | OK: ☐ | WORN: ☐ | LOOSE/MISSING: ☐ | BROKEN: ☐ | NOTES:
WING RAILS: | OK: ☐ | WORN: ☐ | CHIPPED: ☐ | BROKEN: ☐ | NOTES:
GUARD FACE GAGE: | OK: ☐ | DEFECT: ☐ | GUARD CHECK GAGE: | DEFECT: ☐

Straight Side

GAGE/CROSS LEVEL AT TOE: | GAGE: DEFECT: ☐ | CROSS LEVEL DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐
GAGE/CROSS LEVEL AT POINT: | GAGE: DEFECT: ☐ | CROSS LEVEL DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐
GAGE/CROSS LEVEL AT HEEL: | GAGE: DEFECT: ☐ | CROSS LEVEL DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐
FLANGEWAYS MEASUREMENT: | WIDTH: DEFECT: ☐ | WIDTH: DEFECT: ☐
FLANGEWAYS MEASUREMENT: | DEPTH: DEFECT: ☐ | DEPTH: DEFECT: ☐

Turnout Side

GAGE/CROSS LEVEL AT TOE: | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐
GAGE/CROSS LEVEL AT POINT: | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐
GAGE/CROSS LEVEL AT HEEL: | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐ | GAGE: DEFECT: ☐ | CROSS LEVEL: DEFECT: ☐
FLANGEWAYS MEASUREMENT: | WIDTH: DEFECT: ☐ | WIDTH: DEFECT: ☐
FLANGEWAYS MEASUREMENT: | DEPTH: DEFECT: ☐ | DEPTH: DEFECT: ☐

GUARD RAILS

CONDITION: | RIGHT: ☐ | LEFT: ☐ | UNSECURED: ☐ | OK: ☐ | DAMAGED: ☐
FLANGEWAYS WIDTH MEASUREMENTS: | STRAIGHT SIDE: DEFECT: ☐ | TURNOUT SIDE: DEFECT: ☐
LUBRICATION (STRAIGHT SIDE): | OK: ☐ | NEEDED: ☐ | APPLIED: ☐ | NOTES:
LUBRICATION (TURNOUT SIDE): | OK: ☐ | NEEDED: ☐ | APPLIED: ☐ | NOTES:

OVERALL CONDITION | ☐ GREEN ☐ YELLOW ☐ RED ☐ BLACK | * REINSPECT BY (DATE): ________/____/________
* REQUIRED: Yellow and Red conditions must be re-inspected within 30 days. | INSPECTOR'S INITIALS:

(USE OPPOSITE SIDE TO LIST AND DESCRIBE ALL DEFECTS)

WMATA TRST MONTHLY TURNOUT INSPECTION FORM (Page 2 of 2)

For inspection of Diamond Frogs in Double Crossovers, Use the Diamond Double Crossover Inspection Form

DATE: | INTERLOCKING: | SWITCH:

DEFECT NARRATIVES
(New or Modified Defects Only)

MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:
MAXIMO No. / OPTRAM ID:
Component: | Description:

INSPECTOR NAME (PRINT) | INSPECTOR SIGNATURE | DATE
SUPERVISOR NAME (PRINT) | SUPERVISOR SIGNATURE | DATE
SUPERINTENDENT NAME (PRINT) | SUPERINTENDENT SIGNATURE | DATE

IT-TMI-FRM-MTIF-REV 6.0 | 12062019

Figure 14: Mainline Turnout Switch Inspection Form

- Similar to the mainline turnout switch, having a specific Restraining Rail inspection form verifies compliance, provides traceability and promotes preventive maintenance.

5.4 SUMMARY OF REQUIRED ACTIONS

QICO-RRIM-21-01 **Action Owner – MOWE** **Overall Risk –** High (Average Rating)

Required Action: Create and disseminate maintenance bulletins to communicate modifications in standards and maintenance practices.

Applicable Findings

- **FQ-RRIM-21-01: Implementing modifications through adequate change and configuration management processes, following an Engineering Modification Instruction (EMI) reduces potential errors and promotes compliance.**
  - **Standard:** Design Control **Risk:** Service Delivery – High (5,4)

QICO-RRIM-21-02 **Action Owner – MOWE** **Overall Risk –** Elevated (Average Rating)

Required Action: Conduct a curved rail study and update design criteria based upon the results of the study.

Applicable Findings

- **FQ-RRIM-21-02: Adherence to Restraining Rail installation requirements within design criteria establishes consistency and compliance.**
  - **Standard:** Document Control **Risk:** Service Delivery – Elevated (4,3)

QICO-RRIM-21-03 **Action Owner – MOWE** **Overall Risk –** Elevated (Average Rating)

Required Action: Update controlled documents to reflect consistent design and maintenance standards throughout.

Applicable Findings

- **FQ-RRIM-21-03: Alignment of design criteria, maintenance standards, work instructions, and issuance of consistent governing documents would improve efficiency and reduce uncertainty performing inspections and maintenance.**
  - **Standard:** Inspection, Testing and Status **Risk:** Service Delivery – Elevated (4,4)

QICO-RRIM-21-04 **Action Owner – MOWE, TRST** **Overall Risk –** Elevated (Average Rating)

Required Action: Review all rail inspection and maintenance documents for alignment of designated tasks with current practices, and conduct quality assurance checks to verify adherence to approved restraining rail maintenance and repair documents.

Applicable Findings

- **FQ-RRIM-21-04: Documenting Restraining Rail inspections validates data, facilitates proper track maintenance, and promotes traceability.**
  - **Standard:** Inspection, Testing and Status **Risk:** Service Delivery – Elevated (4,4)

Internal Corrective and Preventive Actions (iCAPAs) are designated to address each Required Action listed above.

INTERNAL CORRECTIVE AND PREVENTIVE ACTIONS (iCAPAs)

AFCS iCAPAs

Internal Safety Review

In response to the Internal Safety Review report regarding the Office of Automatic Fare Collection Section(AFCS), the Office of Quality Assurance Internal Compliance & Oversight (QICO) has coordinated the development of five (5) iCAPAs. The iCAPAs have been developed to address required actions and the associated findings.

EXECUTIVE LEADERSHIP COMMITMENT

RESPONSIBLE PARTIES

[redacted]

Joseph Leader *Date*
Executive Vice President & Chief Operating Officer

[redacted]

Andy Off *Date*
Executive Vice President, Capital Delivery

INTERNAL OVERSIGHT

[redacted]

Hakim Davis *Date*
Vice President, Quality Assurance, Internal Compliance & Oversight (QICO)

[redacted]

Eric Christensen *Date*
Executive Vice President, Internal Compliance (INCP)

[redacted] 1/27/22

Paul J. Wiedefeld *Date*
General Manager & Chief Executive Officer (GM/CEO)

PURPOSE AND SCOPE

On November 5, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Automatic Fare Collection Section (AFCS) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated findings and required action for **QICO-AFCS-21-01**.

FINDINGS

FS-AFCS-21-01: Utilizing proper safety equipment in accordance with approved Preventive Maintenance Inspections (PMIs) promotes safety culture and enhances risk mitigation.

FS-AFCS-21-03: Adherence to the SMNT's MCP, AFCS governing documents and QMSP promotes consistent maintenance practices and quality records.

REQUIRED ACTION

QICO-AFCS-21-01	***Automatic Fare Collection Section (AFCS)***	*Risk:* Yellow	

Enforce implementation of quality control and compliance checks to include PPE, tools and equipment, and PMI checklist population.

Measure: Safety Risk Management *Risk Category:* Safety *[3,C]*

ACTION PLAN OVERVIEW

Automatic Fare Collection Section (AFCS) will implement the use of their current Weekly Activity Report (WAR) to cover compliance checks and inspections of all safety equipment deemed necessary to perform Preventive Maintenance (PM) activity in work areas; this will ensure that safety equipment is readily available when needed. In addition, AFCS will address their plan to record and streamline the process for entering PMIs in Maximo using the current PMI checklist template as a guide.

Business Impact – Budget/Cost Estimate:
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Weekly Compliance Checks	AFCS will update the Weekly Activity Report (WAR) to include the inspection of vehicles for the storage of safety equipment. AFCS will submit three months' worth of the WAR demonstrating compliance.	**Keon Day (AFCS)**	12/01/21	04/06/22
2.	Preventative Maintenance Inspection (PMI) Checklist	Upon completion of QICO-AFCS-21-02 Actionable Item #1, AFCS will address, reinforce, and document the process for entering PMIs checklist into Maximo. AFCS will submit signed acknowledgement of the applicable job function PMI procedures from all AFCS active personnel.	**Michael Lynch (AFCS)**	04/20/22	07/20/22
3.	Safety Equipment Purchase & Utilization	AFCS will obtain barrier equipment to optimize the safety condition of work areas. AFCS will provide photos as evidence of safety equipment/barrier use as required by the performance measures below.	**Keon Day (AFCS)**	12/01/21	06/15/22
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	07/21/22	08/26/22

PERFORMANCE MEASURES

AFCS will provide three months' worth of sample photos from at least three different locations showing the use of safety equipment/barriers as per Actionable Item #3.

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.
[2] Est Start – Estimated Start Date.
[3] Est End – Estimated Completion Date.
[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

AFCS	Keon Day	[redacted]
		(Signature/Date)
AFCS	Michael Lynch	[redacted]
		(Signature/Date)

FIRST-LEVEL RESPONSIBILITY

SMNT	Unriquea Butts	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

FSVT	Rodolfo Bitar	[redacted]
		(Signature/Date)
BPDV	Lisa Woodruff	[redacted]
		(Signature/Date)

PURPOSE AND SCOPE

On November 5, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Automatic Fare Collection Section (AFCS) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for **QICO-AFCS-21-02**.

FINDING

FS-AFCS-21-02: Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner.

REQUIRED ACTION

QICO-AFCS-21-02	***Automatic Fare Collection Section (AFCS)***	*Risk:* Yellow	

Develop and implement a review and revision process for AFCS governing documents.

Measure: Safety Management Policy *Risk Category:* Safety *[4,B]*

ACTION PLAN OVERVIEW

Automatic Fare Collection Section (AFCS) will follow the Office of Systems Maintenance (SMNT) Document Control Process for developing, revising AFCS governing documents listed below.

- Money Spills SOP 204-01
- AFCS Ticket Vending Machine PMI Procedure
- AFCS SmarTrip® Sale and Reload Machine PMI Procedure
- AFCS Station Operator Console PMI Procedure
- AFCS Faregate PMI Procedure
- AFCS Parking Lot Equipment PMI Procedure
- AFCS Exitfare PMI Procedure

Business Impact – Budget/Cost Estimate: Operating

Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Document Control Procedure	SMNT will develop and submit a document control procedure that outlines the review and revision frequency of all SMNT governing documents.	**Tonia Jennings (SMNT)**	12/01/21	02/16/22
2.	Update PMI Documents	AFCS Engineering will review and revise the outdated PMI documents (mentioned in the Action Plan Overview above) to clarify the utilization of PM Checklist as per QICO-AFCS-21-01 Actionable Item #2 and submit the updated PMI documents.	**Dennis Nguyen (ENGA/COMM)** **Supporting Office[4]:** **Michael Lynch (AFCS)**	12/15/21	04/20/22
3.	Update SOP	AFCS will update and submit the Money Spills SOP 204-01.	**Michael Lynch (AFCS)** **Tonia Jennings (SMNT)**	12/01/21	03/16/22
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	04/20/22	05/20/22

PERFORMANCE MEASURES

N/A

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

SMNT	Tonia Jennings	[redacted] (Signature/Date)
ENGA/COMM	Dennis Nguyen	[redacted] (Signature/Date)
AFCS	Michael Lynch	[redacted] (Signature/Date)

FIRST-LEVEL RESPONSIBILITY

SMNT	Unriquea Butts	[redacted] (Signature/Date)
ENGA	Van Johnson	[redacted] (Signature/Date)

SECOND-LEVEL RESPONSIBILITY

FSVT	Rodolfo Bitar	[redacted] (Signature/Date)
ENGA	Nichalos Gardner	[redacted] (Signature/Date)
BPDV	Lisa Woodruff	[redacted] (Signature/Date)

PURPOSE AND SCOPE

On November 5, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Automatic Fare Collection Section (AFCS) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated findings and required action for **QICO-AFCS-21-03**.

FINDINGS

FS-AFCS-21-04: Maintaining and complying with an accurate training matrix for AFCS assures compliance with governing documents, the SMNT MCP hazard management, and promotes safety.

FS-AFCS-21-05: Maintaining current Roadway Worker Protection (RWP) training safeguards WMATA personnel from the hazards on and around the roadway and promotes a safe working environment.

REQUIRED ACTION

QICO-AFCS-21-03	***Automatic Fare Collection Section (AFCS)***	*Risk:* Yellow	

Update the AFCS training matrix to reflect the current business practice.

Measure: Safety Promotion *Risk Category:* Safety *[3,D]*

ACTION PLAN OVERVIEW

Automatic Fare Collection Section (AFCS) will provide its training requirements in accordance with the refresher courses developed by ELM for AFCS and other training standards based on their most current business practices.

Business Impact – Budget/Cost Estimate:
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Training Matrix	AFCS will update and submit the AFCS training matrix to reflect all current training requirements.	**Michael Lynch (AFCS)**	12/01/21	01/26/22
2.	Training Records	AFCS will submit the ELM training records of all AFCS active personnel with a memorandum of all the training titles that changed throughout the years.	**Michael Lynch (AFCS)**	11/29/21	01/26/22
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	01/26/22	02/25/22

PERFORMANCE MEASURES

N/A

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

AFCS	Michael Lynch	[redacted]
		(Signature/Date)

FIRST-LEVEL RESPONSIBILITY

SMNT	Unriquea Butts	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

FSVT	Rodolfo Bitar	[redacted]
		(Signature/Date)
BPDV	Lisa Woodruff	[redacted]
		(Signature/Date)

PURPOSE AND SCOPE

On November 5, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Automatic Fare Collection Section (AFCS) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for **QICO-AFCS-21-04**.

FINDING

FS-AFCS-21-06: Mitigating hazards and retaining electronic records to include backups of personnel records safeguards from accidents and accidental loss of documents due to flooding or fire and protects the privacy of AFCS personnel.

REQUIRED ACTION

QICO-AFCS-21-04	***Automatic Fare Collection Section (AFCS)***	*Risk:* Yellow	

Create and utilize an electronic repository for handwritten training and personnel documentation.

Measure: Safety Management Policy *Risk Category:* Safety *[3,D]*

ACTION PLAN OVERVIEW

Automatic Fare Collection Section (AFCS) will develop and manage an electronic record keeping system for personnel records.

Business Impact – Budget/Cost Estimate:
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Electronic Records Repository	AFCS will develop an electronic record keeping system that captures paper records of: • On-The-Job (OJT) training for AFCS applicable personnel • 30-60-80 days training for AFCS applicable personnel • An initial scan and archive of current personnel training records AFCS will submit a list of all AFCS personnel with hard copy training records converted to electronic format and provide a link to the electronic file repository.	**Michael Lynch (AFCS)**	12/02/21	12/14/22
2.	Quality Control	AFCS will conduct a Quality Control (QC) check as per Actionable Item #1 to ensure that all hard copy training records are scanned and saved electronically. AFCS will submit the QC report of 100% conversion from hard copy to the electronic file.	**Keon Day (AFCS)**	12/15/22	01/18/23
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	01/18/23	02/17/23

PERFORMANCE MEASURES

N/A

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

AFCS	Keon Day	[redacted]
		(Signature/Date)
AFCS	Michael Lynch	[redacted]
		(Signature/Date)

FIRST-LEVEL RESPONSIBILITY

SMNT	Unriquea Butts	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

FSVT	Rodolfo Bitar	[redacted]
		(Signature/Date)
BPDV	Lisa Woodruff	[redacted]
		(Signature/Date)

PURPOSE AND SCOPE

On November 5, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Automatic Fare Collection Section (AFCS) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for **QICO-AFCS-21-05**.

FINDING

FS-AFCS-21-07: Periodically updating AFCS job descriptions to comply with the Human Resources (HR) procedure fulfills qualifications' accuracy and job performance.

REQUIRED ACTION

QICO-AFCS-21-05	***Automatic Fare Collection Section (AFCS)***	*Risk:* Yellow	

Update AFCS job descriptions to fulfill qualifications' accuracy and job performance.

Measure: Safety Management Policy *Risk Category:* Safety *[4,D]*

ACTION PLAN OVERVIEW

Automatic Fare Collection Section (AFCS) will revise job descriptions to ensure that they accurately depict current qualification requirements and job performance.

Business Impact – Budget/Cost Estimate:
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Job Description Update	AFCS will update and submit job descriptions for all AFCS job codes in accordance with the Department of Human Capital (HC) and compensation requirements.	**Michael Lynch (AFCS)**	02/16/22	11/30/22
2.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	11/30/22	01/06/23

PERFORMANCE MEASURES

N/A

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

AFCS	Michael Lynch	[redacted]
		(Signature/Date)

FIRST-LEVEL RESPONSIBILITY

SMNT	Unriquea Butts	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

FSVT	Rodolfo Bitar	[redacted]
		(Signature/Date)
BPDV	Lisa Woodruff	[redacted]
		(Signature/Date)

Office of Vehicle Program Services (CENV) iCAPAs

Internal Safety Review

In response to the Internal Safety Review report regarding the Office of Vehicle Program Services (CENV), the Office of Quality Assurance, Internal Compliance & Oversight (QICO) has coordinated the development of three iCAPAs. The iCAPAs have been developed to address the required actions and the associated findings.

EXECUTIVE LEADERSHIP COMMITMENT

RESPONSIBLE PARTIES

[redacted]

Joseph Leader *Date*
Executive Vice President & Chief Operating Officer

INTERNAL OVERSIGHT

[redacted]

Hakim Davis *Date*
Vice President, Quality Assurance, Internal Compliance & Oversight (QICO)

[redacted]

Eric Christensen *Date*
Executive Vice President, Internal Compliance (INCP)

GENERAL MANAGER & CHIEF EXECUTIVE OFFICER (GM/CEO)

[redacted] 03/08/2022

Paul J. Wiedefeld *Date*
General Manager & Chief Executive Officer (GM/CEO)

PURPOSE AND SCOPE

On December 15, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Vehicle Program Services (CENV) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-CENV-21-01.**

FINDING(S)

FS-CENV-21-01: Performing regular workplace inspections helps reduce incidents, injuries, and illnesses, through the identification and recording of hazards for adequate analysis and timely mitigation.

FS-CENV-21-06: Development and continuous update of a Hazard Log/Risk Register contributes to the proper recording and assessment of all potential hazards and their associated risks, so that all responsible parties are identified, and effective mitigation response are anticipated.

FS-CENV-21-07: Participating in all mandatory Safety Committee meetings will further engage personnel and promote WMATA's safety culture.

REQUIRED ACTION

QICO-CENV-21-01	Vehicle Program Services (CENV)	Risk: Red	

Meet or exceed standards for workplace safety inspection, safety committee participation, and hazard management processes defined in the Agency Safety Plan (PTASP).

Measure: Safety Assurance *Risk Category: Safety [3,B]*

ACTION PLAN OVERVIEW

CENV will review and submit CENV SOP 202.18 Emergency Action Plan for Greenbelt E95 Railcar Commissioning Facility Building H, perform safety inspections based on the CENV checklist, and record documentation.

CENV will develop a documented process addressing hazard identification that is aligned with the PTASP and in consultation with SAFE. A hazard tracker will also be developed that captures identified hazards and corresponding mitigations.

CENV will identify facilities where CENV personnel are assigned and attend the respective local safety committee meetings for these locations. CENV will submit the list of locations and respective local safety committee attendance and meeting minutes records.

Business Impact – Budget/Cost Estimate: Operating

Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Develop Workplace Safety Inspections Checklist	CENV will develop and submit a checklist to record the workplace safety inspections as per Actionable Item #2 (Update Workplace Safety Inspections SOP).	**Cameron Akins (ODCM)**	02/02/22	04/06/22
2.	Update Workplace Safety Inspections SOP	CENV will update and submit CENV Standard Operating Procedure (SOP) 202.18 *Emergency Action Plan for Greenbelt E95 Railcar Commissioning Facility Building H* to include requirements for workplace safety inspections at facilities under the control of CENV.	**Cameron Akins (ODCM)**	02/02/22	08/31/22
3.	Workplace Safety Inspections Report I	CENV will conduct workplace safety inspections as specified in updated SOP 202.18 *Emergency Action Plan for Greenbelt E95 Railcar Commissioning Facility Building H*. CENV will submit 6 months' worth of workplace safety inspection records for review. CENV will submit first quarterly report	**Anthony Johnson (CENV)**	04/06/22	08/10/22
4.	Workplace Safety Inspections Report II	CENV will submit second quarterly report.	**Anthony Johnson (CENV)**	07/06/22	11/02/22
5.	Local Safety Committee Meeting Attendance Report I	CENV will designate at least one representative per location where CENV has personnel assigned to attend and participate in the respective Local Safety Committee (LSC) meeting(s). CENV will submit 6 months' worth of attendance logs and meeting minutes records for review from each LSC as per above. CENV will submit the first three months' worth of records including locations list.	**Anthony Johnson (CENV)**	03/01/22	06/15/22

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
6.	Local Safety Committee Meeting Attendance Report II	CENV will submit the second three months' worth of records including locations list.	**Anthony Johnson (CENV)**	06/01/22	10/19/22
7.	Documented Process	CENV will develop and submit a documented Safety Risk Assessment process to include Hazard Identification, Hazard Analysis, Safety Risk Evaluation, and Safety Risk Mitigation in alignment with the Public Transit Agency Safety Plan (PTASP) and in consultation with SAFE.	**Anthony Johnson (CENV) Supporting Office4 Wayne Bolander (CMOR) Francine James (SAFE)**	11/30/22	08/02/23
8.	Develop Safety Risk Register	CENV will develop a safety risk register in accordance with Actionable Item #7 (Documented Process) capturing hazards and corresponding mitigations. CENV will submit three months' worth of hazards identified.	**Anthony Johnson (CENV) Supporting Office4 Wayne Bolander (CMOR)**	08/02/23	12/06/23
9.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	12/06/23	01/05/24

PERFORMANCE MEASURES

N/A

RESPONSIBLE PARTIES

CENV	Cameron Akins	[redacted] (Signature/Date)
CENV	Anthony Johnson	[redacted] (Signature/Date)
CMOR	Wayne Bolander	[redacted] (Signature/Date)

SUPPORTING ROLE ACKNOWLEDGEMENT

SAFE	Francine James	[redacted] (Signature/Date)

SECOND-LEVEL RESPONSIBILITY

CENV	Shushil Ramnaress	[redacted] (Signature/Date)
CMOR	John Doherty	[redacted] (Signature/Date)
RAIL	Michael Hass	[redacted] (Signature/Date)

PURPOSE AND SCOPE

On December 15, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Vehicle Program Services (CENV) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-CENV-21-02.**

FINDING(S)

FS-CENV-21-02: Proper Test, Measurement and Diagnostic Equipment (TMDE) calibration is important to promote the accuracy and reliability of the instrument. Accurate measurements are essential to the quality and safety of the activities performed by CENV.

FS-CENV-21-03: Current and controlled policies, procedures, and standards provide clear direction and result in more consistent process control.

FS-CENV-21-04: Proper documentation and use of standardized templates are crucial in the creation of controlled records to verify all necessary information is registered.

FS-CENV-21-05: Availability of formal courses for employees to be trained for the specific tasks they perform, and maintaining an updated employee training log, helps improve operations, compliance, safety, and employee engagement.

REQUIRED ACTION

QICO-CENV-21-02	Vehicle Program Services (CENV)	Risk: Red	

Align training, inspection, process control, measuring & testing equipment, and document control management with organization-wide quality management system plan standards.

Measure: Safety Assurance *Risk Category: Safety [3,B]*

ACTION PLAN OVERVIEW

CENV will develop and submit equipment calibration list as per CENV SOP 203.01 *Inspection and Calibration* for Precision Measuring Devices and submit calibration records.

Closure of iCAPA QICO PAP 21-06 will satisfy the required actions for FS-CENV-21-03 and FS-CENV-21-04.

Closure of Washington Metrorail Safety Commission (WMSC) corrective action plan WMSC-21-C0142 Actionable Items #2 and #4 will satisfy the required actions for FS-CENV-21-05.

Business Impact – Budget/Cost Estimate: Operating

Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Inventory of CENV Equipment Subject to Calibration	CENV will develop and submit a list of Precision Measuring Devices (PMD) and other equipment subject to periodic calibration as per CENV Standard Operating Procedure (SOP) 203.01, *Inspection and Calibration for Precision Measuring Devices*.	**Anthony Johnson (CENV)**	08/08/22	10/12/22
2.	Calibration Compliance Report I	CENV will submit 6 months' worth of completed calibration records and, if applicable, an updated equipment list per Actionable Item #1, (Inventory of CENV Equipment Subject to Calibration). CENV will submit the 1st quarterly worth of reporting.	**Anthony Johnson (CENV)**	10/01/22	01/18/23
3.	Calibration Compliance Report II	CENV will submit the next 2nd quarterly worth of reporting.	**Anthony Johnson (CENV)**	01/01/23	04/19/23
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	04/19/23	05/19/23

PERFORMANCE MEASURES

N/A

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

CENV	Anthony Johnson	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

CENV	Shushil Ramnaress	[redacted]
		(Signature/Date)
CMOR	John Doherty	[redacted]
		(Signature/Date)
RAIL	Michael Hass	[redacted]
		(Signature/Date)

PURPOSE AND SCOPE

On December 15, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Vehicle Program Services (CENV) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-CENV-21-03.**

FINDING(S)

FS-CENV-21-08: A reliable Vehicle Monitoring System (VMS)/Event Recorder (ER) is essential for a complete data download and thorough analysis of a railcar systems' operation, particularly for incident/accident investigation.

REQUIRED ACTION

QICO-CENV-21-03	Vehicle Program Services (CENV)	Risk: Yellow	

Develop a solution to improve reliability of 2K/3K event recorder systems to comply with requirements of National Transportation Safety Board recommendation NTSB R-10-21.

Measure: Safety Risk Management *Risk Category:* Safety *[3,D]*

ACTION PLAN OVERVIEW

CENV will prepare an engineering analysis to produce recommendations for improving reliability of the 2K3K Vehicle Monitoring System (VMS) Event Recorder (ER) through the remaining lifecycle of the 2K3K railcar fleet.

CENV will develop an action plan based on the recommendations issued from the engineering analysis.

Business Impact – Budget/Cost Estimate: Operating

Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Conduct Engineering Analysis	CENV will prepare and submit an engineering analysis to produce recommendations for improving reliability of the 2K3K Vehicle Monitoring System (VMS) Event Recorder (ER) through the remaining lifecycle of the 2K3K fleet.	**Anthony Johnson (CENV)**	02/02/22	02/01/23
2.	Develop Action Plan	Based on the results of Actionable Item #1, (Conduct Engineering Analysis), CENV will develop and submit an action plan after review and assessment of the recommendation(s).	**Anthony Johnson (CENV)**	02/01/22	09/06/23
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	09/06/23	10/06/23

PERFORMANCE MEASURES

N/A

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

CENV	Anthony Johnson	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

CENV	Shushil Ramnaress	[redacted]
		(Signature/Date)
CMOR	John Doherty	[redacted]
		(Signature/Date)
RAIL	Michael Hass	[redacted]
		(Signature/Date)

Offices of Environmental Management & Compliance and Occupational Safety & Health iCAPAs

Internal Safety Review

In response to the Internal Safety Review report regarding the Offices of Environmental Management & Compliance (EMAC) and Occupational Safety & Health (OSH), the Office of Quality Assurance, Internal Compliance & Oversight (QICO) has coordinated the development of six iCAPAs. The iCAPAs have been developed to address the required actions and the associated findings.

EXECUTIVE LEADERSHIP COMMITMENT

RESPONSIBLE PARTIES

[redacted]

Theresa Impastato *Date*
Executive Vice President & Chief Safety Officer

INTERNAL OVERSIGHT

[redacted]

Hakim Davis *Date*
Vice President, Quality Assurance, Internal Compliance & Oversight (QICO)

[redacted]

Eric Christensen *Date*
Executive Vice President, Internal Compliance (INCP)

GENERAL MANAGER & CHIEF EXECUTIVE OFFICER (GM/CEO)

[redacted] 03/11/2022

Paul J. Wiedefeld *Date*
General Manager & Chief Executive Officer (GM/CEO)

PURPOSE AND SCOPE

On February 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Offices of Environmental Management and Compliance (EMAC) and Occupational Safety and Health (OSH) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-SAFE-22-01**.

FINDING(S)

FS-SAFE-22-01: Development of documented departmental procedures is necessary for consistent safety oversight within all processes.

REQUIRED ACTION

QICO-SAFE-22-01	***Environmental Management and Compliance (EMAC)***	3D Marginal/Remote	3D

Required Action(s):
Develop and implement documented processes for all EMAC core functions.

Measure: Safety Assurance *Risk Category:* Safety *3, D*

ACTION PLAN OVERVIEW

As part of the Department of Safety Quality Management Plan (QMP) implementation, Environmental Management and Compliance (EMAC) will identify and document a list of their specific internal core processes. EMAC will submit the list of core processes. Once the core processes have been identified, EMAC will develop a documented procedure for each and submit the completed documents.

Business Impact – Budget/Cost Estimate: Operating
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Identify Internal Core Processes	EMAC will conduct an assessment to identify all internal core processes. EMAC will submit the final assessment, listing all identified core processes.	**Claire Fox (EMAC)**	04/01/22	05/04/22
2.	Develop Documented Procedures	As per Actionable Item #1 (Identify Internal Core Processes), EMAC will develop and submit documented procedures for the identified core functions.	**Claire Fox (EMAC)**	05/04/22	03/01/23
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	03/01/23	03/31/23

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

PURPOSE AND SCOPE

On February 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Offices of Environmental Management and Compliance (EMAC) and Occupational Safety and Health (OSH) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-SAFE-22-02**.

FINDING(S)

FS-SAFE-22-01: Development of documented departmental procedures is necessary for consistent safety oversight within all processes.

REQUIRED ACTION

QICO-SAFE-22-02	***Occupational Safety and Health (OSH)***	3D Marginal/Remote	3D

Required Action(s):
Develop and implement documented processes for all OSH core functions.

Measure: Safety Assurance *Risk Category:* Safety *3, D*

ACTION PLAN OVERVIEW

As part of the Department of Safety Quality Management Plan (QMP) implementation, Occupational Safety and Health (OSH) will identify and document a list of their specific internal core processes. OSH will submit the list of core processes. Once the core processes have been identified, OSH will develop a documented procedure for each and submit the completed documents.

Business Impact – Budget/Cost Estimate: Operating
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Identify Internal Core Processes	OSH will conduct an assessment to identify all internal core processes. OSH will submit the final assessment, listing all identified core processes.	**Valerie Steele (OSH)**	04/01/22	05/04/22
2.	Develop Documented Procedures	As per Actionable Item #1 (Identify Internal Core Processes), OSH will develop and submit documented procedures for the identified core functions.	**Valerie Steele (OSH)**	05/04/22	03/01/23
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	03/01/23	03/31/23

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

PURPOSE AND SCOPE

On February 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Offices of Environmental Management and Compliance (EMAC) and Occupational Safety and Health (OSH) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-SAFE-22-03.**

FINDING(S)

FS-SAFE-22-02: Conducting further investigations after identifying chemical hazards can lead to identification of root cause and in turn mitigation or elimination of the hazards.

REQUIRED ACTION

QICO-SAFE-22-03	***Environmental Management and Compliance (EMAC)***	3D Marginal/Remote	3D

Required Action(s):
Develop and implement a root cause analysis investigative requirement and process.

Measure: Safety Assurance *Risk Category: Safety 3, D*

ACTION PLAN OVERVIEW

As part of the identification and development of documented procedures identified as part QICO-SAFE-22-01, EMAC will develop a procedure, to include the following elements: performing a spot check, the threshold triggering a root cause analysis, and the process for conducting a root cause investigation.

Business Impact – Budget/Cost Estimate: Operating
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Develop Documented Procedure	As per QICO-SAFE-22-01 Actionable Item #2 (Develop Documented Procedures), EMAC will develop and submit a procedure, to include the following elements: performing a spot check, the threshold triggering a root cause analysis, and the process for conducting a root cause investigation.	**Claire Fox (EMAC)** **Supporting Office[4]:** **Valerie Steele (OSH)**	05/04/22	03/01/23
2.	Staff Communication	As per Actionable Item #1 (Develop Documented Procedure), SAFE will develop and distribute a communication to notify WMATA staff of the chemical spot check root cause investigation procedure.	**Claire Fox (EMAC)** **Supporting Office[4]:** **Valerie Steele (OSH)**	03/01/23	04/05/23
3.	Implementation	As per Actionable Item #1 (Develop Documented Procedure), EMAC will submit six months' worth of evidence reflecting compliance with the new procedure. Evidence will consist of completed spot checks or, if applicable, root cause investigations provided the determined triggering criteria in the procedure has been met.	**Claire Fox (EMAC)**	04/05/23	11/15/23
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	11/15/23	12/15/23

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.
[2] Est Start – Estimated Start Date.
[3] Est End – Estimated Completion Date.
[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

SUPPORTING ROLE ACKNOWLEDGEMENT

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

PURPOSE AND SCOPE

On February 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Offices of Environmental Management and Compliance (EMAC) & Occupational Safety and Health (OSH) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-SAFE-22-04**.

FINDING(S)

FS-SAFE-22-04: A documented training matrix which includes required departmental safety training is essential to ensure personnel are incorporating safe practices within their assigned work.

REQUIRED ACTION

QICO-SAFE-22-04	***Occupational Safety and Health (OSH)***	4D Negligible/Remote	4D

Required Action(s):
Develop an OSH specific training matrix.

Measure: Safety Promotion *Risk Category:* Safety *4, D*

ACTION PLAN OVERVIEW

Occupational Safety and Health (OSH) will develop and submit a training matrix to track the required training requirement for OSH personnel. The training matrix will identify the required training for specific positions within OSH.

Business Impact – Budget/Cost Estimate: Operating
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Develop Training Matrix	OSH will develop and submit a training matrix which will identify and track the required training for job positions within OSH.	**Valerie Steele (OSH)**	05/04/22	11/02/22
2.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	11/02/22	12/02/22

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

PURPOSE AND SCOPE

On February 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Offices of Environmental Management and Compliance (EMAC) and Occupational Safety and Health (OSH) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-SAFE-22-05.**

FINDING(S)

FS-SAFE-22-05: Performing internal SMS compliance audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.

REQUIRED ACTION

QICO-SAFE-22-05	*Department of Safety (SAFE)*	3D Marginal/Remote	3D

Required Action(s):
Revise PTASP (rev 2.0), section 4.1.2, to clarify SMS audit requirements.

Measure: Safety Management Policy *Risk Category: Safety 3, D*

ACTION PLAN OVERVIEW

SAFE will draft the proposed changes to WMATA's Public Transportation Agency Safety Plan (PTASP) Section 4.1.2 *Monitoring of Operational Safety Risk Mitigations*, which will include the clarification of the Safety Management System (SMS) audit requirements and present them at the General Review meeting, as part of WMATA's annual PTASP update. Per the requirements of the Program Standard Section 4 A.2, SAFE will present the updated PTASP for review and approval by WMATA leadership and the WMSC. SAFE will publish the approved PTASP to MetroDocs along with SSOA certification.

Business Impact – Budget/Cost Estimate: Operating
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	PTASP General Review Meeting	SAFE will review and revise language in Section 4.1.2 *Monitoring of Operational Safety Risk Mitigations* of the PTASP to include the requirements for SMS audits and present them for concurrence at the General Review Meeting conducted as part of the annual PTASP revision. SAFE will submit the meeting notes from General Review meeting.	**James Wojciechowski (SAFE)**	05/20/22	06/01/22
2.	PTASP Draft	As per Actionable Item #1 (PTASP General Review Meeting), SAFE will present the updated PTASP for review and approval by WMATA leadership and the WMSC. SAFE will submit the revised draft document.	**James Wojciechowski (SAFE)**	06/01/22	07/06/22
3.	Publish Updated PTASP	As per Actionable Item #2 (PTASP Draft), SAFE will publish the approved PTASP to MetroDocs along with State Safety Oversight Agency (SSOA) certification. SAFE will submit the fully approved PTASP.	**James Wojciechowski (SAFE)**	10/03/22	01/04/23
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	01/04/23	02/03/23

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

PURPOSE AND SCOPE

On February 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Offices of Environmental Management and Compliance (EMAC) & Occupational Safety and Health (OSH) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action(s) for **QICO-SAFE-22-06**.

FINDING(S)

FS-SAFE-22-06: Creating and maintaining a comprehensive collection of Job Hazard Analyses will promote a safe work environment by identifying specific hazards and mitigations prior to the start of the task.

REQUIRED ACTION

QICO-SAFE-22-06	***Occupational Safety and Health (OSH)***	3C Marginal/Occasional	3C

Required Action(s):
Facilitate the development and maintenance of a library of JHAs that are available to all employees.

Measure: Safety Risk Management *Risk Category:* Safety *3,C*

ACTION PLAN OVERVIEW

Occupational Safety and Health (OSH) will develop an internal directive for WMATA organizational departments to identify, create, and store Job Hazard Analyses (JHA). SAFE will roll-out the directive to appropriate departments via a staff communication notice. SAFE will also create a centralized library for the storage of completed and current JHA.

Business Impact – Budget/Cost Estimate: Operating
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Develop JHA Internal Directive	OSH will develop an internal directive for organizational departments to identify, create, and store Job Hazard Analyses. SAFE will provide evidence of completion.	**Valerie Steele (OSH)**	03/16/22	12/21/22
2.	Create JHA Library	As per Actionable Item #1 (Develop JHA Internal Directive) Create library for the storage of completed and current Job Hazard Analyses. SAFE will provide electronic storage location of the library.	**Valerie Steele (OSH)**	12/21/22	02/01/23
3.	Staff Communication	As per Actionable Item #1 (Develop JHA Internal Directive), SAFE will roll-out the directive to appropriate departments and submit the communication notice.	**Valerie Steele (OSH)**	12/21/22	02/01/23
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	02/01/23	03/03/23

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

Track Maintenance and Inspections: Office of Track and Structure iCAPAs

Internal Safety Review

In response to the Internal Safety Review report regarding the Office of Track & Structures, the Office of Quality Assurance Internal Compliance & Oversight (QICO) has coordinated the development of four (4) iCAPAs. The iCAPAs have been developed to address required actions and the associated findings.

EXECUTIVE LEADERSHIP COMMITMENT

RESPONSIBLE PARTIES

[redacted]

Joseph Leader *Date*
Executive Vice President & Chief Operating Officer

[redacted]

Theresa Impastato *Date*
Executive Vice President & Chief Safety Officer

INTERNAL OVERSIGHT

[redacted]

Hakim Davis *Date*
Vice President, Quality Assurance, Internal Compliance & Oversight (QICO)

[redacted]

Eric Christensen *Date*
Executive Vice President, Internal Compliance (INCP)

[redacted] 03/21/2022

Paul J. Wiedefeld *Date*
General Manager & Chief Executive Officer (GM/CEO)

PURPOSE AND SCOPE

On February 28, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Track Maintenance (TRMN) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated findings and required action for **QICO-TRMN-22-01**.

FINDINGS

FS-TRMN-21-01: Following established safety protocols and procedures when operating or working around track equipment reduces risk to employee safety.

FS-TRMN-21-02: Consistent communication between the Equipment Operator and the Vehicle Flag Person while operating on track equipment supports a safe working environment.

REQUIRED ACTION

QICO-TRMN-21-01	***Track & Structures (TRST)***	Risk: Red	

Required Action(s):
Enforce developed safety procedures in the MSRPH and standard operating procedures to protect employees, passengers and WMATA property.

Measure: Safety Risk Management *Risk Category:* Safety *2,C*

ACTION PLAN OVERVIEW

Must be completed by Action Owner:
The office of Track and Structures (TRST) will partner with SAFE and perform a hazard analysis of the rail loading process and evaluate if safety improvements can be made. TRST will create a maintenance bulletin to re-enforce safety protocols on the roadway. This will include roadway worker activity around moving equipment in a work zone and proper communication between Equipment Operators and Vehicle Flag Persons.

Business Impact – Budget/Cost Estimate:
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	SAFE Analysis	TRST will partner with SAFE to analyze TRST rail loading activities to distinguish any hazards and establish a mitigation plan. TRST will submit the analysis and hazard mitigation plan.	**Michael Thomas** **TRST** **Supporting Office** **Matthew Swanhart** **SAFE**	03/14/22	06/22/22
2.	Rail Loading Activity Maintenance Bulletin	TRST will develop and submit a maintenance bulletin identifying any safety standard updates, if necessary, as per Actionable Item #1 (SAFE Analysis), and disseminate to all employees. TRST will also submit the applicable Track personnel roster, and acknowledgements from 95% of active applicable TRST personnel. Submission of this Actionable Item is contingent upon the outcome of Actionable Item # 1.	**Bruce Buck** **TRST**	06/22/22	09/07/22
3.	Roadway Communication Maintenance Bulletin	TRST will develop and submit a maintenance bulletin describing clear communication standards and disseminate to all employees. TRST will also submit the applicable Track personnel roster, and acknowledgements from 95% of active applicable TRST personnel.	**Bruce Buck** **TRST**	03/14/22	06/01/22
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	09/08/22	10/14/22

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.
[2] Est Start – Estimated Start Date.
[3] Est End – Estimated Completion Date.
[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

SUPPORTING ROLE ACKNOWLEDGEMENT

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

PURPOSE AND SCOPE

On February 28, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Track Maintenance (TRMN) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated findings and required action for **QICO-TRMN-22-02**.

FINDINGS

FS-TRMN-21-03: Following track repair work instructions would support quality work and consistent results.

FS-TRMN-21-05: Completing exception forms for Heat Ride inspections according to governing documentation provides traceability and verification of compliance.

REQUIRED ACTION

QICO-TRMN-21-02	***Track & Structures (TRST)***	Risk: Yellow	

Required Action(s):
Enforce established work instructions and standard operating procedures when performing routine maintenance and inspections to provide a safer work environment and support quality standards.

Measure: Safety Assurance *Risk Category:* Safety *3,C*

ACTION PLAN OVERVIEW

Must be completed by Action Owner:
The office of Track and Structures (TRST) will re-enforce maintenance repair work instructions and provide associated quality control checks to verify compliance. TRST will submit rail documentation recording ambient temperatures, heat ride inspections, and completed exception forms where required.

Business Impact – Budget/Cost Estimate:
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Fastener Bolt Installation	TRST will perform quality control checks to verify fastener bolt installation compliance with WTIK-701.2 *Stud Replacement Core Drilling and Setting of New Anchor Studs on Direct Fixation Track* and 701.3 *New Anchor Stud Locations Rock Drilling on Direct Fixation Track*. TRST will submit three months' worth of completed fastener bolt installation quality control checklists.	**Joseph Fowler TRST**	03/14/22	08/03/22
2.	Fastener Shim Installation	TRST will perform quality control checks to verify proper fastener shim installation compliance with WITK-701.4.1 *Fastener Replacement on Direct Fixation Track-Anchor Studs or Concrete Inserts*. TRST will submit three months' worth of completed fastener installation quality control checklists.	**Joseph Fowler TRST**	03/14/22	08/03/22
3.	Fastener Stud Torque Marking	TRST will perform quality control checks to verify proper stud torque marking compliance with WTIK-701.2 *Stud Replacement Core Drilling and Setting of New Anchor Studs on Direct Fixation Track* and 701.3 *New Anchor Stud Locations Rock Drilling on Direct Fixation Track*. TRST will submit three months' worth of completed fastener stud torque quality control checklists.	**Joseph Fowler TRST**	03/14/22	08/03/22

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.
[2] Est Start – Estimated Start Date.
[3] Est End – Estimated Completion Date.
[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
4.	Heat Ride Inspections	TRST will complete heat ride inspection exception forms, when applicable, to verify compliance with SOP 208-06 Heat Ride Inspection Procedure. TRST will submit documentation showing ambient temperatures for May-September 2022 with corresponding heat ride compliance for all days with temperatures 90 degrees and above.	**Joseph Fowler TRST**	05/02/22	10/12/22
5.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	10/13/22	11/18/22

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

PURPOSE AND SCOPE

On February 28, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Track Maintenance (TRMN) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated findings and required action for **QICO-TRMN-22-03**.

FINDINGS

FS-TRMN-21-04: Utilizing a specific tool for a particular job activity reduces the risk of a work-related injuries.

FS-TRMN-21-06: Performing regular tool and equipment inspections prior to work initiation demonstrates effective hazard mitigation and reduces the potential for injuries.

REQUIRED ACTION

QICO-TRMN-21-03	***Track & Structures (TRST)***	Risk: Yellow	

Required Action(s):

Assure the availability of the proper tools for specific jobs and routine inspections.

Measure: Safety Assurance *Risk Category:* Safety *3,C*

ACTION PLAN OVERVIEW

Must be completed by Action Owner:
The office of Track and Structures (TRST) will issue a maintenance bulletin to refresh track maintenance employees of proper/safe tool and equipment use. TRST will perform compliance checks of track maintenance activity to verify adherence to standards outlined in the maintenance bulletin.

Business Impact – Budget/Cost Estimate:
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Proper Tool Use Maintenance Bulletin	TRST will develop and submit a maintenance bulletin outlining the proper/safe use and condition of tools and equipment used within TRST. TRST will also submit the applicable Track personnel roster, and acknowledgements from 95% of active applicable TRST personnel.	**Bruce Buck TRST**	03/14/22	06/01/22
2.	Compliance Checks	TRST will perform compliance checks identifying proper tool use for the individual jobs and verifying non-usage of damaged equipment. TRST will submit three months' worth of completed compliance checks.	**Darryl Suggs TRST**	06/06/22	10/05/22
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	10/06/22	11/11/22

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

PURPOSE AND SCOPE

On February 28, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Track Maintenance (TRMN) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for **QICO-TRMN-22-04**.

FINDING

FS-TRMN-21-07: Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner.

REQUIRED ACTION

QICO-TRMN-21-03	***Track & Structures (TRST)***	Risk: Green	

Required Action(s):

Revise and update TRST governing documents as per OAP-108-02.

Measure: Safety Management Policy *Risk Category: Safety 4,C*

ACTION PLAN OVERVIEW

Must be completed by Action Owner:
The office of Track and Structures (TRST) will update governing documents past due for review.

Business Impact – Budget/Cost Estimate:
Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Document Update	TRST will update and submit SOP 108-03 *Quality Assurance of Track Inspections* and SOP 208-14 *Establishing and Maintaining Positive Communication between Equipment Operator and Flag Person of Class II Vehicles*.	**Bruce Buck TRST**	03/01/22	08/03/22
2.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	**QICO**	08/04/22	09/09/22

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

[redacted]

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

[redacted]

(Signature/Date)

Restraining Rail Installation and Maintenance (RRIM) iCAPAs

Engineering & Maintenance

In response to the internal review report regarding Restraining Rail Installation and Maintenance the Office of Maintenance of Way Engineering (MOWE), the Office of Engineering and Architecture (ENGA), the Office of Track and Structures (TRST), and the Office of Quality Assurance Internal Compliance & Oversight (QICO) have coordinated the development of four (4) iCAPAs. The iCAPAs have been developed to address the required actions and the associated findings.

EXECUTIVE LEADERSHIP COMMITMENT

RESPONSIBLE PARTIES

[redacted]

Joseph Leader *Date*
Executive Vice President & Chief Operating Officer

[redacted]

Andrew Off *Date*
Executive Vice President, Capital Delivery

INTERNAL OVERSIGHT

[redacted]

Hakim Davis *Date*
Vice President, Quality Assurance, Internal Compliance & Oversight (QICO)

[redacted]

Eric Christensen *Date*
Executive Vice President, Internal Compliance (INCP)

GENERAL MANAGER & CHIEF EXECUTIVE OFFICER (GM/CEO)

[redacted] 04/18/2022

Paul J. Wiedefeld *Date*
General Manager & Chief Executive Officer (GM/CEO)

PURPOSE AND SCOPE

On September 8, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Restraining Rail Installation and Maintenance Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding and required action for QICO-RRIM-21-01.

FINDING

FQ-RRIM-21-01: Implementing modifications through adequate change and configuration management processes, following an Engineering Modification Instruction (EMI) reduces potential errors and promotes compliance.

REQUIRED ACTION

QICO-RRIM-21-01	***Maintenance of Way Engineering (MOWE) Track and Structures (TRST)***	*Risk:* High	

Create and disseminate maintenance bulletins to communicate modifications in standards and maintenance practices.

Measure: Design Control *Risk Category:* Safety *[5,4]*

ACTION PLAN OVERVIEW

MOWE will create a maintenance bulletin to address the latest change to the restraining rail flangeway gap as interim solution before updating the other governing maintenance documents referencing this specification. Any additional changes to restraining rail maintenance standards in the time frame of this required action will also be submitted.

TRST will disseminate and provide acknowledgement of the maintenance bulletin(s) from track supervisors and field personnel.

Business Impact – Budget/Cost Estimate: Operating
Process Execution – A current process/procedure exists that meets the Required Action(s), but needs to be executed. This type of initiative does not need additional resources.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Flangeway Width Maintenance Bulletin	MOWE will create and submit a maintenance bulletin for the modification in restraining rail flangeway width. Other interim updates to maintenance standards will be created and submitted if needed. Maintenance bulletins will be submitted to TRST management.	**Ravi Amin MOWE**	09/27/21	12/01/21
2.	Maintenance Bulletins Acknowledge-ment	TRST will disseminate the maintenance bulletins to all active TRST track maintenance/inspection personnel and submit evidence of acknowledgement.	**Bruce Buck TRST**	12/01/21	02/02/22
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	02/02/22	03/04/22

PERFORMANCE MEASURES

Evidence that 95% of active TRST track maintenance/inspection supervisory and field personnel acknowledge receipt of maintenance bulletins as per Actionable Item #2.

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

MOWE	Ravi Amin	[redacted]
		(Signature/Date)
MOWE	Sariah TambreLeigh	[redacted]
		(Signature/Date)
TRST	Bruce Buck	[redacted]
		(Signature/Date)
TRST	Joseph Fowler	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

RIME	Nathan Williams	[redacted]
		(Signature/Date)

THIRD-LEVEL RESPONSIBILITY

RAIL	Michael Hass	[redacted]
		(Signature/Date)

PURPOSE AND SCOPE

On September 8, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Restraining Rail Installation and Maintenance Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding and required action for QICO-RRIM-21-02.

FINDING

FQ-RRIM-21-02: Adherence to Restraining Rail installation requirements within design criteria establishes consistency and compliance.

REQUIRED ACTION

QICO-RRIM-21-02.	***Maintenance of Way and Engineering (MOWE) Engineering & Architecture (ENGA)***	*Risk:* Elevated	

Conduct a curved rail study and update design criteria based upon the results of the study.

Measure: Document Control *Risk Category:* Service Delivery *[4,3]*

ACTION PLAN OVERVIEW

MOWE will develop a scope of work for a third-party contract for evaluation and recommendations on a curved restraining rail study. MOWE will oversee the evaluation and collect the report from the contractor. MOWE will formally submit any recommendations to ENGA for review by the Configuration Change Control Board.

ENGA will conduct a Configuration Change Control Board meeting to review any recommendations from MOWEs notification for approval. If the changes are approved, interim notification will be sent out to fill the gap between the next design criteria update.

Business Impact – Budget/Cost Estimate: Capital

New/Expanded Initiative or Process – A new initiative needs to be created or a current process/procedure needs to be substantially expanded to address the Required Action(s). Additional resources will be required to address these initiatives.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Curved Restraining Rail Study Scope of Work	MOWE will develop and submit the scope of work for a third-party contractor to conduct a curved restraining rail study.	**Ravi Amin MOWE**	12/01/21	04/06/22
2.	Curved Restraining Rail Study	MOWE will partner with a consultant and submit a final report of the curved restraining rail study.	**Ravi Amin MOWE**	04/06/22	04/10/24
3.	Design Criteria Notification	MOWE will formally notify ENGA on the necessary updates to the design criteria based upon the results of the curve restraining rail study. MOWE will submit the formal notification.	**Ravi Amin MOWE**	04/10/24	07/10/24
4.	Configuration Change Control Board Meeting Results	Based on Actionable Item #3, the revised design criteria will be reviewed by the Configuration Change Control Board. ENGA will submit the results of the Configuration Change Control Board meeting.	**Nick Gardner ENGA**	07/10/24	01/08/25
5.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	01/08/25	02/05/25

PERFORMANCE MEASURES

N/A

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

MOWE	Ravi Amin	[redacted]
		(Signature/Date)
MOWE	Sariah TambreLeigh	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

ENGA	Nichalos Gardner	[redacted]
		(Signature/Date)
RIME	Nathan Williams	[redacted]
		(Signature/Date)

THIRD-LEVEL RESPONSIBILITY

RAIL	Michael Hass	[redacted]
		(Signature/Date)

PURPOSE AND SCOPE

On September 8, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Restraining Rail Installation and Maintenance Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding and required action for QICO-RRIM-21-03.

FINDING

FQ-RRIM-21-03: Alignment of design criteria, maintenance standards, work instructions, and issuance of consistent governing documents would improve efficiency and reduce uncertainty performing inspections and maintenance.

REQUIRED ACTION

QICO-RRIM-21-03.	***Maintenance of Way Engineering (MOWE) Track and Structures (TRST)***	*Risk:* Elevated	

Update controlled documents to reflect the consistent design and maintenance standards throughout.

Measure: Inspection, Testing & Status *Risk Category:* Service Delivery *[5,4]*

ACTION PLAN OVERVIEW

MOWE will conduct a review of restraining rail installation, inspection, and maintenance governing documents to verify alignment and consistency throughout. Change control logs will be submitted as governing documents are reviewed within their respective periodicity.

TRST will disseminate and provide acknowledgement of the updated governing documents from track supervisors and field personnel.

Business Impact – Budget/Cost Estimate: Operating

Process Improvement – A current process/procedure needs to be optimized to address the Required Action(s). This type of initiative does not need additional resources because current manpower will be used to improve the process.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Restraining Rail Governing Documents	MOWE will update and submit the change control logs of reviewed TRST 1000 Volume 2, Volume 3, and restraining rail related work instructions to ensure alignment and consistency throughout. MOWE will also submit updated governing documents related to the restraining rail inspection and maintenance.	**Ravi Amin MOWE**	10/13/21	02/01/23
2.	Distribution and Acknowledge-ment	TRST will disseminate all updated documentation to all track inspection/maintenance supervisory and field personnel as per Actionable Item #1 TRST will submit evidence of acknowledgement of the governing documents.	**Bruce Buck TRST**	02/01/23	04/26/23
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	04/26/23	05/31/23

PERFORMANCE MEASURES

Evidence that 95% of active TRST track inspection/maintenance supervisory and field personnel acknowledge receipt of updated documentation as per Actionable Item #2.

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.
[2] Est Start – Estimated Start Date.
[3] Est End – Estimated Completion Date.
[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

MOWE	Ravi Amin	[redacted] (Signature/Date)
MOWE	Sariah TambreLeigh	[redacted] (Signature/Date)
TRST	Bruce Buck	[redacted] (Signature/Date)
TRST	Joseph Fowler	[redacted] (Signature/Date)

SECOND-LEVEL RESPONSIBILITY

RIME	Nathan Williams	[redacted] (Signature/Date)

THIRD-LEVEL RESPONSIBILITY

RAIL	Michael Hass	[redacted] (Signature/Date)

PURPOSE AND SCOPE

On September 8, 2021, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Restraining Rail Installation and Maintenance Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding and required action for QICO-RRIM-21-04.

FINDING

FQ-RRIM-21-04: Provide guidance on restraining rail inspection and proper documentation of conditions and any defects.

REQUIRED ACTION

QICO-RRIM-21-04.	***Track and Structures (TRST)***	*Risk:* Elevated

Review all rail inspection and maintenance documents for alignment of designated tasks with current practices, and conduct quality assurance checks to verify adherence to approved restraining rail maintenance and repair documents.

Measure: Inspection, Testing & Status *Risk Category:* Service Delivery *[4,4]*

ACTION PLAN OVERVIEW

Alignment of restraining rail inspection governing documents is covered by QICO-RRIM-03.
The quality control checks will be completed with the form included in Track Work Instruction 700.4.8 and per SOP 208-15 guidelines. TRST is to provide three (3) months of quality control checks on restraining rail maintenance.

Business Impact – Budget/Cost Estimate: Operating
Process Execution – A current process/procedure exists that meets the Required Action(s), but needs to be executed. This type of initiative does not need additional resources.

Actionable Items		Description	Responsible Party[1]	Est Start[2]	Est End[3]
1.	Conduct Quality Control Checks	TRST will submit three (3) months of quality control checklists for Restraining Rail maintenance.	**Demond Lyles TRST**	10/13/21	03/02/22
2.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is reasonable evidence that the findings and this required action have been resolved, taking into account the actionable item descriptions and performance measures.	**QICO**	02/16/22	03/16/22

PERFORMANCE MEASURES

N/A

[1] In the event of personnel or departmental changes, responsibilities for actionable items shall transfer to the new leadership.

[2] Est Start – Estimated Start Date.

[3] Est End – Estimated Completion Date.

[4] Offices designated as supporting roles provide subject matter expertise to responsible parties during action development and are not directly responsible for delivery of actionable items listed above.

RESPONSIBLE PARTIES

TRST	Demond Lyles	[redacted]
		(Signature/Date)
TRST	Joseph Fowler	[redacted]
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

RIME	Nathan Williams	[redacted]
		(Signature/Date)

THIRD-LEVEL RESPONSIBILITY

RAIL	Michael Hass	[redacted]
		(Signature/Date)

SUPPLEMENTAL MATERIALS

APPENDIX A: SAFETY MANAGEMENT SYSTEM COMPONENTS

Pillar 1: Safety Management Policy

- ***ASP Management:*** *Updates and revisions to the safety plan and establishment of targets.*
- ***Responsibilities:*** *Specific and common departmental responsibilities for all employees.*
- ***Emergency Management:*** *Development, maintenance, and implementation of all security and emergency management documentation.*
- ***Documentation:*** *General document maintenance as it pertains to the ASP.*

Pillar 2: Safety Risk Management

- ***Hazard Risk Assessment:*** *The methodology and process which outlines how safety risk is assessed.*
- ***Hazard Identification:*** *Process of how hazards are identified.*
- ***Hazard Reporting:*** *Employee and customer hazard reporting programs/process.*
- ***Hazard Resolution and Tracking:*** *The mitigation and ongoing tracking of identified hazards.*

Pillar 3: Safety Assurance

- ***Safety Data Analysis:*** *Departmental responsibility to identify and analyze data on their safety critical functions.*
- ***Compliance:*** *Ongoing performance monitoring activities and maintenance control plans.*
- ***Analysis & Risk Mitigation:*** *Risk identification, investigation, analysis, mitigation, corrective action plans, and continuous improvement.*
- ***Configuration Management:*** *Change management, system modification, and safety and security certification.*
- ***Procurement:*** *Development of measures to ensure that the safety principles, requirements and representatives are included in the transit agency's procurement process.*

Pillar 4: Safety Promotion

- ***Training:*** *Establishment of safety-training requirements, communication, and recordkeeping for personnel, adhering to all applicable safety and health statutes and regulations.*
- ***Hazardous Materials:*** *Processes, training, approval, protective equipment, and documentation of chemicals and hazardous or toxic substances.*
- ***Environmental Management:*** *Processes, training, approvals, and compliance checks as they relate to environmental management and regulation compliance.*
- ***Drug and Alcohol Compliance:*** *Departmental training and compliance with the established Substance Abuse Policy and Employee Assistance Program.*

APPENDIX B: THE 15 CORE QMS STANDARDS PER THE QUALITY MANAGEMENT SYSTEM PLAN

1. ***Management Responsibilities:*** *Commitment of senior management to implement, maintain, and continually improve upon WMATA's Quality Management System*
2. ***Documented Quality Management System:*** *The combined set of quality documents, including a Quality Management System Plan, subordinate Quality Management Plans, Policies & Procedures, Work Instructions, Forms, etc.*
3. ***Design Control:*** *Processes to ensure the consistent development and maintenance of quality design documentation for projects and assets based on requirements, standards, criteria, etc.*
4. ***Document Control:*** *Managing information to ensure the most current approved documents are used*
5. ***Purchasing:*** *Providing for timely procurement of the right items/assets and services required for proper performance*
6. ***Identification & Traceability of Assets & Materials:*** *The ability to track the unique history, location performance, and configuration of any asset over its lifecycle*
7. ***Process Control:*** *Management and documentation of inter-related resources and activities to turn inputs into outputs/outcomes*
8. ***Inspection, Testing & Status:*** *Verification and documentation that practices, processes, assets, and materials comply with applicable procedures, specification, etc. and are fit for service*
9. ***Inspection, Measuring & Test Equipment:*** *Identification and periodic testing and calibration of measuring and test equipment to assure readiness for use*
10. ***Non-Conformance:*** *Systematic tracking of work performed or material that does not meet procedures, specs, contract requirements, etc.*
11. ***Corrective & Preventive Actions:*** *Measured taken to modify processes/procedures to correct and prevent recurrence of non-conformances and failures*
12. ***Quality Records:*** *Documents generated by Quality functions that provide objective evidence of fulfilment of requirements*
13. ***Internal Reviews & Quality Assessments:*** *Independent, objective review of conformance to quality standards and/or the overall effectiveness of processes in delivering acceptable levels of quality*
14. ***Training:*** *Providing skills and knowledge required for staff to successfully perform a job*
15. ***Customer Focus:*** *Proactively addressing the needs and wants of internal and external customers, always*

APPENDIX C: RISK ASSESSMENT (ISR)

Risk Assessment Methodology

Internal Safety Reviews performed by QICO utilize a safety risk evaluation method based on MIL-STD-882E, which categorizes all identified hazards in terms of severity and probability of occurrence.

- A hazard probability may be derived from the analysis of transit system operating experience, evaluation of WMATA safety data, the analysis of reliability and failure data, or from historical safety data from other passenger rail systems or bus systems.
- Hazard severity is a subjective determination of the worst case that could be anticipated to result from human error, design inadequacies, component failure or malfunction. The categorization of hazards is consistent with risk-based criteria for severity; it reflects the principle that not all hazards pose an equal amount of risk to personal safety.

Risk Management Likelihood Scale

Probability	Value	Qualitative Meaning	Quantitative Meaning
Frequent	A	Opportunity for risk to be realized expected to occur often	Probability of occurrence greater than or equal to 10-1 (10%)
Probable	B	Opportunity for risk to be realized expected on a recurring basis	Probability of occurrence less than 10-1 (10%) but greater than or equal to 10-2 (1%)
Occasional	C	Opportunity for risk to be realized expected to occur	Probability of occurrence less than 10-2 (1%) but greater than or equal to 10-3 (0.1%)
Remote	D	Opportunity for risk to be realized not expected to occur but possible	Probability of occurrence less than 10-3 (0.1%) but greater than or equal to 10-6 (0.0001%)
Improbable	E	Opportunity for risk to be realized not expected to occur and almost inconceivable	Probability of occurrence less than 10-6 (0.0001%)

Risk Management Severity Scale

Probability	Value	Meaning
Catastrophic	1	Risk realization expected to result in one or more of the following: death, permanent total disability, loss of occupied volume with equipment damage causing separations in structure, infrastructure damage that suspends service through the affected area for greater than 24 hours.
Critical	2	Risk realization expected to result in one or more of the following: permanent partial disability, injuries/illness that results in hospitalization, loss of occupied volume with equipment damage that causes openings but no separations in structure, infrastructure damage that suspends service through the affected area for greater than 2 and up to 24 hours.
Marginal	3	Risk realization expected to result in one or more of the following: injury or illness resulting in one or more lost work day(s),occupied volume with equipment damage that causes no openings in structure, infrastructure damage that suspends service through the affected area for more than 30 minutes and up to 2 hours.
Negligible	4	Risk realization expected to result in one or more of the following: injury or occupational illness that does not result in a lost work day, no loss of occupied volume, equipment or infrastructure damage that does not suspend service nor cause a delay through the affected area for more than a maximum of 30 minutes.

APPENDIX C: RISK ASSESSMENT (ISR)

Risk Assessment Matrix

Probability	Severity: Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)
Frequent (A)	1A	2A	3A	4A
Probable (B)	1B	2B	3B	4B
Occasional (C)	1C	2C	3C	4C
Remote (D)	1D	2D	3D	4D
Improbable (E)	1E	2E	3E	4E

Risk Probability

Risk Severity

Risk Index

Red	1A, 2A, 3A, 1B, 2B, 3B, 1C, 2C, 1D	GM, COO, and CSO acceptance required to continue activity without level-changing mitigations in place.
Yellow	4A, 4B, 3C, 2D, 3D, 1E, 2E, 3E	VP level acceptance required to continue activity without level-changing mitigations in place.
Green	4C, 4D, 4E	Risk effectively mitigated or considered so unlikely its acceptable as-is.

APPENDIX D: RISK ASSESSMENT (IR)

Risk Assessment Methodology

Risk is defined as an uncertain event or condition that, if it occurs, has a positive or negative effect on the organization's objectives and operations (both threats and opportunities). It is assessed on the combination of the probability of occurrence of risk and the severity of the risk. Risk management is an attempt to answer the following questions:

- What can go wrong? – The Risk
- How bad are the consequences? – The Impact
- How often does/will it happen? – The Probability of Occurrence
- Is the risk acceptable? – The Risk Treatment, Remediation

Categories of Risk

- ***Service Delivery*** – A broad range of risks with direct or indirect impact on daily transit and/or business operations. The risk of direct or indirect losses or other negative effects due to inadequate or failed internal business or transit operations, or from external events that impair internal processes, people, or systems.
- ***Financial*** – The risk to achievement of the Authority's mission arising from an inability to manage credit, debt and financial leverage, and other financial resources. Financial risk would also include risk arising from adverse movements in market rates or the Authority's inability to meet its obligations.
- ***Legal & Compliance*** – Risks arising from a failure to comply with applicable laws and regulations and a failure to detect and report activities that are not compliant with statutory, regulatory, or internal policy requirements. Failure to comply with prescribed guidelines and established practices. This would also include a lack of awareness or ignorance of the relevant standards, guidelines or regulations.
- ***Safety*** – The risk of achievement of the Authority's mission arising from failures to prevent hazards that may cause harm to human, equipment, or the environment. This would also include risk arising from the Authority's inability to comply with safety-related legal or regulatory standards.
- ***Strategic*** – Risks arising from failure to achieve strategic or tactical objectives, an adverse business decision, or a lack of strategic direction and leadership. This would also include the ineffective implementation of the strategic plans, a lack of business strategies developed to achieve goals, and inadequate resources deployed against the achievement of those goals. Strategic risks can be affected by changes in the political environment such as changes in administration and resulting changes in strategic priorities. Strategic risks can also be triggered by actions of key stakeholders such as the Tri-Jurisdictional law makers or the Federal Transit Administration (FTA).
- ***Technology*** – The risk of unexpected losses from inadequate systems, breaches in information technology security, and inadequate business continuity planning. This would also include risks to the achievement of the Authority's mission arising from the inability of networks, security, and technologies to meet Metro's evolving needs.
- ***Reputation*** – The risk to the achievement of the Authority's mission arising from negative internal or external stakeholder opinion. Reputation risk affects the Authority's ability to establish new and/or sustain existing relationships.

Risk Assessment Process

The following risk matrix is used to assess risks within the universe of review areas. The universe (see Table 1) is comprised of the potential range of all review activities and review business units (or departments) that fall within QICO's scope and oversight authority. These business units consist of programs, processes, assets and people which together contribute to the fulfilment of the departments' strategic goals (Goal 1 - Build Safety Culture; Goal 2 - Deliver Quality Service; Goal 3 - Improve Regional Mobility; and Goal 4 - Ensure Fiscal Stability).

Risks are assessed based on the significance of their impact (see horizontal axis in Figure 1) and the probability of occurrence (see vertical axis in Figure 1). The probability ratings are rated on a scale of 1 (minimum) to 5 (maximum) and are driven by the metrics shown on the next page. The impacts ratings are also rated on a scale of 1 (minimum) to 5 (maximum) and are driven by the category of risks, which are then aligned on the metrics shown on the next page.

Each finding is given a severity rating of Insignificant, Low, Moderate, Elevated or High. All areas with Elevated/High ratings are considered to be high risk to the organization's objectives; and need to be mitigated/reduced in severity at the earliest. The risk ratings to the findings are provided as "Type of Risk" followed by "Severity Rating (Impact, Probability)" (e.g. a finding with *"Elevated (IMP 4, PROB 3)"* would mean a 'significant (4)' impact along with a 'possible (3)' probability of occurrence).

APPENDIX D: RISK ASSESSMENT (IR)

Risk Assessment Matrix

Probability of Occurrence	Negligible (1)	Minor (2)	Moderate (3)	Significant (4)	Major (5)
Almost Certain (5)	Low	Moderate	Elevated	High	High
Likely (4)	Low	Low	Moderate	Elevated	High
Possible (3)	Low	Low	Moderate	Elevated	Elevated
Unlikely (2)	Insignificant	Low	Low	Moderate	Moderate
Rare (1)	Insignificant	Insignificant	Low	Moderate	Moderate
Probability / Impact	Potential Impact of Risk				

Risk Scale Definitions

Insignificant	Reasonable assumption that this risk will not occur and unlikely to cause the activity to fail to meet part of its objective.
Low	Reasonable assumption that this risk will likely not occur & may cause a failure of the business process to meet part of its objectives.
Moderate	Reasonable assumption that this risk may occur & may cause a failure of the business process to meet a significant part of its objectives.
Elevated	Reasonable assumption that this risk will likely occur & likely to cause a failure of the business process to meet a significant part of its objectives.
High	Reasonable assumption that this will occur & will cause a failure of the business process to meet its objectives or cause objective failure in other activities.

Potential Impact

(1) Negligible – Unlikely to cause the activity to fail to meet part of its objectives.

(2) Minor – May cause a failure of the business process to meet part of its objectives, which may expose Metro to minor financial losses, less- effective or efficient operations, some non- compliance with laws and regulations, waste of resources, etc.

(3) Moderate – May cause a failure of the business process to meet a significant part of its objectives, or negatively impact the objectives of other activities, which may expose Metro to moderate financial losses, reductions to or ineffectiveness of operations, non- compliance with laws and regulations, sizable waste of resources, etc.

(4) Significant – Likely to cause a failure of the business process to meet a significant part of its objectives, or negatively impact the objectives of other activities, which may expose Metro to significant financial losses, reductions to or ineffectiveness of operations, non- compliance with laws and regulations, sizable waste of resources, etc.

(5) Major – Will cause a failure of the business process to meet its objectives, or cause objective failure in other activities, which may cause or expose Metro to major financial losses, interruptions in operations, failure to comply with laws and regulations, major waste of resources, failure to achieve stated goals, etc.

Probability of Occurrence

(1) Rare – Reasonable assumption that this risk will not occur

(2) Unlikely – Reasonable assumption that this risk will likely not occur

(3) Possible – Reasonable assumption that this risk may occur

(4) Likely – Reasonable assumption that this risk will likely occur

(5) Almost Certain – Reasonable assumption that this will occur

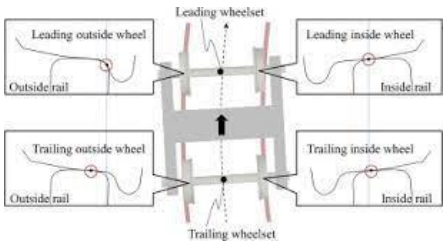
APPENDIX E: TECHNICAL TERMINOLOGY

DESCRIPTION

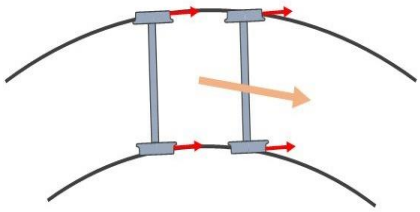
- **AFCS Maintenance Field Office Dispatch Center (Helpdesk):** Where all failures relating to Rail AFCS equipment are reported (L'Enfant Plaza). It is manned by dispatchers and at least one AFCS supervisor during the hours of revenue operation. Station Managers and possibly other WMATA personnel call the center to report problems with AFCS devices. Work orders are then generated, and technicians are dispatched to investigate. The dispatch center provides a secure "Keywatcher" system for managing the keys to fare vendors, which each technician must pick up at the beginning of their shift and return at the end of their shift.

- **Chain Markers:** Chain Markers identify the distance, in multiples of 100 ft., to the middle of the Metro Center platform (or to the most inbound end of the rail line, if the line does not pass-through Metro Center). In the illustration, B, represents the line of revenue service, the 2, denotes track 2 and 132+00 represents 132 x 100 feet from Metro Center.

- **Climb Derailment:** The loss of relationship between the wheel and rail, whereas the wheel lifts (climb) from the guidance of the track and derails.



- **Curve:** Any uniformed change in direction of alignment measured in degrees or radius.

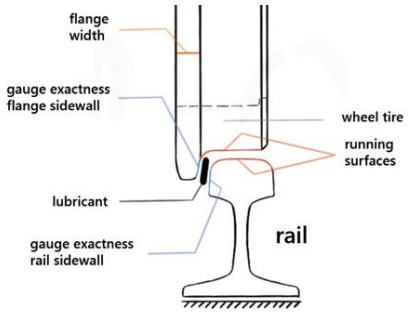


- **Exitfare Machine:** Automated machine located on station platforms or mezzanines where customers can reload farecards with money in order to exit the station.

DESCRIPTION

- **Farecard Vendor:** Automated machine located within the station mezzanine where customers can purchase a disposable farecard for a user defined amount of money.

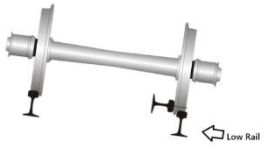
- **Flangeway Width:** The distance between head of low rail and Restraining Rail. The open way or channel through a track structure which provides a passageway for wheel flanges.

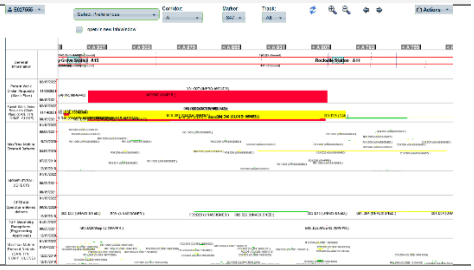


- **Horizontal Restraining Rail:** WMATA uses two forms of Restraining Rail in its system being the Horizontal and Vertical designs. Both are located on mainline and yard tracks, weather ballasted or direct fixation. The older design in the process of being replaced, is a horizontal 115 lbs. tee rail bolted on a chair adjacent to the low running rail. The newer design is 132 lbs. bolted through a web spacer block web connect to the low running rail.

- **Interlocking:** Various locations around the system and in rail yards where trains can crossover from one track to the other.

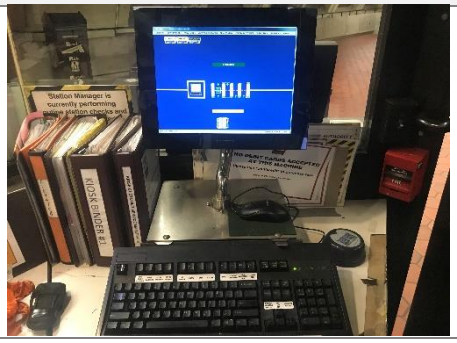
- **Low Rail Curve:** Inside low rail in a curve. In a design system of curve, the design raise level of the outer rail to the inner rail in a curve. The inner rail maintains its original level.



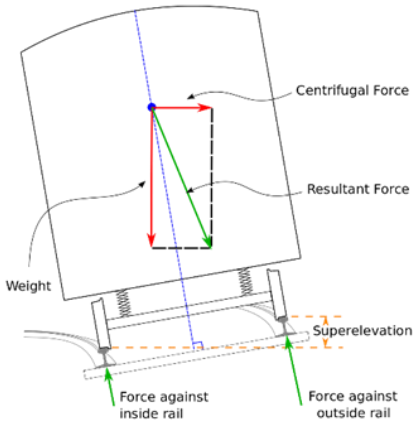
DESCRIPTION	
- **MaxTrax:** Data repository where track defects are identified and stored by location and defect type.	
- **Pandrol Clip:** A clip (shown in red) which is used to secure and properly seat the rail on to the tie plate. The Pandrol Clip also aids in preventing the rail from expanding and contracting during periods of extreme heat or cold, respectively.	
- **Roadway:** The WMATA Roadway is anywhere a rail vehicle may travel, whether at-grade, through tunnels or on aerial structures. It also includes arrival and departure tracks between terminals and yard identification signs.	
- **SmarTrip Card:** A contactless, closed-loop prepaid card used to access both WMATA's Metrobus and Metrorail system. The card uses near-field RFID to communicate with readers on each faregate or bus farebox machine.	
- **SmarTrip Dispenser:** Automated machine where customers can purchase plastic reusable farecards to utilize throughout the system.	

DESCRIPTION

- **Station Operator Console:** The SOC is a computer within the Kiosk of Metro stations which provides monitoring and control functions for all AFCS devices associated with a single station. It allow Station Managers and other authorized personnel to place fare vendors and faregates in or out of service, configure faregates for entry or exit operation (control direction), and read patron's smartcards on the SOC's attached card reader.

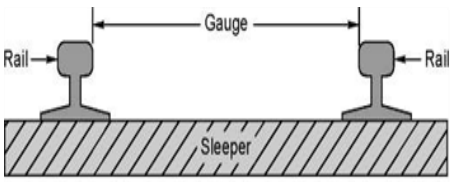


- **Superelevation:** The vertical distance that the outer rail is above the inner rail in a curve.

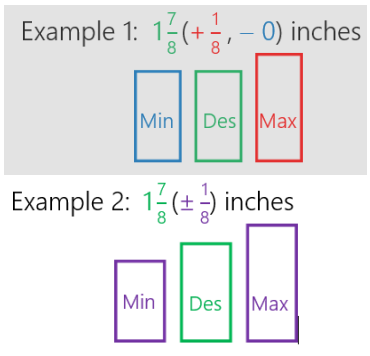


- **Vertical Restraining Rail:** WMATA uses two forms of Restraining Rail in its system being the Horizontal and Vertical designs. Both are located on mainline and yard tracks, weather ballasted or direct fixation. The older design in the process of being replaced, is a horizontal 115 lbs. tee rail bolted on a chair adjacent to the low running rail. The newer design is 132 lbs. bolted through a web spacer block web connect to the low running rail.

- **Track Gauge:** Gauge is measured between the heads of the rails at right-angles to the rails in a plane $\frac{5"}{8}$ below the top of rail.



- **Tolerance Notation:** Nomenclature to denote the ranges of acceptable measurement for manufactured components. In example 1, the desired measurement (green) is $1\frac{7}{8}$ inches. There is design tolerances (red) of plus $\frac{1}{8}$ inch yielding a maximum acceptable measurement of 2 inches. There is another design tolerance (blue) of minus 0 inches, yielding a minimum of
- $1\frac{7}{8}$ inches. In example 2, the tolerance is uniform (purple), denoted with the plus or minus symbol with maximum acceptable measurement of 2 inches and a minimum acceptable measurement of $1\frac{3}{4}$ inches.



Additional Terms
- **Area of Refuge (AOR):** Sometimes known as an Area of Rescue Assistance, AOR is a location in a building designated to hold occupants during an emergency, when evacuation may not be safe or possible. Occupants can wait there until rescued or relieved by first responders.
- **Controlled Document:** Is any digital or hard-copy entity which is required by a company, a standard organization, or a regulatory agency to be managed within a tightly controlled process that maintains the integrity of the document's content through revisions
- **Corrective Action Plan (CAP):** A plan or set of tasks that outline corrective measures planned or already taken to address external audit recommendations and related deficiencies or findings
- **Corrective Maintenance (CM):** Maintenance which is carried out after "failure" of an asset and is aimed at restoring an asset to a condition in which it can perform its intended function reliably (state of good repair).
- **COVID Clean Program:** A leadership-driven joint effort between SAFE and Plant (PLNT) for the notification, cleaning, and disinfection of work areas after an employee reports COVID-19 exposure
- **Documentum:** Electronic document management system software that provides a single source for documentation storage and controlled access.
- **Documented Process**: The comprehensive and consistent development of documentation of procedures and/ or policies that specify thee work conducted by a department
- **Engineering Modification Instruction (EMI):** The system of record for approval and validation of changes in components, assemblies (including fit, form or function), or documents such as processes, part numbers including the Parts Action Form (PAF) process and work instructions and/or changes in specifications.
- **Fatigue Risk Management**: Data driven means of continuously monitoring and maintaining fatigue related safety risks
- **Hazard Log:** Is the continually updated record of all safety management activities, hazards identified, risk assessment and risk reduction activities, as well as solutions and decisions taken
- **Internal Corrective and Preventive Action (iCAPA):** A plan or set of tasks that outline corrective measures planned or already taken to address internal audit recommendations and related deficiencies or findings
- **Job Hazard Analysis (JHA):** A documented list of potential hazards or conditions specific to a particular job, project, or task
- **Limited Maintenance (LM):** Maintenance that is performed to bring an AFCS asset in-service for use, although some functionality may not be present in the equipment (Limited Service)
- **Maximo:** The current System of Record for work accomplishment as well as the current System of Record for all non-mainline defects.
- **Operations Administrative Policy (OAP):** Is a set of administrative policies, applicable to specified departmental administrative and management activities, which applies to employees at all levels, and provide uniform guidance for the daily operations.
- **OPTRAM:** The current System of Record for defects on the Mainline. Mainline are tracks other than yard tracks and storage tracks.
- **Policy/Instruction:** a set of principles, rules, and guidelines formulated or adopted by an organization to reach its long-term goals and typically published in a booklet or other form that is widely accessible. They are usually designed to influence and determine all major decisions and actions, and all activities take place within the boundaries set by them.
- **ProCore:** A construction management software application.
- **Public Transit Agency Safety Plan (PTASP):** Documented comprehensive agency safety plan for a transit agency.
- **Risk Register:** Is a document used as a risk management tool and to fulfill regulatory compliance acting as a repository for all risks identified and includes additional information about each risk.
- **Safety Bulletin:** A supplemental notification delivered by the company that contains new information, recommendations, or safety awareness and guidance for current workplace safety and health regulations.
- **Safety Committee:** Is an organizational group within a workplace who work together through the regularly scheduled meetings to identify and recommend solutions to health and safety problems.
- **Safety Risk Coordinator:** Is an individual charged with managing safety within a workplace

Additional Terms
- **Standard Operating Procedure (SOP):** Is a set of step-by-step instructions compiled by an organization to help workers carry out routine operations.
- **Subject Matter Expert (SME):** A person who has special skills or in-depth knowledge on a particular job or topic.
- **System Safety Program Plan (SSPP):** Is the blueprint for the Authority's efforts in strengthening its overall safety - management and its goal of continuous improvement in safety performance. It sets forth the requirements for systematically identifying, evaluating, and minimizing safety risks throughout all elements of the Metrorail, Metrobus and Metro Access systems.
- **Test, Measurement and Diagnostic Equipment (TMDE):** All devices, including diagnostic and prognostic equipment, used to measure, test, gauge, inspect, or otherwise examine the operational condition of an end-item, to identify and isolate any actual or potential malfunctions.
- **Test, Training Matrix/Log:** A tool used in an organization to track training and skills, both required, and the team's desired skills needed to complete a particular project.