



March 17, 2023

QICO 2022

CY22 Q2-Q3 REVIEWS

Washington Metropolitan Area Transit Authority
WMATA

- 6. *Silver Line Safety Certification Oversight Internal Review*
- 7. *Office of Car Track Equipment Maintenance Internal Safety Review*
- 8. *Engineering Modification Instruction Internal Review*
- 9. *Structures Maintenance Leak Mitigation Process Internal Review*



TABLE OF CONTENTS

CY22 Q2-Q3 COMPREHENSIVE INTERNAL QUALITY & SAFETY REVIEW SUMMARY	1
6. Silver Line Safety Certification Oversight Internal Review	3
6.1 FUNCTIONAL OVERVIEW AND STRUCTURE	4
6.2 REVIEW SCOPE	6
6.3 AREAS FOR IMPROVEMENT	7
6.4 SUMMARY OF REQUIRED ACTIONS	12
7. Office of Car Track Equipment Maintenance Internal Safety Review	14
7.1 FUNCTIONAL OVERVIEW AND STRUCTURE	15
7.2 REVIEW SCOPE	17
7.3 WHAT WORKED WELL	19
7.4 ITEMS RESOLVED DURING REVIEW	20
7.5 AREAS FOR IMPROVEMENT	21
7.6 SUMMARY OF REQUIRED ACTIONS	27
8. Engineering Modification Instruction Internal Review	31
8.1 FUNCTIONAL OVERVIEW AND STRUCTURE	32
8.2 REVIEW SCOPE	34
8.3 AREAS FOR IMPROVEMENT	36
8.4 SUMMARY OF REQUIRED ACTIONS	42
9. Structures Maintenance Leak Mitigation Process Internal Review	44
9.1 FUNCTIONAL OVERVIEW AND STRUCTURE	45
9.2 REVIEW SCOPE	47
9.3 ITEMS RESOLVED DURING REVIEW	49
9.4 AREAS FOR IMPROVEMENT	52
9.5 SUMMARY OF REQUIRED ACTIONS	57
INTERNAL CORRECTIVE AND PREVENTIVE ACTIONS (ICAPAS)	60
Silver Line Safety Oversight	61
Car Track Equipment Maintenance	72
Engineering Modification Instruction	89
Structures Maintenance Leak Mitigation	104
SUPPLEMENTAL MATERIALS	115
APPENDIX A: QUALITY MANAGEMENT SYSTEM CORE STANDARDS	121
APPENDIX B: QUALITY REVIEW RISK ASSESSMENT	117
APPENDIX C: SAFETY MANAGEMENT SYSTEM COMPONENTS	120
APPENDIX D: SAFETY REVIEW RISK ASSESSMENT	121

WHAT WE DO



What is QICO?

The Office of Quality Assurance, Internal Compliance & Oversight is an internal management function that partners with other departments to provide an objective review. 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:

- Silver Line Safety Certification & Oversight
- Car Track Equipment Maintenance
- Engineering Modification Instruction
- Structures Maintenance Leak Mitigation Process

QICO’s Methodology:

- Develop relevant review activities by identifying and assessing risks to policies, procedures & standards, quality & compliance, and traceability.
- Review documentation, observe processes, and interview key personnel.

Review findings and required actions are rated based on level of risk, 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 | CY22 Q2-Q3 INTERNAL REVIEWS

March 2023

(6) Silver Line Safety Certification & Oversight

Service Delivery

Areas for Improvement Identified During Review:

- Performing quality audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.
- Establishing and implementing processes to oversee and monitor SAFE’s contractor K&J performance would provide a standard, promote efficiency, and assist in maintaining compliance throughout the life of the project.
- Creating detailed work instructions describing the Certifiable Item List approval/rejection process would reduce rework and waste while encouraging consistency of work performed.
- Having a master repository of all project documents is essential in storing, organizing, tracing, and accessing project data.
- Developing and maintaining the required training matrix for each safety and security certification position allows for uniformity and promotes compliance with all training requirements.

(7) Car Track Equipment Maintenance (CTEM)

Internal Safety Review

Wins:

CTEM management compliance with safety observations/conversations program exceeds the established goal, promoting a positive safety culture.

Items Resolved During Review:

Complying with the established safety protocols and processes promotes risk mitigation in the workplace.

Areas for Improvement Identified During Review:

- The utilization of a fall protection system supports a proactive safety management system and compliance with regulatory standards.
- The inspection of fire extinguishers inside the Roadway Maintenance Machines (RMMs) promotes risk mitigation and compliance with regulatory standards.
- The creation and usage of standardized maintenance instruction manuals for all equipment will promote safe maintenance practices.
- Conducting regular and thorough inspections of maintenance facilities strengthens the ongoing risk management process and ensures compliance with OSHA requirements.
- Performing shelf-life inspections as outlined in the internal procedure prevents utilizing expired parts and materials (Repeat Finding).
- The presence of a designated Deputy Compliance Officer (DCO) will enhance compliance with existing environmental management policies.
- A Maintenance Control Plan (MCP) is essential for consistency and traceability of maintenance activities.
- Completing Maximo work orders with specific data element promotes maintenance data accuracy and safety performance reporting.

WHAT WE WILL DO MOVING FORWARD

(6) Key Takeaway:

Developing controlled work processes, strengthening contractor oversight, and regularly performing audits would provide assurance and transparency.

Required Actions:

- QICO- SLSC -22-01: Enforce implementation of quality control audits and establish departmental controls to include contractor oversight as well as detailed work instructions for item review and approval.
- QICO- SLSC -22-02: Create and maintain a master repository throughout the project life cycle for all safety certification documents and records.
- QICO-SLSC-22-03: Develop a training matrix for all safety and security certification positions.

(7) Key Takeaway:

Increasing employee awareness of the PTASP and aligning the core elements with departmental processes will provide shared understanding and collaboration for a smooth implementation of a proactive safety management system (SMS).

Required Actions:

- QICO-CTEM-22-01: Implement a fall protection system, which includes approved equipment, documented procedures, training, storage, and preventive maintenance requirements in all CTEM facilities.
- QICO-CTEM-22-02: Develop and implement a plan to maintain compliance with safety and environmental regulations as it pertains to fire extinguisher inspections, facility safety inspections, and designation of compliance officers.
- QICO-CTEM-22-03: Establish and implement a comprehensive maintenance control plan and standardized manuals for all equipment.
- QICO-CTEM-22-04: Develop a plan to maintain compliance with established shelf-life procedures.
- QICO-CTEM-22-05: Develop and implement a process to improve work order data capture in Maximo for accuracy and consistency.

(8) Engineering Modification Instruction (ENGA/MOWE)

Engineering & Maintenance



Areas for Improvement Identified During Review:

- Having well-defined criteria necessitating the utilization of an EMI and aligning the EMI SOP with governing P/Is would support process consistency.
- Adherence to established processes for emergency repair enhances process compliance and reduces potential safety risks.
- Adherence to the established record storage process assures compliance and traceability of documents.
- Establishing a training and certification matrix for personnel promotes proper skill management (Repeat Finding).
- Updating Policy Instructions and governing documents within the required frequency assures accuracy and efficiency.

(9) Structures Maintenance Leak Mitigation Process

Engineering & Maintenance



Items Resolved During Review:

- ✦ Following established safety protocols and procedures when transporting, storing, and disposing of chemicals reduces the risk to employee exposure.
- ✦ Establishing a pressure range while performing grout injection would create a uniform process and help prevent damage.
- ✦ Following required PPE Work Instruction guidelines helps protect employees from inhaling dust particles, prevents injury and promotes a safety culture.

Areas for Improvement Identified During Review:

- Defect reporting into the appropriate system of record in accordance with the Standard Operating Procedures supports accurate tracking and timely scheduling of leak mitigation activities.
- Regularly reviewing, tracking, investigating, and documenting the status of aged work plans would promote on-time completion of scheduled work providing a good state of repair.
- Following leak mitigation Work Instructions would support quality work, produce consistent results, and may prevent employee injury (Repeat Finding).
- Performing tool and equipment inspections prior to utilization enhances work production and decreases job hazards.
- Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner.

(8) Key Takeaway:

Including clear criteria for when an engineering design change should be addressed through an EMI in departmental governing procedures and adhering to established guidelines for emergency repairs would promote consistent and efficient execution of engineering solutions.

Required Actions:

- **QICO-EMI-22-01:** Update SOP 114-02 to include clear circumstances of when an EMI is required and enforce adherence to P/I 4.14/3 instructions for emergency repairs.
- **QICO-EMI-22-02:** Enforce adherence to EMI record archive according to existing guidance of SOP 114-02 and ATC 4000.
- **QICO-EMI-22-03:** Develop a training matrix for all ENGA and MOWE roles.
- **QICO-EMI-22-04:** Enforce revision of Policy Instructions and governing documents in accordance with the required revision periodicity and enforce implementation of SOP 121-10 document control guidelines.

(9) Key Takeaway:

Adhering to Standard Operating Procedures (SOPs) and Work Instructions (WIs) would enhance the quality of work, improve work efficiency, and create a safer work environment.

Required Actions:

- **QICO-STLM-22-01:** Appropriately reporting defects into the system of records, eliminating any duplicate work orders, performing regular reviews, and evaluating the status of aged work plans for accurate traceability.
- **QICO-STLM-22-02:** Follow the guidance provided in the Standard Operating Procedures and Work Instructions when performing job functions.
- **QICO-STLM-22-03:** Perform inspections and assure the removal of defective tools to avoid use at job locations.



INTERNAL REVIEW SUMMARY

February 2022

(6) Silver Line Safety Certification Oversight



Key Takeaway:

Developing controlled work processes, strengthening contractor oversight, and regularly performing audits would provide assurance and 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 quality and safety concerns while assuring compliance with rules and regulations. 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 the Safety Certification verification process of the Silver Line Phase 2 and promote the actions needed to address any concerns.

QICO's Methodology:

- Review relevant 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."

Areas for Improvement:

- Performing quality audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.
- Establishing and implementing processes to oversee and monitor SAFE's contractor K&J performance would provide a standard, promote efficiency, and assist in maintaining compliance throughout the life of the project.
- Creating detailed work instructions describing the Certifiable Item List approval/rejection process would reduce rework and waste while encouraging consistency of work performed.
- Having a master repository of all project documents is essential in storing, organizing, tracing, and accessing project data.
- Developing and maintaining the required training matrix for each safety and security certification position allows for uniformity and promotes compliance with all training requirements.

Supplementary Guidance – Quality Business Practices:

- Establishing a file structure for all packages promotes uniformity and transparency throughout the project lifecycle.

Required Actions:

- **QICO- SLSC -22-01:** Enforce implementation of quality control audits and establish departmental controls to include contractor oversight as well as detailed work instructions for item review and approval.
- **QICO- SLSC -22-02:** Create and maintain a master repository throughout the project life cycle for all safety certification documents and records.
- **QICO-SLSC-22-03:** Develop a training matrix for all safety and security certification positions.

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>

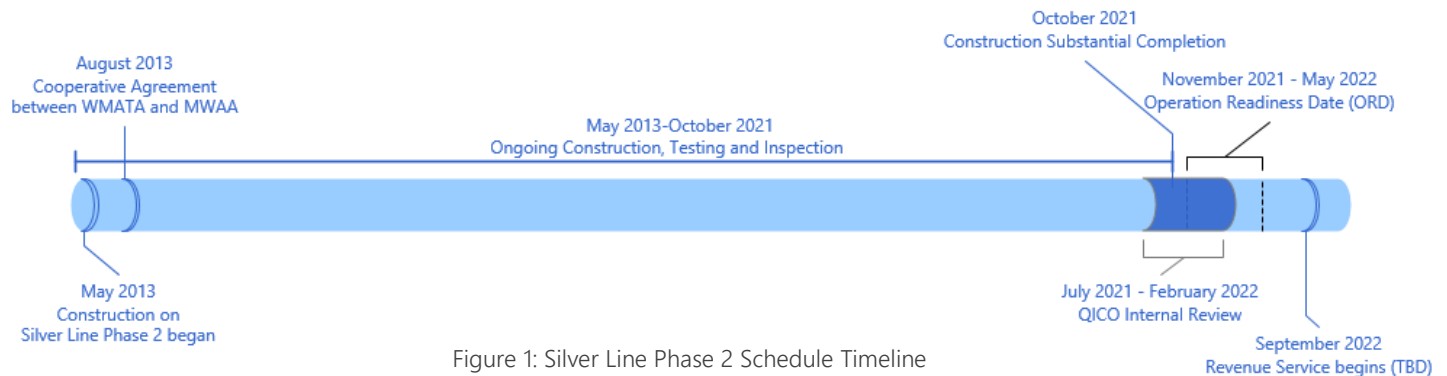
6.1 FUNCTIONAL OVERVIEW AND STRUCTURE

Silver Line Safety Certification Oversight

Safety Certification is the series of processes that collectively verify the safety readiness of a project for public use. Washington Metropolitan Area Transit Authority's (WMATA) Safety Certification process is based on the Federal Transportation Agency's (FTA) Handbook for Transit Safety and Security Certification. In addition, WMATA incorporates in its Safety and Security Certification process the Safety Risk Management (SRM) requirements of WMATA's Safety Management System (SMS), practical experience that has been gained through the administration of major capital projects, and information collected from other transit agencies.

WMATA Safety and Security Certification Program Plan (SSCPP) establishes, and outlines management responsibilities and technical processes associated with the implementation of the Safety Certification process. QICO utilized the SSCPP and the WMATA Dulles Corridor Metrorail Project (DCMP) Phase 2 Safety and Security Certification Oversight Plan (03/2015) as the standards for this Safety Certification Oversight Internal Review.

Silver Line Phase 2 (SL2) project consists of extending the current Silver Line from Wiehle-Reston Station through Dulles International Airport to Route 772 (Package A) and building Dulles Rail Yard (Package B). SL2 project is currently in the Operation Readiness Date (ORD) Phase (Figure 1). Metropolitan Washington Airports Authority (MWAA) is currently the owner of SL2 and will turn over the ownership to WMATA upon project completion.



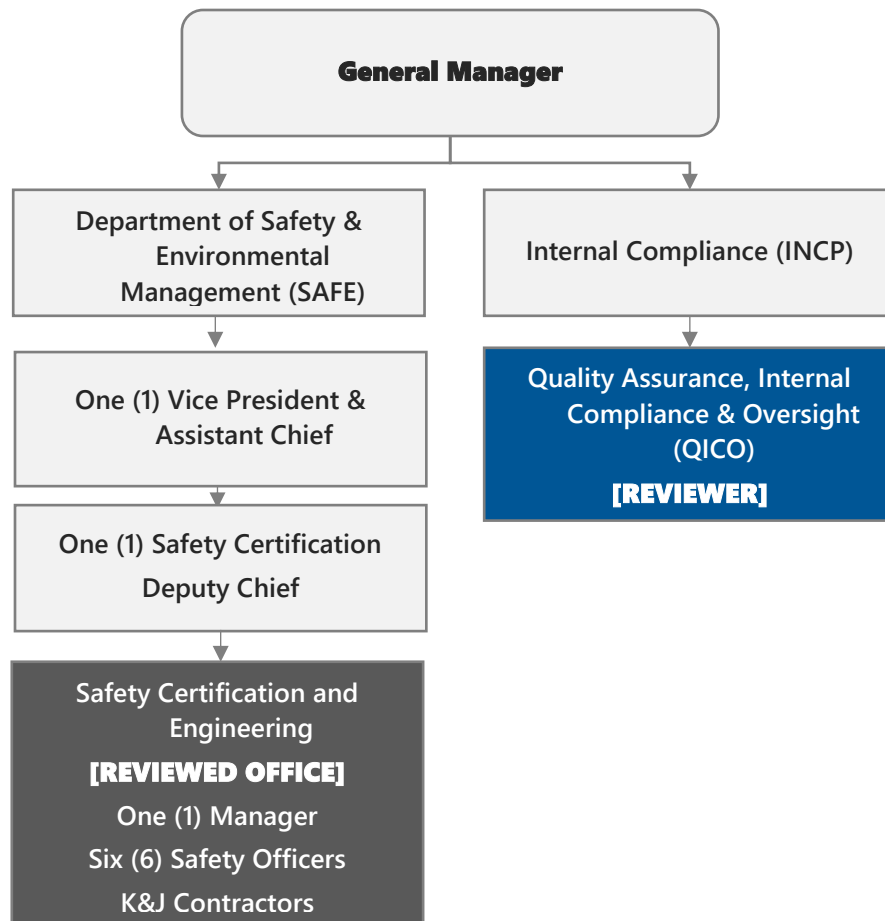
MWAA, as the principal owner of the SL2 project, works directly with its contractors and is responsible for the Safety and Security Certification process. WMATA's Department of Safety and Environmental Management (SAFE) role in the Safety Certification process is to oversee and verify the SL2 project meets the standards for safety certification set forth by the FTA, WMATA's SSCPP, and DCMP Phase 2 Safety and Security Certification Oversight Plan. To perform the verification process, WMATA contracts with K&J to review MWAA's safety certification activities and create monthly reports associated with Safety Certification progress. Under SAFE management, the contractor K&J is conducting 100% verification of safety certification reports that have been reviewed/approved by MWAA (Figure 2). This Internal Review focuses on WMATA Safety Certification verification activities of SL2. While the emphasis of the Internal Review is on Safety Certification, the Security Certification portion was also part of the peripheral document review. During this Internal Review, QICO evaluated 13 Certifiable Items List (CIL) which were reviewed by SAFE/K&J.

QICO's scope for this internal review is to evaluate the process of the Safety Certification verification and does not focus on one particular system.



Organizational Structure and Background

Within WMATA, the Department of Safety & Environmental Management (SAFE) reports to the General Manager. As shown in the organization chart, QICO is independent of this function, reporting to the General Manager through Internal Compliance (INCP).



6.2 REVIEW SCOPE

Document Review

- WMATA Safety and Security Certification Program Plan (SSCPP) (Rev.4, 01/2020)
- WMATA DCMP Phase 2 Safety and Security Certification Oversight Plan (03/2015)
- DCMP Silver Line Phase 1 Lessons Learned/After Action Review (Rev. 1, 10/30/2015)
- FTA Handbook for Transit Safety and Security Certification (11/2002)
- FTA Hazard Analysis Guidelines for Transit Projects (01/2000)
- Cooperative Agreement for Phase 2 of the Dulles Corridor Metrorail Project (Silver Line) (08/07/2013)
- Silver Line Phase 2 Rail Activation Plan (Rev. 4.0, 10/30/2020)
- Capital Rail Constructors (CRC) Safety and Security Certification Plan (SSCP) (Rev. 10, 03/30/2018)
- SOP 200-18: Development of Certifiable Elements and Items Lists (CEL and CIL) (Rev. 0, 01/08/2020)
- SOP-SAFE-ADM-001-00 (Rev. 0, 09/14/2021)
- Airports Authority Safety and Security Management Plan
- 10 Certifiable Item List (CIL) items (from Package A and Package B)

Personnel Discussions

- Safety Certification & Engineering Manager (9/3/2021)
- Two (2) Safety Officers (9/3/2021, 9/13/2021)
- Three (3) K&J contractors (9/20/2021, 9/28/2021, 10/5/2021)

CAPs & iCAPAs Reviewed

Open	- WMSC-21-C0084 Due Date: 07/19/2024	Metrorail must implement a unified, specific safety certification procedure and develop and implement appropriate training to ensure that each Metrorail department understands and implements safety certification requirements so that safety is considered from start to finish for each relevant project.
Open	- WMSC-21-C0085 Due Date: 07/08/2022	Metrorail must ensure that adequate processes are in place through a unified, specific safety certification procedure across engineering, safety, procurement and any other appropriate departments to ensure that safety certification or approval requirements are properly completed for each engineering modification or other change, including SAFE's full participation in the approval process for modifications. This must include Metrorail ensuring that SAFE identifies and is adequately notified of engineering changes to Rail Maintenance Machines (RMMs) and that SAFE reviews the changes prior to implementation.
Open	- WMSC-21-C0086 Due Date: 01/07/2022	Metrorail must follow its documentation procedures and processes for RMM modifications, including required reviews by all appropriate departments of each modification and training and instructions to employees.
Open	- WMSC-21-C0103 Due Date: 02/25/2022	Metrorail must comply with its safety certification procedures, which includes the development and use of a comprehensive Certifiable Elements Lists (CEL) and Certifiable Items Lists (CIL) based on complete and updated hazard analysis, detailed review by safety working group(s) including all relevant departments, a final Safety and Security Verification Report (SSCVR) and other aspects for projects that, like Automatic Train Operations (ATO), fall into Category 1 safety certification.
Open	- WMSC-21-C0118 Due Date: 07/07/2023	Metrorail must clearly communicate requirements of, and take active, recurring steps to ensure compliance with its safety certification procedures and processes from the initiation of a project through competition, activation, final verification, and acceptance.

6.3 AREAS FOR IMPROVEMENT

Findings are categorized by the [15 Core QMS Standards](#) and rated by the [Risk Assessment](#)

FQ-SLSC-21-01 Process Control

Safety – Elevated (4, 4) ■ Owner – SAFE

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

Discussion

Quality Audits identify areas for improvement as well as high functioning areas within the project and verify if the established goals are met. Having Quality Audits assists the project team in monitoring contract compliance, identifying non-conformances, and assuring the work performed meets the standards set forth in the SSCPP.

- Through document reviews and interviews with SAFE, QICO noted the following:
 - o WMATA DCMP Phase 2 Safety and Security Certification Oversight Plan (03/2015) Section 7.1 describes one of the functional responsibilities of SAFE as “leading audits of the safety and security process.”
 - o In addition, The Silver Line 2 Rail Activation Plan (October 30, 2020, Rev. 4.0) includes a chart on page 18 identifying quality assurance audits of the Safety and Security Certification process as a requirement for WMATA. Section 3.1 requires WMATA to perform Quality Assurance audits during the Final Design, Construction, and Start-Up and Integrated Testing phases.
 - o WMATA Quality Management System Plan (QMSP) Section 3.6 states that “all work performed on WMATA assets and inventory by the Authority and/or contracted organizations will be subjected to appropriate testing to verify that purchased parts, work or services delivered meet the Authority’s specified requirements as well as compliance to applicable federal, state and local laws and regulations.”
 - o Performing quality audits is one of the responsibilities listed for WMATA in the Capital Rail Constructors (CRC), MWAA’s SL2 contractor, Safety and Security Certification Plan (SSCP) (03/30/2018, Rev. 10) for Package A. Package A is the final design and construction of the remaining 11.4 miles of the Locally Preferred Alternative (LPA) which lists the duties of CRC, MWAA, and WMATA as they relate to Safety Certification. The SSCP chart below, Responsibilities Matrix, references the responsibilities of each stakeholder (Figure 3).

Activity	Project Phase	Responsibility		
		CRC	WMATA	MWAA
Establish design criteria and standards for Project	Preliminary engineering	N/A	Perform	N/A
Support WMATA Threat and Vulnerability Analysis (TVA)	Final design	Support	Perform	Review
Update and finalize Certifiable Items List (CIL)	Final design	Perform	Review and concur	Review and accept
Conduct hazard/vulnerability evaluation of deviations from design criteria and standards	Final design, construction, start-up and integrated testing	Perform	Review and concur	Review and accept
Conduct QA audits of System Safety/Security Certification process	Final design, construction, start-up and integrated testing	Perform	Perform	Perform
Develop and finalize Design Criteria Checklists (DCC) – update CIL	Final Design	Perform	Review and concur	Review and accept

FQ-SLSC-21-01	Process Control	Safety – Elevated (4, 4)			Owner – SAFE
Verify and document compliance of construction through Construction Specification Conformance checklists – update CIL	Construction	Perform	Review and concur	Review and accept	
WMATA TVA	Construction	Support	Perform	Support	

Figure 3: SSCP Responsibilities Matrix

QICO requested records of completed audits per the above requirements but found no evidence of quality audits throughout the life of the project.

FQ-SLSC-21-02	Process Control	Service Delivery – Moderate (3, 3)	Owner – SAFE
Establishing and implementing processes to oversee and monitor SAFE's contractor K&J performance would provide a standard, promote efficiency, and assist in maintaining compliance throughout the life of the project.			

Discussion

Established governing documents to provide guidelines for process control to accurately monitor and effectively manage the project throughout its life cycle. Documented processes are a vital part of project management providing the foundation for quality and traceability. Creating work instructions provides guidelines for accurate and effective work performance. According to WMATA QMSP 3.5 "Processes are analyzed and verified prior to being formalized and fully implemented, to ensure efficiency and effectiveness."

- QICO conducted document review and interviews with SAFE personnel and noted the following:
 - Absence of SAFE documented process or records indicating any oversight or monitoring of the contractor, K&J.
 - Absence of a process to identify and report a work item, existing asset, or task not conforming to contract requirements.
 - Absence of a process to assure resolution of non-conformances and/or non-compliance.
 - Absence of non-conformance reports, forms, or logs to verify that only work meeting requirements is accepted.
 - In addition, in a WMSC recent audit dated 08/13/2021, the requirement of safety certification procedures was noted in Corrective Action Plan (CAP) WMSC-21-C0084 stating, "There is no Metrorail-wide safety certification procedure to implement the SSCP."
- While SAFE maintains a formal contract with its contractor K&J which identify specific project interactions, SAFE does not have any established governing documents that provide guidance for contractor oversight and monitor performance.

Establishing and implementing governing documented processes for SAFE's business functions and training staff accordingly would provide document traceability, assure performance, and promote compliance.

FQ-SLSC-21-03	Process Control	Service Delivery – Moderate (3, 3)	Owner – SAFE
Creating detailed work instructions describing the Certifiable Item List approval/rejection process would reduce rework and waste while encouraging consistency of work performed.			

Discussion

Creating work instructions provide guidelines for accurate and effective work performance. According to WMATA QMSP 3.5 "Maintaining and controlling a set of processes is readily recognized as an essential activity for departments that perform inspection and maintenance or directly operate transit service."

- QICO conducted document review and interviews with SAFE personnel and noted the following:
 - WMATA receives safety testing and inspection data associated with facilities and equipment from MWAA for review which is later recorded in a tracking log.
 - A review of 13 randomly selected CIL submittals indicates the following:

- Ten (10) CIL submittals were reviewed in Procore and QICO was able to trace their review process from submittal to review and approval.
- Three (3) CIL submittals were reviewed, initially rejected, and recorded in the tracking log with comments and justification for rejection. MWAA addressed SAFE's concerns and re-submitted the items for a second review during which SAFE reviewed and approved the items (Figure 4). However, there is no documented criteria governing the approval/rejection process performed by WMATA.

WMATA Review Comments/Notes	WMATA PENDING State	WMATA Concurrence Status	MWAA Acceptance Status	Previous WMATA Comments
Justin Tuoci 9/14/2021 P03065 is approved SAFE recognizes that Dulles is obtaining an overall CCTV improvement equal to that being installed on other current Dulles projects. The integrated units will provide coverage of those activating the intercom unit.		Concur	Accepted	CSC1: <0000> CSC2: <0000> CSC3: <0000> CSC4: <0000> CSC5: <0000> CSC6: <0000> CSC7: <0000> CSC8: <0000> CSC9: <0000> CSC10: <0000> CSC11: <0000> CSC12: <0000> CSC13: <0000> CSC14: <0000> CSC15: <0000> CSC16: <0000> CSC17: <0000> CSC18: <0000> CSC19: <0000> CSC20: 04/08/2020 D. Mullaney Photo pg 2f2 Intercom on Platform is not covered by the camera shown. This intercom is blocked by the columns, see camera layout on N07-CM-CCTV-115. Missing are the platform windscreens and Safe Area pylons. WMATA would be looking for a screen shot each camera that would demonstrate the view of intercom is unobstructed and in focus. <0000> CSC21: <0000> CSC22: <0000> CSC23: <0000> CSC24: <0000> CSC25: <0000> CSC26: <0000> CSC27: 07/10/2020 D. Mullaney Coordination with MTPD. Multiple issues with provided visual verification. (a) There are some camera locations that have a significant distance between the intercom and camera location. (b) There are locations that do not provide the required coverage. within the CCTV camera's field of view, there are obstructions preventing adequate coverage of the intercom and or the intercom location is on the far side of an object (passenger windscreen). Requirement is not met. <0000> CSC28: <0000> CSC29: <0000> CSC30: <0000> CSC31: <0000> CSC32: 10/02/2020 D. Mullaney Not all intercoms are provided with CCTV coverage. <0000> CSC33: <0000> CSC34: <0000> CSC35: <0000> CSC36: <0000> CSC37: <0000> CSC38: <0000> CSC39: <0000> CSC40: <0000> CSC41: 01/18/2021 D. Mullaney Criteria is not met, there are three requirements; Intercom Covered Y/N Intercom Unobstructed Y/N Intercom Clear Y/N. Camera view do not take into account passengers on the platform. <0000> CSC42: <0000> CSC43: <0000> CSC44: <0000> CSC45: <0000> CSC46: <0000> CSC47: <0000> CSC48: <0000> CSC49: <0000> CSC50: <0000> CSC51: <0000> CSC52: <0000> CSC53: <0000> CSC54: <0000> CSC55: <0000>

Figure 4: CIL item C1.1.5.6 review process

- SOP 200-18, sections 200-18.08 through 200-18.10 list requirements for checklist and verification approval; however, there is no established work process for the approval/rejection and routing of submittals.
- To approve an item on the CIL, per SOP 200-18 Section 4, SAFE must review data from design, construction, installation, and testing/inspection. After reviewing the SSCP, QICO identified an absence of requirements associated with the number of testing/inspections that must be physically observed by SAFE.
 - According to SAFE/K&J personnel, 100% of the Safety Certification documents are reviewed. However, there is no standard set forth in the plan. Through interviews with SAFE, QICO was informed that approximately 30% of safety critical items are observed by SAFE when testing/inspection is being performed. However, no documented evidence/records to support this statement.
- QICO conducted three (3) Field Assessments witnessing MWAA's contractor testing and inspection and SAFE's (K&J's) safety certification verification process:
 - During the two (2) field assessments on 10/12/2021 and 10/13/2021, SAFE was not present.
 - During the third field assessment on 10/24/2021, SAFE was present; however, they did not appear to take any notes or create a report of the observations.

Having a defined documented process inclusive of the CIL in place for document safety certification reviews and field observations would provide consistency and a baseline for the approval or rejection of safety certified items.

- Having a master repository of all project documents is essential in storing, organizing, tracing, and accessing project data.

Discussion

A master repository is critical in document management. It provides traceability and a central location in which project documents may be traced and attained at any point during the project lifecycle. SOP 200-18, Development of Certifiable Elements and Items Lists (CEL and CIL) (Rev. 0, 01/08/2020) states, "The completed Conformance Checklists shall be maintained and included as part of the Final Safety Certification Verification Report and project Master File."

- SSCPP Section 7.0 requires a master safety and security file to reside within SAFE. The master safety and security certification file must contain the following:
 - o Certifiable Items List (CIL)
 - o Completed checklists for each certifiable element
 - o Support documentation such as visual inspection reports
 - o Test reports
 - o Temporary Use Notices (TUN)
 - o Interim Certificates of Conformance
 - o Certificates of Conformance for all certifiable elements
 - o Original System Certificate of Conformance
 - o Safety and Security Certification Verification Report
- As part of the initial document request and during this Internal Review monthly meeting with the stakeholder on 10/14/2021, QICO requested the safety and security master file and the master repository and noted the following:
 - o SAFE was unable to provide QICO with evidence of the existence of the file.
 - o SL2 documents are not currently held within the SAFE shared drive.
 - o SAFE shared drive holds completed safety certification documents from other projects but not SL2 project.
 - o Currently, all SL2 documents including design, construction, and safety, are held in:
 - Procore
 - Constructware (a construction management cloud which was discontinued on 10/31/2021)
 - Latista (web-based construction software)
 - o There are three (3) separate software systems being used for document retention.
 - o None of these three (3) systems are utilized as a singular central document repository as required by SOP 200-18.
 - o In the event of loss of access to these systems, there is a potential risk of quality document loss.
- SOP-SAFE-ADM-001-00 Rev. 0, (09/14/2021), Section 6.4.1 describes the records retention process as, "Once a quality record is completed, SAFE will retain and store the quality record in MetroVault, which is SAFE's document storage."

Having and maintaining a central and master repository for SL2 project throughout the life of the project would facilitate communication, provide traceability for all project safety certification documents and records, increase knowledge share, and promote consistency for document review.



- Developing and maintaining the required training matrix for each safety and security certification position allows for uniformity and promotes compliance with all training requirements.

Discussion

Standardized training increases productivity and performance. When employees undergo training, it improves their skills and knowledge of the job, builds their confidence in their abilities, and unifies the work processes. Per PTASP Section 5.1.4 Training, requirements for each position and employee are to be stored in a central data base. Additionally, Section 3.12 of the QMSP states departments must identify the training needs of all staff. Because training needs may vary by role, a training matrix for each project or department/office will be created that identifies each role and the corresponding, relevant training needs for each role, including frequency.”

- As part of the initial document request dated 07/14/2021 QICO solicited a training matrix by position covering the office of SAFE.
- A follow up request was sent to SAFE on 12/01/2021 inquiring about the availability of a departmental training matrix for SAFE.
- SAFE responded on 12/14/2021 stating there is currently no training matrix available covering all positions within SAFE.
- While the SL2 Safety Certification Verification project utilizes a contractor to provide services associated with safety certification, training requirements such as Roadway Worker Protection (RWP) apply to all personnel who wish to enter the roadway and is not limited to WMATA employees as stated in PTASP Section 5.1.3.
- SAFE is currently working with QICO's QMSP team to develop required documents including a training matrix for QMSP compliance with an estimated completion time of Mid 2022.

By developing a training matrix and complying with all required training and regulations, SAFE can maintain consistency among employees training and promote a safe working environment.

6.4 SUMMARY OF REQUIRED ACTIONS

QICO-SLSC-22-01

Action Owner – SAFE

Overall Risk – Moderate (Average Rating)



Required Action: Enforce implementation of quality control audits and establish departmental controls to include contractor oversight as well as detailed work instructions for item review and approval.

Applicable Findings

- FQ-SLSC-21-01: Performing quality audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.
 - o Standard: Process Control Risk: Safety – Elevated (4, 4)
- FQ-SLSC-21-02: Establishing and implementing processes to oversee and monitor SAFE's contractor K&J performance would provide a standard, promote efficiency, and assist in maintaining compliance throughout the life of the project.
 - o Standard: Process Control Risk: Service Delivery – Moderate (3, 3)
- FQ-SLSC-21-03: Creating detailed work instructions describing the Certifiable Item List approval/rejection process would reduce rework and waste while encouraging consistency of work performed.
 - o Standard: Process Control Risk: Service Delivery – Moderate (3, 3)

QICO-SLSC-22-02

Action Owner – SAFE

Overall Risk – Low (Average Rating)



Required Action: Create and maintain a master repository throughout the project life cycle for all safety certification documents and records.

Applicable Findings

- FQ-SLSC-21-04: Having a master repository of all project documents is essential in storing, organizing, tracing, and accessing project data.
 - o Standard: Document Control Risk: Service Delivery – Low (2, 2)

QICO-SLSC-22-03

Action Owner – SAFE

Overall Risk – Low (Average Rating)



Required Action: Develop a training matrix for all safety and security certification positions.

Applicable Findings

- FQ-SLSC-21-05: Developing and maintaining the required training matrix for each safety and security certification position allows for uniformity and promotes compliance with all training requirements.
 - o Standard: Training Risk: Service Delivery – Low (2, 2)

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

TECHNICAL TERMINOLOGY

Additional Terms

- **Capital Rail Constructors (CRC):** CRC is the contractor employed by MWAA to perform the design/build of Silver Line Phase 2 package A.
- **Certifiable Elements List (CEL):** A broad list of systems that require safety certification.
- **Certifiable Items List (CIL):** A list of items that require inspection and/or testing prior to achieving safety certification.
- **Constructware:** A construction management cloud which was discontinued on 10/31/2021. Constructware was used as part of the SL2 project until its discontinuation.
- **K&J Safety and Security Consulting Services (K&J):** K&J is the contractor employed by WMATA to review and verify Safety and Security Certification compliance for SL2.
- **Latista:** Web based construction software by Oracle used during the SL2 project.
- **MetroVault:** SAFE's online record storage location.
- **Procore:** Web based construction software used to manage contractor submittals for the SL2 project.



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 Transportation 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 CTEM 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.

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>

INTERNAL SAFETY REVIEW SUMMARY

May 2022

(7) Office of Car Track Equipment Maintenance (CTEM)



Key Takeaway:

Increasing employee awareness of the PTASP and aligning the core elements with departmental processes will provide shared understanding and collaboration for a smooth implementation of a proactive safety management system (SMS).

Wins:

- ✓ CTEM management compliance with safety observations/conversations program exceeds the established goal, promoting a positive safety culture.

Items Resolved During the Review:

- ★ Complying with the established safety protocols and processes promotes risk mitigation in the workplace.

Areas for Improvement:

- The utilization of a fall protection system supports a proactive safety management system and compliance with regulatory standards.
- The inspection of fire extinguishers inside the Roadway Maintenance Machines (RMMs) promotes risk mitigation and compliance with regulatory standards.
- The creation and usage of standardized maintenance instruction manuals for all equipment will promote safe maintenance practices.
- Conducting regular and thorough inspections of maintenance facilities strengthens the ongoing risk management process and ensures compliance with OSHA requirements.
- Performing shelf life inspections as outlined in the internal procedure prevents utilizing expired parts and materials. [\(Repeat Finding\)](#)
- The presence of a designated Deputy Compliance Officer (DCO) will enhance compliance with existing environmental management policies.
- A Maintenance Control Plan (MCP) is essential for consistency and traceability of maintenance activities.
- Completing Maximo work orders with specific data element promotes maintenance data accuracy and safety performance reporting.

Required Actions:

- **QICO-CTEM-22-01:** Implement a fall protection system, which includes approved equipment, documented procedures, training, storage, and preventive maintenance requirements in all CTEM facilities. (Overall Risk **3C**)
- **QICO-CTEM-22-02:** Develop and implement a plan to maintain compliance with safety and environmental regulations as it pertains to fire extinguisher inspections, facility safety inspections, and designation of compliance officers. (Overall Risk **3C**)
- **QICO-CTEM-22-03:** Establish and implement a comprehensive maintenance control plan and standardized manuals for all equipment. (Overall Risk **2E**)
- **QICO-CTEM-22-04:** Develop a plan to maintain compliance with established shelf-life procedures. (Overall Risk **3C**)
- **QICO-CTEM-22-05:** Develop and implement a process to improve work order data capture in Maximo for accuracy and consistency. (Overall Risk **3C**)



7.1 FUNCTIONAL OVERVIEW AND STRUCTURE

Car Track Equipment Maintenance (CTEM)

Within the Office of Car Maintenance (CMNT), Car Track Equipment Maintenance (CTEM) is responsible for the maintenance activities of all Metro owned non-licensed (non-highway) equipment utilized by the Office of Track and Structures (TRST) to maintain Metro's railroad and infrastructure. As of March 2, 2022, CTEM is responsible for 180 of these Class 2 Rail Vehicles such as prime movers, flatcars, cranes, tampers, ballast regulators and over 1,400 pieces of ancillary support equipment like drills, spikers, and saws. CTEM is also on call for Rail Operations Control Center (ROCC) emergency response in the event any track equipment malfunctions within the system.

With a total of 59 employees including 12 administrative personnel, CTEM provides the following services to its internal customers:

- Preventive maintenance
- Interdepartmental support coverage
- Running maintenance
- Rail system emergency response
- Mainline or yard TRST track rights support
- Severe weather support
- New equipment procurement specification review and technical evaluation team participation
- New equipment milestone inspections
- Equipment decommissioning and commissioning support
- Engineering review and Engineering Modification Instruction (EMI) implementation
- Railcar load and offload yard movement

CTEM's mission is to provide overall lifecycle management services to Roadway Maintenance Machines (RMM) and associated support tools while optimizing the safety and reliability of the equipment. As of April 1, 2022, CTEM has four (4) heavy maintenance facilities actively used for maintenance services with the fifth facility coming soon at Dulles rail yard.

1. Greenbelt
2. New Carrollton
3. Branch Ave
4. Alexandria

The objective of the Car Track Equipment Maintenance (CTEM) Internal Safety Review (ISR) is to internally identify and mitigate hazards, promote safety, and validate compliance with established processes in accordance with the standards and requirements below:

- WMATA Public Transportation Agency Safety Plan (PTASP)
- WMSC Program Standard
- Federal Transit Administration (FTA), 49 CFR part 674, and
- Approved Metro policies, procedures, and rules

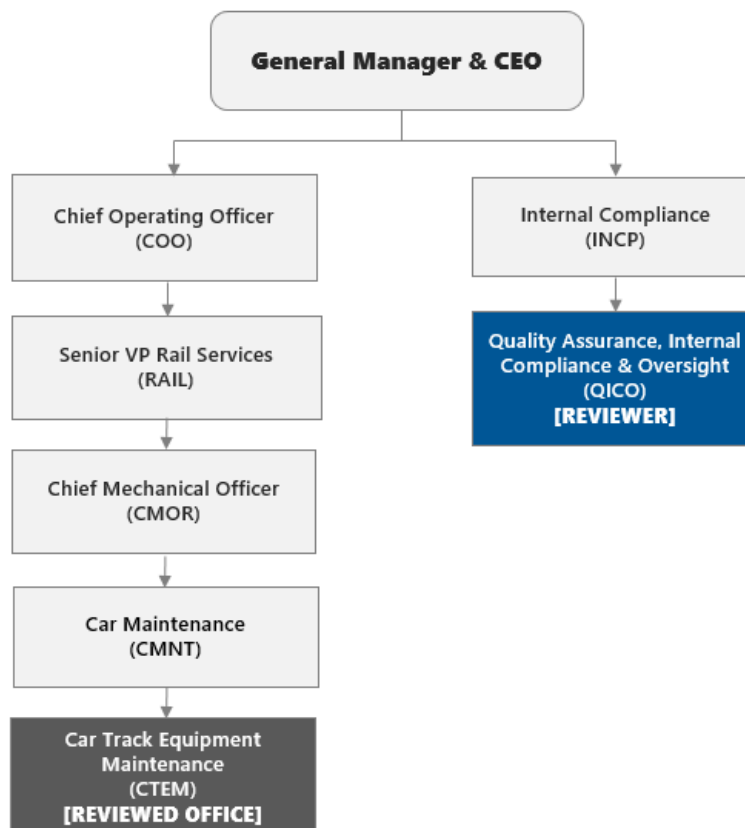
Metro's PTASP defines specific Safety Management System (SMS) components such as safety policy, safety risk management, safety assurance, and safety promotion, and establishes the requirements for systematically identifying, evaluating, and minimizing safety risks within Metrorail, Metrobus, and MetroAccess systems.



Figure 01: CTEM Greenbelt yard: Testing heavy equipment through a dynamic envelope template

Organizational Structure and Background

The Office of Car Track Equipment Maintenance (CTEM) department reports to the Chief Operating Officer (COO) through Car Maintenance (CMNT), the Office of Chief Mechanical Officer Rail (CMOR), and the Department of Rail Services (RAIL). As shown below in the organizational chart, QICO is independent of this function, reporting to the General Manager through Internal Compliance (INCP).



As referenced in the PTASP, the Office of Quality Assurance, Internal Compliance and Oversight (QICO) provides independent internal reviews and quality assurance assessments of service delivery, engineering and maintenance, capital program management, and safety. QICO coordinates and oversees the closure of corrective and preventive actions that address regulatory safety recommendations and required actions. QICO also manages Metro's Policy Instruction Manual, leads the development and implementation of Metro's Quality Management System Plan (QMSP), and conducts triennial internal safety reviews. The department's activities encompass key components of Metro's safety, risk, and quality assurance frameworks, promoting improved safety, better business practices and greater service reliability across the organization.

QICO performed this internal safety review from January 21, 2022, to May 12, 2022. The review team conducted interviews with CTEM management and supervisory staff. In addition, the team performed field assessments and reviewed multiple documents including departmental standard operating procedures, structured and unstructured maintenance related data, and all additional documentation provided by CTEM. Follow-up interviews with CTEM management team were also conducted to clarify concerns raised by senior QICO management team members.

As indicated in the subsequent pages, the reviewers identified positive practices (Wins), items resolved during the review process, and findings/discrepancies (Areas for Improvement). The Findings are rated and color coded based on PTASP, Section 3.1.2 Risk Assessment Matrix/Index. CTEM is required to develop actions to correct all identified areas for improvement of current business practices with enhanced safety and quality fundamentals.

7.2 REVIEW SCOPE

Documentation Review

- Documents Reviewed
 - o WMATA Public Transportation Agency Safety Plan (PTASP), Version 2.0, 12/31/2021
 - o CTEM Program for Maintenance Services, (No rev), 1/24/2022
 - o WMATA Quality Management System Plan (QMSP) Rev. 2.0 (09/20/2021)
 - o CTEM 12 Month SMS Report (03/10/2022)
 - o Standard Operating Procedure (SOP) 2.02 Records Management Administration, Rev 3.3, 5/29/2019
 - o SOP 401-01 Quality Control Program for RMM Maintenance, Rev 2.0, 11/20/2020
 - o SOP 401.02 Procedure for Recording Work Orders on Roadway Machines, Rev 3, 11/20/2020
 - o SOP 1.02 Management of Torque Indicating Devices, Rev 4, 2/11/2019
 - o SOP 1.06 Deferred Maintenance Work Orders for Class 1 & 2 Rail Vehicles and Small Equipment, Rev. 2.1, 9/18/2018
 - o SOP 1.08 Shelf Life Management Procedures, Rev 2.2, 6/14/2019
 - o SOP 1.09 Bloodborne Pathogens Program, Rev 2, 9/10/2019
 - o SOP 2.07 Duties & Responsibilities for Superintendent and Assistant Superintendent, Rev 5, 7/8/2019
 - o SOP 2.09 Procedures for Accessing Safety Data Sheets, Rev 2, 9/14/2019
 - o SOP 302.10 Duties and Responsibilities for Supervisors, Rev 5, 9/13/2016
 - o SOP 2.11 Supervisor Succession Program, Rev 0, 2/19/2019
 - o SOP 3.08 Procedures for Controlling Special Tools and Inspecting Personnel Toolboxes, Rev 3, 1/18/2018
 - o SOP 6.01 Procedures for Controlling Shop Tools and Mandatory Personnel Tools, Rev 1, 1/16/2019
 - o SOP 3.05 Procedures for Precision Measuring Devices Shop Equipment and Special Tools, Rev 5, 2/19/2019
 - o SOP 3.03 Snow and Ice Removal at Rail Yards and Deicer Operations, Rev 5, 11/20/2020
 - o SOP 3.07 Lock Out Tag Out (LOTO) Procedures, Rev 4, 6/3/2019
 - o SOP 303.04 Management and Inspection of Lifting Devices, Rev 3, 6/30/2020
 - o SOP 4.03 Reporting Class 2 Rail Vehicle and Small Equipment Deficiencies, Rev 1, 1/8/2020
 - o Operations Administrative Procedure (OAP) 101.01 Inspection of Contractor Rail Vehicles, Rev 1.0, 1/8/2021
 - o CTEM Program Management Document developed by Superintendent, 2/17/2022
 - o CTEM Accident/Incident Reporting Guide by Superintendent, 2/17/2022
 - o Precision Measurement Devices (PMD) Report - Calibrated Tools – 03/24/2022
 - o Reliability Engineering Asset Management (REAM) Corrective Maintenance dataset, October – December 2021
 - o Supervisor Quality Control Completed Checklists (October – December 2021)
 - o Safety Bulletin SB-22-03-B, Fall Protection and Prevention, Version 1, 3/24/2022
 - o TRST CLASS 2 Rail Vehicle Prior To Use Inspection Checklist, Rev 5.2, 4/12/2021
- Records Reviewed
 - o CTEM Training Matrix and ELM Report (December 2021)
 - o Supervisors' Shop Inspection Report (October – December 2021)
 - o Local Safety Committee Meeting (LSC) Attendance and Minutes
 - o Executive Safety Committee (ESC) meeting materials
 - o Safety Coordinators Facility Inspection Report (October – December 2021)
 - o CTEM Equipment Status Report, (October – December 2021)

Personnel Discussions

- CMOR Safety Risk Coordinator (SRC)
- CTEM Superintendent
- CTEM Assistant Superintendent
- CTEM Supervisors (4)
- CTEM Technicians (6)

Field Assessments

Field assessments were conducted at all four CTEM facilities:

- New Carrollton (Day Shift) – 3/1/2022
- Greenbelt (Day Shift) – 3/3/2022
- Alexandria (Day Shift) – 3/7/2022
- Branch Avenue (Day Shift) – 3/9/2022
- New Carrollton (Night Shift) – 3/16/2022

Applicable CAPs & iCAPs Reviewed

Status	CAP/iCAPA ID	Required Action
Open	WMSC-21-C0084 Issued: 03/09/2021 Due: July 2024	- Metrorail must implement a unified specific safety certification procedure and develop and implement appropriate training.
	WMSC-21-C0087 Issued: 03/09/2021 Due: August 2023	- Metrorail must establish a robust coordinated reliability tracking and assessment process for RMMs to proactively identify and mitigate safety risks.
	WMSC-21-C0095 Issued: 03/09/2021 Due: August 2022	- Metrorail must establish and document completion of vehicle training requirements for CTEM staff.
	WMSC-21-C0101 Issued: 04/30/2021 Due: November 2022	- Metrorail must clearly specify safety-based rules and procedures governing vehicle and switch movement in dark (non-signalized) territory.
Closed	WMSC-21-C0092 Issued: 03/09/2021 Closed: June 2021	- Metrorail must establish a sufficient procedure for the inspection of non-WMATA RMMs before they are used on Metrorail property.
	WMSC-21-C0096 Issued: 03/09/2021 Closed: October 2021	- Metrorail must provide a way for operators, supervisors, and inspectors in the field to readily identify the inspection and maintenance status of an RMM.
	WMSC-21-C0097 Issued: 03/09/2021 Closed: October 2021	- Metrorail must set safety-based standards for the use of chocks and clearly convey those standards to all personnel.
	QICO-CTE-17-04 Issued: 4/2017 Closed: November 2017	- Develop tracking mechanisms to ensure materials and components with shelf life limitations or other expirations are used or replaced appropriately. (Repeat Finding)

7.3 WHAT WORKED WELL (WINS)

Wins are categorized by the [System Safety Measures](#) and rated by the [Risk Assessment](#)

W-CTEM-22-01 Safety Promotion

Owner – CTEM

- ✓ CTEM management compliance with safety observations/conversations program exceeds the established goal, promoting a positive safety culture

Discussion

- Safety observations are one of the operational safety improvement initiatives at Metro focusing on positively reinforcing safe acts and behaviors through constructive conversations and immediate feedback about safety related concerns.
- Conducting safety observations/conversations increase safety awareness, reinforce safe working practices and habits, and help employees see the strengths and weaknesses of both occupational and system safety.
- Operational management and supervisory teams conduct and document (both safe and unsafe) observations in the Safety Measurement System (SMS_M) and any critical issues and concerns requiring further action are communicated through Local Safety Committee (LSC) or subcommittee meetings.
- In coordination with SAFE, each operational unit has pre-established monthly threshold/target of safety observations based on position titles (example, supervisors are expected to conduct eight observations per month).
- Based on interviews, QICO learned that the goal for CTEM management and supervisory staff is collectively 59 observations/conversations per month.
- As illustrated on the chart below, CTEM consistently demonstrated higher performance rate compared to the expected monthly target.
- A total of 279 additional observations were captured for CY2021 in the broad categories of Rules/Procedures, Tools & equipment, Hygienic work practices, Ergonomics, Housekeeping, and Personal protective equipment (PPE), promoting a positive safety culture.

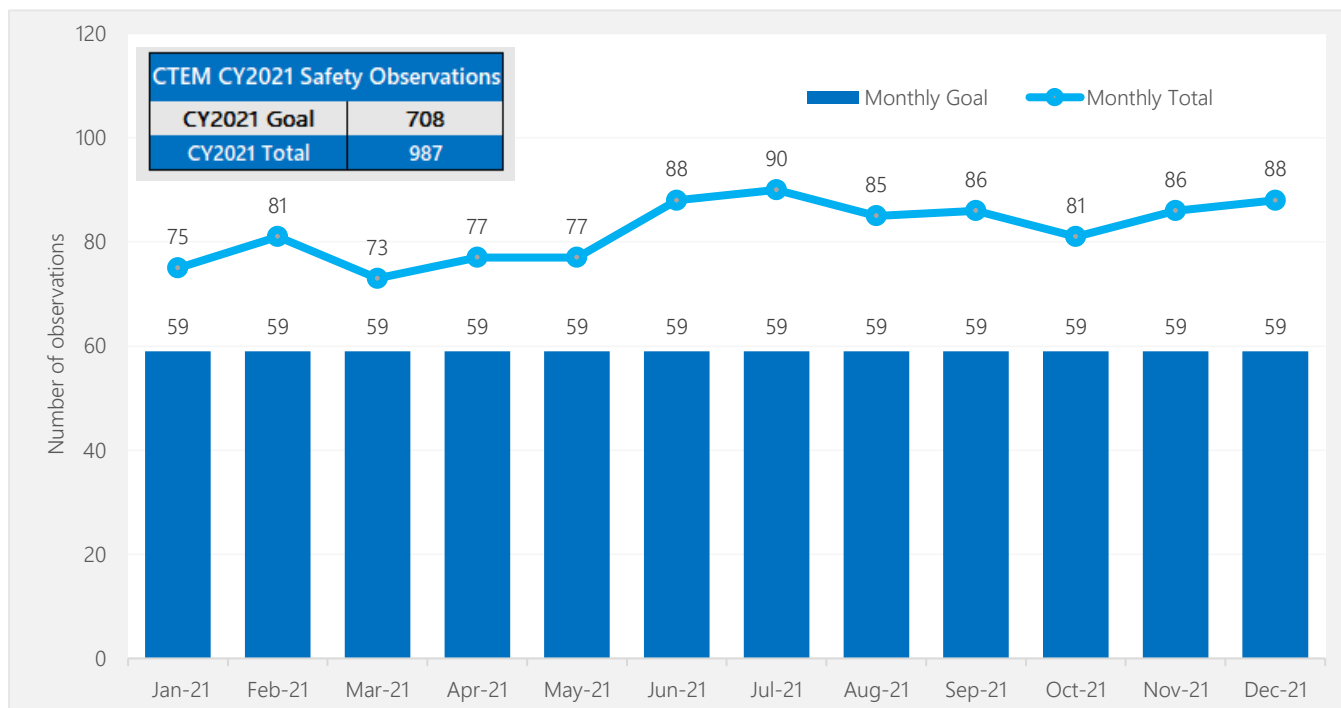


Figure 02: CTEM Safety Observations Monthly Goal vs. Actual (CY 2021)

7.4 ITEMS RESOLVED DURING REVIEW

Items resolved are categorized by [System Safety Measures](#)

R-CTEM-22-01 Safety Risk Management

Owner – CTEM

★ Complying with the established safety protocols and processes promotes risk mitigation in the workplace

Discussion

- During the field assessment at the New Carrollton facility on 03/01/2022, reviewers observed:
 - o A space heater sitting on top of oil/chemical container and close to aerosol cans at technician's workspace (figure 03)
 - o Improperly stored chemical container and other secondary containers with insufficient labeling
 - o A fire extinguisher with last completed inspection date of June 2021
 - o Exit doors without a posted emergency evacuation plan (figure 05)
 - o A Lock Out Tag Out (LOTO) box sitting on the floor and missing annual review and signature
 - o A lifting jack inside the shop without an assigned asset identification number per SOP 303.04 (figure 04)

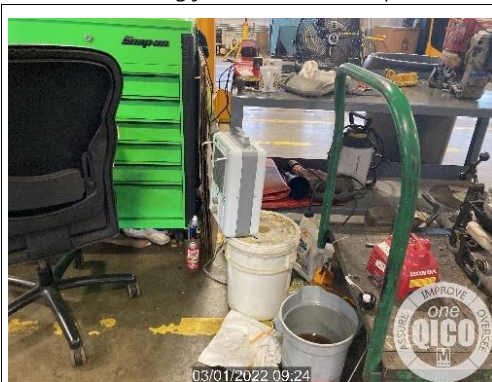


Figure 03: Unsafe utilization of a Space Heater



Figure 04: A lifting jack missing asset identification

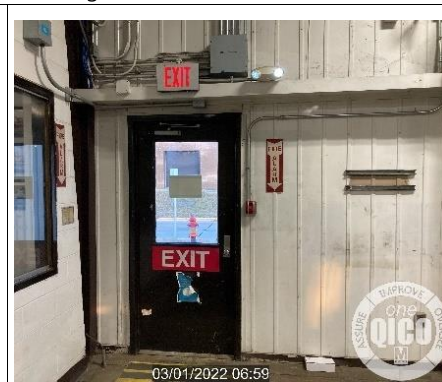


Figure 05: Exit doors without evacuation plan

- During the field assessment at the Greenbelt facility on 03/03/2022 QICO observed:
 - o A fire extinguisher with last completed inspection date of April 2021 (figure 07)
 - o Chemical container stored improperly (figure 08)
 - o Unmarked first aid kit behind the storage room with expired items (figure 06)



Figure 06: First Aid Kit with expired items



Figure 07: Fire extinguisher last inspected Apr. 2021



Figure 08: Improperly labeled and stored chemical container

- The issues observed both at New Carrollton and Greenbelt were communicated to CTEM management via QICO field assessment reports for immediate resolution.
- CTEM management took the necessary mitigation action and submitted applicable objective evidence (including photos). QICO reviewed the evidence submitted by CTEM and marked those discrepancies as "resolved" as of March 18, 2022.

7.5 AREAS FOR IMPROVEMENT

Findings are categorized by [System Safety Measures](#) and rated by the [Risk Assessment](#)

FS-CTEM-22-01 Safety Risk Management

3C

Owner – CTEM

- The utilization of a fall protection system supports a proactive safety management system and compliance with regulatory standards.

Discussion

- CTEM technicians perform HVAC maintenance tasks on rooftops of various Class 2 vehicles which pose a fall risk.
 - o Based on inquiries and observations, CTEM, currently does not have a fall protection system in place.
- As specified in the Occupational Health and Safety Administration (OSHA) code of federal regulation 29 CFR 1910.28, "Except as provided elsewhere in this section, the employer must ensure that each employee on a walking-working surface with an unprotected side or edge that is 4 feet (1.2 m) or more above a lower level is protected from falling".
- WMATA PTASP, Section 5.1.2 - Safety Rules and Procedures Training outlines that fall protection is one of the required OSHA training courses and identified in the training database for each job classification as required by employee position descriptions and work assignments.
- During an interview with the CTEM Superintendent, it was indicated that fall protection systems are on order for purchase with expected delivery in May 2022 (Purchase Order: WMATA-0000165140). Employee training will also be coordinated through department of SAFE upon installation.
- SAFE issued a Safety Bulletin, SB 22-03-B on March 24, 2022, to specifically address fall protection requirements and the importance of implementing mitigation efforts. CTEM's interim mitigation plan includes instruction to discuss the fall protection safety bulletin during the daily safety briefings at all facilities and postpone non-critical tasks that require fall protection until the required measures are implemented. The risk rating reflects CTEM's temporary mitigation.
- Having an effective fall protection system, which includes approved equipment, documented procedures, training, storage, and preventive maintenance requirements in place, reinforces effective hazard mitigation and reduces the potential for injuries.

- The inspection of fire extinguishers inside the Roadway Maintenance Machines (RMMs) promotes risk mitigation and compliance with regulatory standards.

Discussion

- As part of the periodic preventive maintenance process, CTEM Technicians are responsible to inspect the conditions of fire extinguishers that are located within the operating cabs of Roadway Maintenance Machines (RMMs).
- As stated in CTEM SOP 401.01 Quality Control Program (Section 3.5 and 6.3.3), CTEM supervisors have the responsibility for conducting and recording a minimum of four quality control inspections (QICs) per month and fully comply with all requirements.
- During field assessments, fire extinguishers on heavy rolling stock equipment including three prime movers and one tamper were found to be missing compliance inspections, with one inspection tag dated back to June 2019.
- Every time a piece of equipment is put into use, RMM operators perform pre-trip inspections utilizing the "TRST CLASS 2 Rail Vehicle Prior To Use Inspection Checklist" (TRST-TRK-FORM-C2RVPUIC-REV-5.0). This checklist includes the requirement: "Fire extinguishers should be charged and secured. Sign the monthly inspection log (if not already signed)."
- The CTEM inspection procedure as stated in the preventative maintenance manuals for multiple units of equipment such as Harsco tampers, Plasser 4X4 tampers, and Plasser prime movers include:
 - o Make sure fire extinguisher is securely mounted in cab. Repair or replace any brackets that do not securely hold extinguisher in place.
 - o Examine the inspection tag if the extinguisher is over six years old it must be replaced.
 - o Remove, invert, shake, and thoroughly examine the extinguisher including the cylinder, mechanical parts, and nozzle. If there are any wear, rust, or other damage the extinguisher must be replaced.
 - o Ensure gauge reading is in the green area and sign and date the inspection tag in the monthly inspection area. If in the red area, replace the fire extinguisher.
 - o Examine the annual inspection portion of the tag. If the extinguisher is due for annual inspection, sign and date the annual inspection portion.
 - o Reinstall extinguisher in mounting bracket.
- OSHA provides guidelines within section 1910.157(e)(2) stating employers must perform visual inspections once per month of portable fire extinguishers. Also, 1910.157(e)(3) provides for annual inspections, six year internal maintenance, and 12 year hydrostatic testing.
- Regular inspection and servicing of fire protection equipment provides assurance that the equipment is ready and available in the event of an emergency.



Figure 10: Fire extinguisher inside a Tamper cabin (last inspected June 2019)



Figure 11: Fire extinguisher inside a prime mover (last inspected Nov 2021)

- The creation and usage of standardized maintenance instruction manuals for all equipment will promote safe maintenance practices.

Discussion

- As highlighted in the "Maintenance Program for CTEM" document dated 1/24/2022, CTEM has developed customized preventive maintenance manuals for most of the equipment being serviced in its facilities; hence providing its technicians a detailed, step-by-step guide to carry out their maintenance duty effectively.
- The same document further states *"the CTEM Preventive Maintenance (PM) manual is a compilation of the OEM recommendations as well as special instructions customized for the additional purposes. Customized and all-inclusive manuals provide for a simple and consistent method of preventive maintenance instruction to ensure a high level of quality assurance, every time"*
- During the field assessment at the Alexandria facility, reviewers requested to see a customized step-by-step Metro procedure and a completed PM checklist for a National Crane (Boom) that was overhauled on 3/4/2022.
- After verifying records in Maximo, QICO learned that neither customized instruction nor preventive maintenance checklist was available. Reviewers also noted pertinent training for this particular equipment is conducted once a year by an external trainer.
- CTEM SOP 401.02 section 6.5.2 states that *"the CTEM Supervisor shall ensure that all information associated to the work performed, such as hardcopies of documentation, Corrective Maintenance Worksheet sheets, PM checklists, etc. are uploaded to MAXIMO using the attachments dropdown to the CTEM-DATA folder"*.
- Developing preventive maintenance instructions and associated checklists for all equipment promotes safe maintenance practices as well as consistency and traceability of maintenance activities.

FS-CTEM-22-04 Safety Assurance

3C Owner – CTEM

- Conducting regular and thorough inspections of maintenance facilities strengthens the ongoing risk management process and ensures compliance with OSHA requirements.

Discussion

- Per PTASP Section 3.1 the Safety Risk Management (SRM) process emphasizes the proactive identification, assessment, and mitigation of safety risks. As indicated subsequently, the first step to this process is to identify hazards (any real or potential condition that can cause injury, illness, or death; damage to or loss of facilities, equipment, rolling stock, or infrastructure of a public transportation system; or damage to the environment).
- On a monthly basis, CTEM personnel conduct inspections of their respective facility using a "CMNT Shop Safety and Health Inspection Checklist" known as Form 50.951 (See Figure 12).
- During field assessments, CTEM supervisors at each facility provided a sample of three-month inspection reports showing CTEM is complying with monthly inspection requirements. The following discrepancies observed by reviewers attest that these monthly inspections were not performed in a thorough manner. As outlined in the [R-CTEM-22-01](#), section of this report, those discrepancies include:
 - o Improperly placed space heater
 - o Out of inspection compliance fire extinguishers
 - o Improperly labeled and stored chemical containers
 - o A First aid kit with expired items
 - o Portable gantry without asset identification
- Conducting thorough inspections of facility conditions identify and prevent potential hazards and avoid non-compliance with OSHA requirements.

Figure 12: Sample CMNT Inspection Form

- Performing shelf life inspections as outlined in the internal procedure prevents utilizing expired parts and materials.

Discussion

- In 2017, QICO conducted a CTEM-specific internal review and identified the need for a shelf-life inspection process to identify and eliminate parts and materials with deteriorating quality or defined shelf life.
- As part of the internal Corrective Action Plan (iCAPA) QICO-CTE-17-04, to develop a tracking means/mechanism, ensuring that materials and components are within shelf life limitation, CMNT SOP 1.08 Rev 2.2 was updated and published on June 14, 2019.
- The purpose of SOP 1.08 was to establish a shelf-life recognition program and process, with special emphasis on those items having known deterioration characteristics, to mitigate the risk of shelf-life expiration and lapses of shelf life items/material beyond there inspect/test, and useable dates
- During field assessments at New Carrollton and Greenbelt shops, reviewers inquired how CTEM conducts shelf life inspections, and it was indicated that CTEM currently does not perform complete inspections of parts and materials stored within CTEM controlled storage areas as specified in the SOP.
- At Alexandria and Branch Avenue facilities, CTEM supervisors provided periodic inspection documentation for chemical products only excluding parts and rubber items from the inspection process.
- Complying with the internally established procedure helps CTEM to adequately track, inspect, and document materials and components with shelf life limitations; thereby help ensure expired items are not being used.



Figure 13: Shelf materials inside New Carrollton shop

- The presence of designated Deputy Compliance Officers (DCOs) will enhance the process of hazard identification, mitigation, and compliance with existing environmental management policies.

Discussion

- Each Metro facility has an assigned Environmental Compliance Officer (ECO), and several Deputy Compliance Officers (DCOs). The DCOs have specific areas of coverage, typically within their working areas.
- According to the Environmental Management Policy Manual (Oct. 2021, section 4.13.3), each department having an environmentally significant physical presence at a facility shall provide a Deputy Compliance Officer (DCO) in departmental support to the ECO. Each DCO represents and is responsible for its department's activities at that facility as they relate to environmental compliance.
- Senior managers at each facility are assigned collateral duties as ECOs and DCOs. These individuals are trained to perform and are responsible for ensuring compliance with applicable environmental regulations. SAFE is responsible for providing technical advice to the ECOs and DCOs and for monitoring regulatory compliance (PTASP, Section 5.2.4).
- Through interviews with CTEM management staff, it was determined that there are no assigned DCOs for any of the existing CTEM facilities. Personnel who previously held DCO positions have retired or otherwise moved on, and the DCO responsibilities have not been reassigned.
- The presence of dedicated CTEM area DCOs may help promote compliance with environmental requirements, may provide consistency of performance, and help identify improvement opportunities.

- A Maintenance Control Plan (MCP) is essential for consistency and traceability of maintenance activities.

Discussion

- A typical Maintenance Control Plan (MCP) establishes properly documented and approved standards and procedures for all aspects of maintenance performed by a maintenance unit with clearly articulated maintenance plans, schedules, processes, instructions, updated checklists, job hazard analysis, and required training/certifications to ensure maintenance activities are performed safely and consistently.
- According to the WMATA PTASP Section 4.1.1, the COO divisions that perform maintenance are required to coordinate with departments across Metro to develop and maintain Maintenance Control Plans that include:
 - o All inspections, their intervals and requirements, and their documentation, verification, and distribution.
 - o The standards (regulatory, industry and internal) for all aspects of maintenance.
 - o Procedures for all aspects of maintenance and where they are found (OEM manuals and Maintenance Management of Information System).
 - o Testing processes and procedures for all maintenance activities.
 - o Standards and requirements for scheduled maintenance, deferred maintenance, and determination (destruction/condemnation/disposal).
 - o Sources of reporting for deficiencies.
 - o Equipment, and small and large tools required to perform the maintenance activities, including IT systems, software and hardware.
 - o Minimum training requirements for personnel engaged in maintenance activities.
- CTEM currently does not have a Maintenance Control Plan (MCP) incorporating the elements listed above.
- Upon QICO's request for the MCP on 03/21/2022, CTEM provided a 13-page document that was neither controlled nor approved per Metro document control procedures. Reviewers previously received the same document on 2/04/2022 as CTEM functional overview document.
- While the current document provided by CTEM serves as a good starting point, it is important to have a comprehensive maintenance control document detailing the requirements listed above with definitive language and management approval (signatures).
- As a guide of best practice, Reviewers reviewed MCP documents from Track and Structure (TRST), Shops and Maintenance (SAMS), and Elevators and Escalators (ELES) departments within Metro.
- Having a well-documented MCP as specified in the PTASP aids CTEM to execute RMMs and small equipment maintenance activities safely and effectively.

- **Completing Maximo work orders with specific data elements promotes maintenance data accuracy and safety performance reporting**

Discussion

- Following the March 9th, 2021, WMSC Audit of Roadway Maintenance Machine Inspection, Maintenance and Training, CAP WMSC-21-C0087 was developed and implemented to collect and utilize reliability data for RMMs to proactively identify and mitigate safety risks.
- Accordingly, the Reliability Engineering Asset Management (REAM) group issues monthly performance reports based on corrective maintenance data entered into Metro's maintenance database (MAXIMO).
- Based on three months of corrective maintenance data provided by REAM, QICO learned that 51 percent of the corrective maintenance work orders lack specificity with component codes.
 - o CTEM SOP 401.02 section 6.5.1-3 requires the CTEM Supervisor to review the data entered by the technicians for completeness and summarize the actions taken by the mechanic in the memo field. Section 6.5.3 states *"the CTEM Supervisor shall ensure all pertinent data and required fields are accurately documented in MAXIMO and the WO is placed into the completed "COMP" status"*.
- As shown in the charts below, 73 of the 142 work orders recorded at four of CTEM locations have improperly selected component codes (Reference: REAM Spreadsheet, Feb. 22, 2022).
- This issue of not entering and/or documenting specific component codes accurately, has direct impact on the overall diagnosis of equipment failure, performance trend reporting, as well as the storeroom inventory planning process with parts and materials
- Consistent and accurate capture of work order data in Maximo is essential to effectively monitoring, analyzing, and reporting of completed maintenance work.

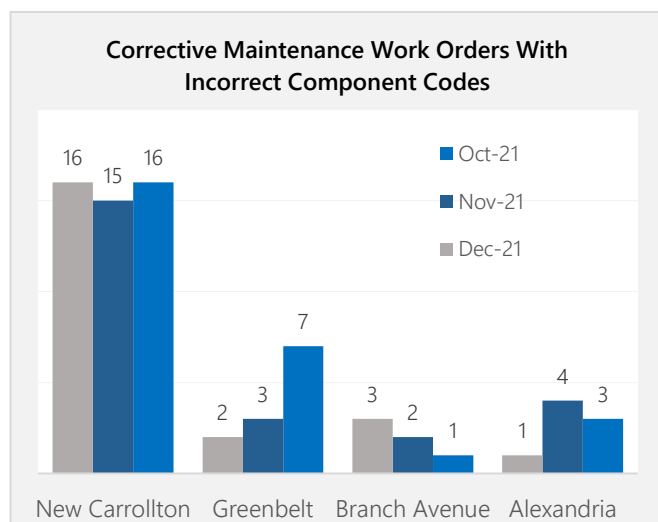


Figure 14: Monthly Maximo Data Quality Analysis by Labor Group
(October-December 2021)

Asset Number	Labor Group	Component Code	REAM updated Component Code
MPM65	CTEM-ALEX-HVYR	000-400-ABS-A00-002	000-400-ABS-A00
MTGV01	CTEM-ALEX-HVYR	000-400-GV0	000-400-GV0-D01-009-007
MPM27	CTEM-ALEX-HVYR	000-400-ABA	000-400-ABC-B00
MPM42	CTEM-ALEX-HVYR	000-400-ABJ	000-400-ABM-A00-001
MPM48	CTEM-BRAN-HVY	000-400-GV0-B06-001-002	000-400-ABA
MPM65	CTEM-BRAN-HVY	000-400-GV0-B08-003-001-002	000-400-ABM-A00-001
MNSP02	CTEM-BRAN-HVY	000-400-SP0-ZC0	000-400-SP0
MT004	CTEM-GBLT-HVY	000-400-ACW-B00	000-400-ACL-C00
MPM49	CTEM-GBLT-HVY	000-400-ABE-D00	000-400-ABB
MBR01	CTEM-GBLT-HVY	000-400-ALE	000-400-AIJ
MPM29	CTEM-GBLT-HVY	000-400-ABZ	000-400-ABM-B00-004
MLPM51	CTEM-GBLT-HVY	000-400-ABJ-B00	000-400-AAJ
MTR05	CTEM-NCAR-HVY	000-400-AJ0	000-400-AJM
MPM40	CTEM-NCAR-HVY	000-400-ABZ	000-400-ABE
MPM26	CTEM-NCAR-HVY	000-400-ABE-A00	000-400-ABS-D00
MPM36	CTEM-NCAR-HVY	000-400-ABZ	000-400-ABH-C00
MPM40	CTEM-NCAR-HVY	000-400-AB0	000-400-ABF

Figure 15: Examples of Incorrectly Recorded Component Codes in Maximo

7.6 SUMMARY OF REQUIRED ACTIONS

QICO-CTEM-22-01

Action Owner – CTEM

Overall Risk – **3C**

Required Action: Implement a fall protection system, which includes approved equipment, documented procedures, training, storage, and preventive maintenance requirements in all CTEM facilities.

Applicable Findings

- FS-CTEM-22-01: The utilization of a fall protection system supports a proactive safety management system and compliance with regulatory standards.
 - o Measure: Safety Risk Management Risk Index: **3C**

QICO-CTEM-22-02

Action Owner – CTEM

Overall Risk – **3C**

Required Action: Develop and implement a plan to maintain compliance with safety and environmental regulations as it pertains to fire extinguisher inspections, facility safety inspections, and designation of compliance officers.

Applicable Findings

- FS-CTEM-22-02: The inspection of fire extinguishers inside the Roadway Maintenance Machines (RMMs) promotes risk mitigation and compliance with regulatory standards.
 - o Measure: Safety Assurance Risk: **3C**
- FS-CTEM-22-04: Conducting regular and thorough inspections of maintenance facilities strengthens the ongoing risk management process and provide compliance with OSHA requirements.
 - o Measure: Safety Assurance Risk: **3C**
- FS-CTEM-22-06: The presence of designated Deputy Compliance Officers (DCOs) will enhance the process of hazard identification, mitigation, and compliance with existing environmental management policies.
 - o Measure: Safety Assurance Risk: **3C**

QICO-CTEM-22-03

Action Owner – CTEM

Overall Risk – **2E**

Required Action: Establish and implement a comprehensive maintenance control plan and standardized manuals for all equipment.

Applicable Findings

- FS-CTEM-22-03: The creation and usage of standardized maintenance instruction manuals for all equipment will promote safe maintenance practices.
 - o Measure: Safety Assurance Risk: **2E**
- FS-CTEM-22-07: A Maintenance Control Plan (MCP) is essential for consistency and traceability of maintenance activities.
 - o Measure: Safety Assurance Risk: **3C**

Required Action: Develop a plan to maintain compliance with established shelf-life procedures.

Applicable Findings

- FS-CTEM-22-05: Performing shelf life inspections as outlined in the internal procedure prevents utilizing expired parts and materials.
 - o Measure: Safety Assurance Risk: 3C

Required Action: Develop and implement a process to improve work order data capture in Maximo for accuracy and consistency.

Applicable Findings

- FS-CTEM-22-08: Completing Maximo work orders with specific data element promotes maintenance data quality and safety performance reporting.
 - o Measure: Safety Assurance Risk: 3C

[Internal Corrective and Preventive Actions \(ICAPAs\)](#) are designated to address each Required Action listed above.

TECHNICAL TERMINOLOGY

ACRONYMS AND DEFINITIONS

- **CFR:** Code of Federal Regulations
- **Corrective Action Plan:** A plan or set of tasks that outline corrective measures planned or already taken to address external audit recommendations and related deficiencies or findings.
- **CMNT:** The office of Car Maintenance
- **CMOR:** The office of the Chief Mechanical Officer, Rail
- **Compliance:** An affirmative indication or judgement that a product or service has met the requirements of the relevant specification, contract, or regulation.
- **CTEM:** The office of Car Track Equipment Maintenance
- **Discrepancies:** Variation between the actual state versus the required state of a process, service, or asset.
- **FTA:** Federal Transit Administration
- **ISR:** Internal Safety Review
- **Key Performance Indicators (KPIs):** Quantifiable measures used to evaluate the success of an organization, employee, etc. in meeting objectives for performance.
- **Maximo:** Asset management software solution product which enterprises use to track the operation, maintenance, and disposal of assets.
- **Maintenance Control Plan (MCP):** Interchangeably used for "Maintenance Control Policy" and "Program", is a documented plan designed to prevent device failure, maximize reliability, reduce risk, and improve public safety.
- **Process:** A set of interrelated resources and activities which transform inputs into outputs or outcomes.
- **Public Transportation Agency Safety Plan (PTASP):** The documented comprehensive agency safety plan for a transit agency that is required by CFR 49 Part 673.
- **QICO:** Office of Quality Assurance, Internal Compliance and Oversight
- **Quality Management System Plan (QMSP):** A formalized system that documents processes, procedures, and responsibilities for achieving quality policies and objectives. A QMSP helps coordinate and direct an organization's activities to meet customer and regulatory requirements and improve its effectiveness and efficiency on a continuous basis.
- **Retention Policy:** A policy that prescribes how long a business needs to keep a piece of information (record), where it's stored and how to dispose of the record when its time.
- **REAM:** Reliability Engineering Asset Management Group
- **Roadway Maintenance Machines (RMMs):** Also referred to as Class 2 Rail Vehicles, devices powered by any means of energy other than hand power which are being used on or near railroad track for maintenance, repair, construction or inspection of track, bridges, roadway, signal, communications, or electric traction systems.
- **Running maintenance:** Unscheduled minor repairs due to normal operation of the equipment.
- **SAFE:** The Department of Safety

ACRONYMS AND DEFINITIONS

- **Safety Assurance:** Processes within a transit agency's Safety Management System that functions to ensure the implementation and effectiveness of safety risk mitigation, and to ensure that the transit agency meets or exceeds its safety objectives through the collection, analysis, and assessment of information.
- **Safety Management Policy:** A transit agency's documented commitment to safety, which defines the transit agency's safety objectives and the accountabilities and responsibilities of its employees in regard to safety.
- **Safety Management System (SMS):** A formal, top-down, organization-wide approach to managing safety risk and assuring the effectiveness of a transit agency's safety risk mitigation. SMS includes systematic procedures, practices, and policies for managing risks and hazards.
- **Safety Measurement System (SMS_M):** An online database/tool, providing both Metro and SAFE a means to manage safety incidents, accidents, safety hotline reports, and hazards through modules of SMS_M by reducing paperwork, eliminating redundant work efforts, centralizing safety critical data, direct tracking of identified problems, and improved communication from the field to management and safety personnel.
- **Safety Promotion:** One of the four SMS components, it is the process of training, communication, and dissemination of safety information.
- **Safety Risk Assessment:** A formal activity whereby a transit agency determines Safety Risk Management priorities by establishing the significance or value of its safety risks.
- **Safety Risk Management (SRM):** The processes within a transit agency's Safety Management System for identifying hazards and analyzing, assessing, and mitigating safety risk.
- **Service Life:** A measurement of anticipated total in-use time. This time is based on the manufacturer's technical manuals, commercial manuals, and other documentation.
- **Shelf Life:** The total period beginning with the date of manufacture/cure/assembly or inspection/test/restorative action that an item may remain in the combined wholesale (including manufacturer) and retail storage system and still remain suitable for issue/use by the end user. Shelf life is not to be confused with service-life, which is a measurement of anticipated total in-use time.
 - o **Type I Shelf Life Item:** An item of supply that has a definite non-extendible period of shelf life. They will be destroyed or turned in to EMIH at the end of their life.
 - o **Type II Shelf Life Item:** An item of supply having an assigned shelf lifetime that may be extended after completion of inspection/test/restorative action.
- **Training Matrix:** 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.
- **Washington Metrorail Safety Commission (WMSC):** An independent agency created by the District of Columbia, Maryland, and Virginia with the approval of Congress and the president to oversee and enforce safety practices on Metro Rail System.



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 quality and safety concerns while assuring compliance with rules and regulations. 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 the Engineering Modification Instruction (EMI) process and promote the actions needed to address any concerns.

QICO's Methodology:

- Review relevant 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".

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>

INTERNAL REVIEW SUMMARY

May 2022

(8) Engineering Modification Instruction (EMI)



Key Takeaway:

Including clear criteria for when an engineering design change should be addressed through an EMI in departmental governing procedures and adhering to established guidelines for emergency repairs would promote consistent and efficient execution of engineering solutions.

Areas for Improvement:

- Having well-defined criteria necessitating the utilization of an EMI and aligning the EMI SOP with governing P/Is would support process consistency.
- Adherence to established processes for emergency repair enhances process compliance and reduces potential safety risks.
- Adherence to the established record storage process assures compliance and traceability of documents.
- Establishing a training and certification matrix for personnel promotes proper skill management. **(Repeat Finding)**
- Updating Policy Instructions and governing documents within the required frequency assures accuracy and efficiency.

Required Actions:

- **QICO-EMI-22-01:** Update SOP 114-02 to include clear circumstances of when an EMI is required and enforce adherence to P/I 4.14/3 instructions for emergency repairs. (Overall Risk – Elevated)
- **QICO-EMI-22-02:** Enforce adherence to EMI record archive according to existing guidance of SOP 114-02 and ATC 4000. (Overall Risk – Moderate)
- **QICO-EMI-22-03:** Develop a training matrix for all ENGA and MOWE roles. (Overall Risk – Moderate)
- **QICO-EMI-22-04:** Enforce revision of Policy Instructions and governing documents in accordance with the required revision periodicity and enforce implementation of SOP 121-10 document control guidelines. (Overall Risk – Moderate)



8.1 FUNCTIONAL OVERVIEW AND STRUCTURE

Engineering Modification Instruction (EMI) Process

An Engineering Modification Instruction (EMI) is a process by which existing assets and systems are modified to meet the changing technology, requirements, and improvements. An EMI is used to document and describe the intended change with detailed instructions on its execution to include means and materials, and a summary of the potential impacts of the intended change to the overall system. Based on Policy Instructions (P/I) 4.10/4 Configuration Control Management (01/11/2019), P/I 4.14/3 Design Control Board (DCB) (01/15/2019) and Standard Operating Procedure (SOP) 114-02 Engineering Modification Instruction Procedure (Rev. 1, 12/23/2020), the life cycle of an EMI process is depicted in Figure 1.

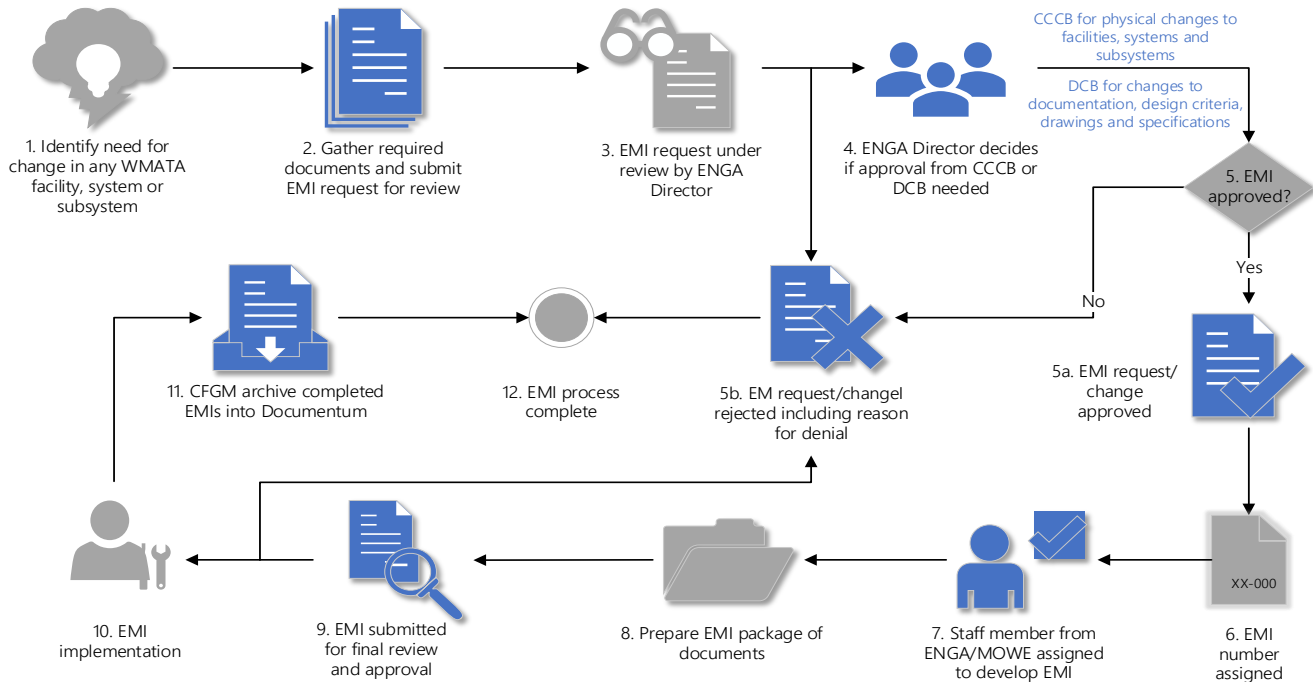


Figure 1: Engineering Modification Instruction (EMI) process

This EMI Internal Review (IR) focuses on the Office of Engineering and Architecture (ENGA) and Maintenance of Way Engineering (MOWE) involvement in the EMI process for the infrastructure assets.

ENGA's responsibilities include providing engineering and project management services for infrastructure renewal and adjacent construction. In addition, ENGA supports Maintenance and Operations' groups in maintaining infrastructure assets in a state of good repair by providing engineering solutions.

ENGA is composed of the following seven (7) sub-departments:

- Architecture (ARCH)
- Automatic Train Control Systems (ATCS)
- Communications and Network Systems (COMM)
- Civil and Structural Engineering (CVST)
- Configuration Management (CFGM)
- Mechanical Engineering (MECH)
- Power Systems Engineering (PWRS)

MOWE office provides engineering support to the Rail Infrastructure Maintenance and Engineering (RIME) maintenance groups {Track and Structures (TRST) and Traction Power (TRPM)} to assure infrastructure assets are maintained in a state of good repair. Operations Administrative Procedure (OAP) 123-01 Rail Infrastructure Asset Maintenance and Engineering (RIME) Roles and Responsibilities (Rev. 0, 03/05/2021) delineates responsibilities for individual assets within MOWE's purview.

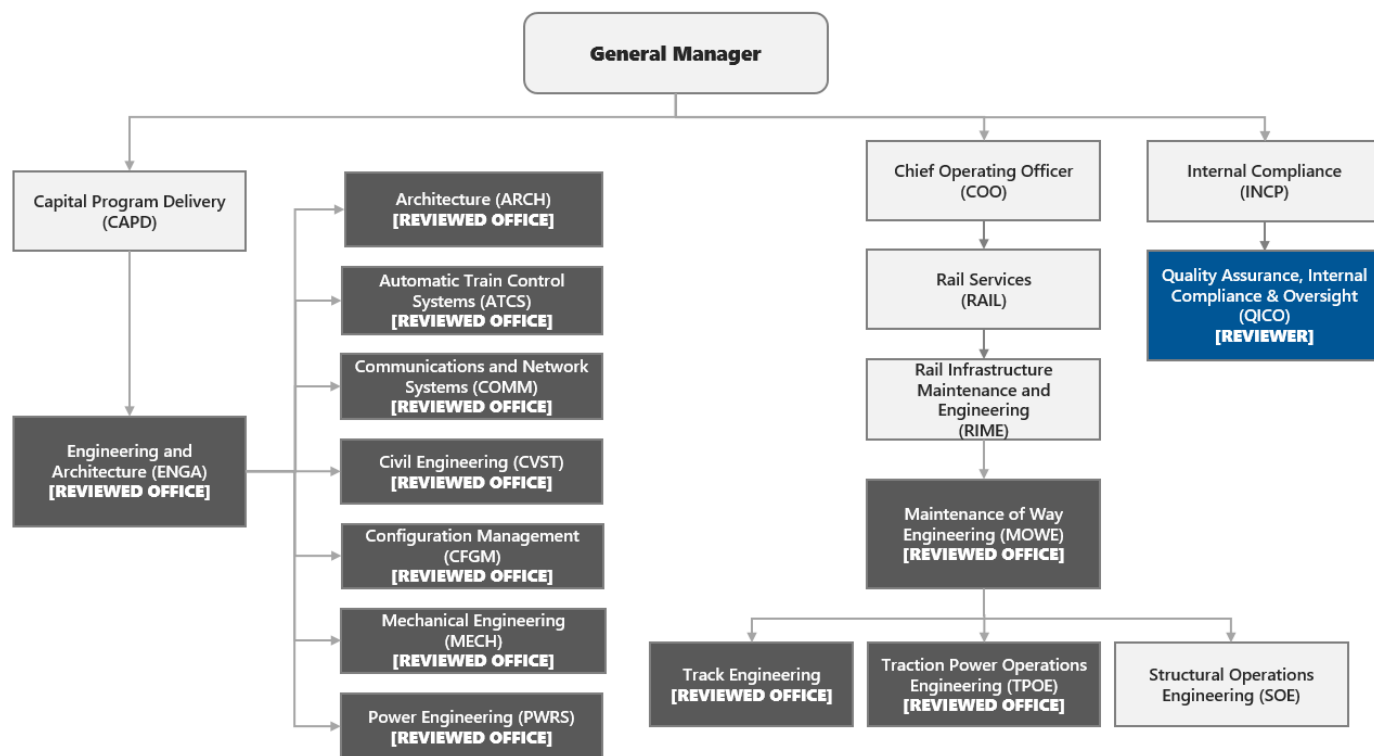
MOWE is comprised of the following three (3) sub-departments:

- Track Engineering
- Traction Power Operations Engineering (TPOE)
- Structural Operations Engineering (SOE)

MOWE Structural Operations Engineering (SOE) group was recently formed in 03/2021 and was not included in this Internal Review.

Organizational Structure and Background

Within WMATA, the Office of Engineering and Architecture (ENGA) reports to Capital Program Delivery (CAPD). The Department of Rail Services (RAIL) reports to the Chief Operating Officer (COO). Under RAIL, Rail Infrastructure Maintenance and Engineering (RIME) oversees the functions of the Office of Chief Maintenance of Way Engineering (MOWE). As shown in the organization chart, QICO is independent of these functions reporting to the General Manager through Internal Compliance (INCP).



8.2 REVIEW SCOPE

Documentation Review

- P/I 1.20/0 Configuration Change Control Board (CCCB) (02/08/2019)
- P/I 4.10/4 Configuration Control Management (01/11/2019)
- P/I 4.14/3 DCB (01/15/2019)
- OAP 123-01 Rail Infrastructure Asset Maintenance and Engineering (RIME) Roles and Responsibilities (Rev. 0, 03/05/2021)
- OAP 121-01 Track Asset Condition Data Management (Rev. 01, 09/20/2019)
- OAP 121-03 Key Track Asset Management Programs Planning & Analysis (Rev. 00, 09/20/2019)
- OAP 123-01 Rail System Asset Maintenance and Engineering (Rev. 1, 07/14/2021)
- SOP 114-02 Engineering Modification Instruction Procedure (Rev. 1, 12/23/2020)
- SOP 121-02 Thermal Imagery Analysis and Tracking (Rev. 02, 04/28/2021)
- SOP 121-05 Track Geometry Vehicle (TGV) Data Management (Rev. 2, 06/17/2021)
- SOP 121-10 Document Control and Record Retention Procedure (Rev. 1, 08/26/2020)
- SOP 121-11 Rail Grinding Procedure (Rev. 0, 05/11/2021)
- SOP 121-12 Quality Assurance of Structures Inspections (Rev. 0, 05/18/2021)
- SOP 121-13 Tamping and Surfacing Needs Analysis and Planning (Rev. 0, 10/01/2021)
- ATC 1000 Instructions for Testing and Inspection of ATC Apparatus and Systems (Rev. 4.0, 05/06/2021)
- ATC 2000 System Integrity Maintenance Practices (Rev. 4.1, 10/22/2020)
- ATC 3000 Instructions for Adjusting ATC Apparatus and Systems (Rev. 3.0, 05/13/2021)
- ATC 4000 Systems Configuration Management Plan Instructions and Procedures Manual (Rev. 3.0, 08/31/2020)
- ATC 5000 ATC Engineering Design Standards (Rev. 1.0, 09/04/2020)
- Engineering Information Bulletin (EIB) 21-0011-SYS EMI Request Process (Rev. 0, 09/29/2021)
- ATC 2000 Appendix C - Engineering Compliance Verification (Rev. 0, 01/03/2020)
- ATC Form 2001 – Field Compliance Report (Rev. 0, 12/21/2020)
- ATC Form 2002 – Procure Compliance Report (Rev. 0, 12/21/2020)
- ATC Form 2003 – Software Compliance Report (Rev. 0, 12/21/2020)
- EMI records from MOWE (TPOE and Track) and ENGA (COMM and ATCE) (2016-2021).
- Organizational charts of MOWE (08/2021) and ENGA (04/2021)
- CCCB Meeting Minutes (02/2020 - 10/2021)
- ATCE EMI Compliance Reports (01/2021 - 06/2021)
- ATCE Training Records and Required Certifications

Personnel Discussions

- Chief MOWE (12/09/2021)
- Director of Traction Power Operations Engineering (MOWE-TPOE) (12/06/2021)
- Manager of Power Operations & Maintenance Engineering (MOWE-TPOE) (12/16/2021)
- Director of Track Engineering (MOWE) (12/06/2021)
- Sr. Track Engineer (MOWE) (12/07/2021)
- Vice President ENGA (12/21/2021)
- Director of Architecture (ENGA-ARCH) (12/10/2021)
- Director of Communications and Network Systems (ENGA-COMM) (12/17/2021)
- Manager of Physical Security of Communications and Network Systems (ENGA-COMM) (12/17/2021)
- Manager of Mechanical Engineering (ENGA-MECH) (12/10/2021)
- Director of Power Systems Engineering (ENGA-PWRS) (12/14/2021)
- Assistant Chief Engineer of Power Systems Engineering (ENGA-PWRS) (12/14/2021)
- Director of Automatic Train Control Engineering (ENGA-ATCE) (12/20/2021)
- Manager of Automatic Train Control Engineering (ENGA-ATCE) (12/15/2021)
- Director of Civil and Structural Engineering (ENGA-CVST) (12/14/2021)

- Document Configuration Manager (ENGA-CFGM) (01/13/2022)
- Project Coordinator (ENGA-CFGM) (01/13/2022)

Applicable Corrective Action Plans (CAPs) & Internal Corrective and Preventive Actions (iCAPAs) Reviewed

Closed	- QICO-ENGA-19-02 Closed Date: 08/31/2020	ENGA will conduct CCCB meetings on a quarterly basis and provide meeting records (i.e., sign in sheets and minutes) for three quarterly meetings. <i>No repeat finding associated with this iCAPA</i>
Closed	- QICO-SM-21-01 Deliverable 1 Closed Date: 10/22/2021	ATCE will update and submit a revised switch machine EMI template to include review and approval requirements from all relevant Engineering departments during structural modifications to direct fixation. <i>No repeat finding associated with this iCAPA</i>
Closed	- QICO-ENGA-19-05 Closed Date: 02/23/2022	Each ENGA department will develop a training matrix with safety-training requirements for each position and employee. (Repeat Finding: FQ-EMI-22-04)
Closed	- WMSC-21-C0071 Closed Date: 11/12/2021	RIME & ENGA will hold safety briefing with front-line employees as needed to convey subjects addressed during the departmental meetings. RIME & ENGA will submit six months of frontline briefing notes. <i>No repeat finding associated with this CAP</i>

8.3 AREAS FOR IMPROVEMENT

Findings are categorized by the [15 Core QMS Standards](#) and rated by the [Risk Assessment](#)

FQ-EMI-22-01

Process Control

Service Delivery – Elevated (4,4) ■ Owner – ENGA

- Having well-defined criteria necessitating the utilization of an EMI and aligning the EMI SOP with governing P/Is would support process consistency.

Discussion

Guidance documents including SOPs and Work Instructions (WIs) are developed in accordance with the associated governing P/Is and include the necessary details to serve as a guide for personnel to perform their work accurately and uniformly.

- In general, an EMI is required in particular situations such as changes in materials or manufacture availability, improvements to materials, change of fit, form or function. QICO conducted interviews with MOWE and ENGA staff to determine how Engineering Modification Instruction (EMI) works and how it is initiated.
- Between 12/10/2021 and 01/13/2022, QICO conducted interviews with ENGA and noted the following:
 - o ENGA groups including ARCH, CVST, MECH and PWRS have not been initiating or utilizing EMIs and no records were received. As conveyed to QICO during the course of interviews with ENGA personnel, there is a lack of guidance within SOP 114-02 Engineering Modification Instruction Procedure (Rev. 1, 12/23/2020).
 - o ATCE's EMI process described in the ATC 4000 Systems Configuration Management Plan (Rev. 3.0, 08/31/2020) incorporates a robust and detailed process for an EMI lifecycle. This was validated by QICO during document review of ATCE EMI records, which included (5) approved EMIs, five (5) EMIs under implementation and five (5) completed EMIs.
- During the course of previous Internal Reviews and document review, QICO identified the following inconsistencies:
 - o A modification to the flangeway width was implemented on the E-Line from 7/12/2020 to 7/19/2020, with the absence of an EMI process or Engineering Test Plan (ETP). This was noted in the Restraining Rail Installation and Maintenance IR report, area of improvement FQ-RRIM-21-01.
 - o Absence of engineering oversight and approval within the ATC EMI process as well as throughout the execution of structural modifications for switch machine installations noted in the Switch Machine IR, area of improvement FQ-SM-21-03.
 - o Section 4.2.6.1 of SOP 114-02 Engineering Modification Instruction Procedure (Rev. 1, 12/23/2020) states, "When a condition is declared an emergency and results in a design criteria change that requires a retrofit of existing facilities, the process to be initially followed shall be in accordance with P/I 4.10 section 7.00 EXCEPTIONS". The correct section is P/I 4.10/4 Section 5.06. In addition, exceptions are also included in Section 7.00 Exceptions of P/I 4.14/3 DCB (01/15/2019).
 - o The table below (Figure 2) lists the exceptions and requirements of addressing emergency situations. The requirements below clearly indicate that these exceptions are applicable to site-specific changes including temporary fixes and not necessarily changes that result in design criteria as mentioned in Section 4.2.6.1 of SOP 114-02 Engineering Modification Instruction.

P/I 4.10/4 Configuration Control Management	P/I 4.14 Design Control Board
5.06 Emergencies: Any department director or his staff, with appropriate authority or approval, may declare a condition an emergency and take the necessary steps to avert the imminent potential injury to life, limb or property.	7.01 Emergencies: Any department director or his staff, with appropriate authority or approval, may declare a condition an emergency and take the necessary steps to avert the imminent or potential injury to life, limb or property.
(a) Any changes taken under emergency conditions shall be documented after the emergency conditions are lifted or deemed to no longer exist.	(a) Any changes taken under emergency conditions shall be documented after the emergency conditions are lifted or deemed to no longer exist.

(b) Within 21 days after addressing the emergency, provide documented details of the actions taken to the relevant Director of Engineering discipline for evaluation and acceptance as a site-specific change. The Director should check the changes made are in compliance with WMATA standards.	(b) Within 21 days after addressing the emergency, provide documented details of the actions taken to the relevant Director of Engineering for evaluation and acceptance as a site-specific change. The emergency condition changes (temporary fixes) need to be checked against standards and route through the normal configuration control management process.
(c) The relevant Director of Engineering discipline shall inform the CCCB of the emergency change made to the configuration of any Metro facility, system or subsystem.	(c) Ensure that both the CCCB and DCB are informed of the facility system or subsystem change.
(d) Actions taken under this exception shall constitute a singular event.	(d) Actions under this exception shall constitute a singular event.

Figure 2: P/I 4.10/4 and P/I 4.14

Incorporating clear instructions of when an EMI is to be initiated and aligning SOP with governing P/Is would clarify situations for personnel where the EMI process is to be utilized and ensure consistency.

- **Adherence to established processes for emergency repair enhances process compliance and reduces potential safety risks.**

Discussion

Following governing documents such as P/Is, SOPs and WIs promotes consistent work performance. This is crucial where emergency repairs are required to mitigate potential safety hazards.

- On 09/24/2021 during Track Maintenance and Inspections Internal Safety Review, QICO noted two (2) discrepancies pertaining to the concrete plinths at Largo Town Center station (G05):
 - o Approximately 1/8" of transverse movement was occurring due to cracks at the interface of the plinth and bridge deck surface at multiple locations as a train traversed the interlocking (Figure 3).
 - o One (1) out of the nine (9) plinths that were previously retrofitted with the addition of an angle bracket was found to have a 1/4" of lateral movement due to a gap between the plinth and the retrofit angle bracket.
 - o QICO was informed that repairs would be performed to eliminate the existing plinth movement until a permanent solution is implemented.

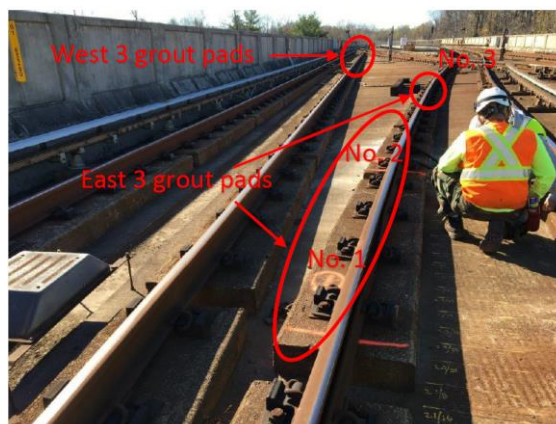


Figure 3: Six (6) grout pads inspected by TRST and CVST

- On 02/10/2022, QICO conducted a follow up interview with a MOWE Track Engineer for an update on the progress of the repairs to concrete plinths at G05 and noted the following:

- CVST Structural Engineer reviewed the issue and proposed temporary repairs to mitigate a safety hazard in a report “Largo Station Interlocking Area Six Grout Pad Temporary Repair (11/20/2020)”. The report includes step-by-step instructions for the temporary repairs of six (6) grout pads. These repairs were completed under Maximo work order (WO) 16005023 on 04/19/2021.



Figure 4: Temporary repairs performed on grout pads located near G1 CM 619+00



Figure 5: Temporary repairs performed on grout pads

- During the repairs, MOWE staff provided field support to TRST.
 - The repairs were implemented to address an emergency situation and therefore did not require an EMI. Permanent repairs are scheduled for the next shutdown of Morgan Boulevard (G04) and G05 stations in two (2) years.
 - For permanent repairs, there is a draft EMI document “Rehabilitation of G04-G05 double Crossovers (Rev. 0 12/13/2021)” that is under development and was provided to QICO for review.
 - According to MOWE Track Engineering, the draft EMI is for the design of a new crossover.
- From the interviews conducted, it was confirmed that temporary repairs performed at G05 were permissible without an approved EMI since it was considered an emergency condition. However, steps (a) through (d) of P/I 4.10/4 and P/I 4.14 (listed in Figure 2) were not followed.
- As of 05/19/2022, QICO has not received any evidence confirming that steps a) through d) were followed for previous emergency situations or the recent temporary repairs at G05 (Figures 4 and 5).
- In addition, QICO requested CCCB and DCB meeting minutes to verify conformance with the process and noted the following:
- CCCB meeting minutes from 2020 to 2021 indicate that no EMIs were initiated for physical modifications to facilities, systems, and subsystems during this timeframe.
 - On 01/31/2022, QICO requested ENGA DCB meeting minutes from 04/2021 to 12/2021. A second request was submitted on 02/09/2022; however, as of 05/19/2022 the DCB meeting minutes have not been provided to QICO.
 - DCB meeting minutes from 02/2020 to 07/2020 were available as part of the Internal Corrective and Preventive Action (iCAPA) QICO-ENGA-19-02. From these it was noted that there is an action log to follow up with issues on EMIs. However, there is no evidence that new or upcoming EMIs are part of the meeting agenda or discussion.

Adherence to the established P/Is would promote traceability and consistency of maintenance practices.

- Adherence to the established record storage process assures compliance and traceability of documents.**

Discussion

Using the appropriate repository to store completed EMI documents and records according to the established process provides record keeping consistency. Maintaining, organizing, and retaining EMI records in a comprehensive centralized document repository enables document retrieval and record availability.

- SOP 114-02 Engineering Modification Instruction Procedure (Rev. 1, 12/23/2020), Section 4.2.3.9 states: “EMIs that have been approved and fully implemented shall be placed in the document repository Documentum.” This procedure is applicable to all Engineering and Architecture (ENGA) and Maintenance of Way Engineering (MOWE) offices.
- ATC 4000 Systems Configuration Management Plan (Rev. 3.0, 08/31/2020), Section 4003.7 has a detailed list of all the documents, including the EMIs to be stored in the Document Management System (currently Documentum).
- Between 12/06/2021 and 01/13/2022, QICO conducted interviews with five (5) MOWE and 11 ENGA employees. During the interviews, QICO noted the following:
 - o ENGA-COMM stores completed EMIs in Procore and on their shared drive (Figure 6).
 - o MOWE-TPOE and ENGA-ATCE store completed EMIs in Procore (Figure 6).
 - o MOWE-Track keeps final EMI records on their shared drive (Figure 6).
 - o MOWE is aware of the requirement to keep completed EMIs in Documentum; however, according to MOWE, Documentum is maintained by ENGA Configuration Management (CFGM).
 - o According to SOP 114-02 Engineering Modification Instruction Procedure (Rev. 1, 12/23/2020), Section 3.12.2, ENGA-CFGM is responsible for recording approved and implemented EMIs into Documentum. CFGM is working with the Department of Information Technology (IT) to update Documentum database and there is no established timeframe for completion.

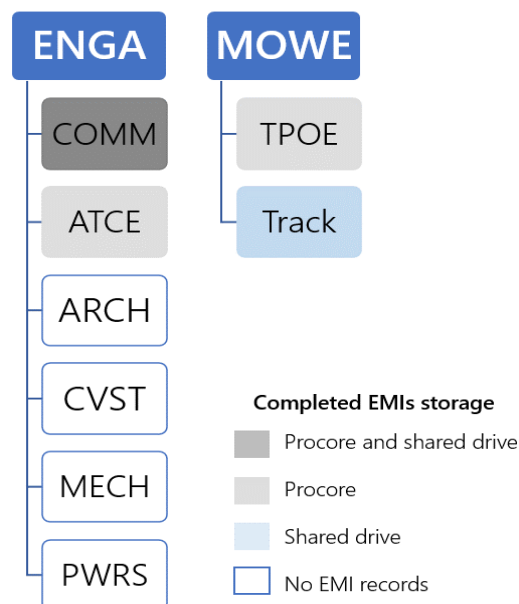


Figure 6: Completed EMIs storage by departments

- As of 05/19/2022, QICO has not received any completed EMIs from ENGA-ARCH, ENGA-CVST, ENGA-MECH, and ENGA-PWRS.
- On 10/07/2021, QICO requested and reviewed a total of 28 EMIs completed between 2016 and 2021 including five (5) from MOWE-TPOE, three (3) from MOWE-Track, five (5) from ENGA-COMM and 15 from ENGA-ATCE. The following was noted (Figure 6):
 - o 25 out of 28 EMIs went through DCB for approval. There is an exception for three (3) EMIs from MOWE-Track that were approved before DCB and CCCB were established.
 - o 27 of the 28 EMI records were developed according to the standard template which comprise sections such as purpose, background, applicable equipment, test equipment and tools, modification instructions and test procedures. One (1) reviewed EMI was initiated in 2016 which is before the development of SOP 114-02, however QICO did not have a review criterion to compare against.
 - o All EMI records reviewed contain a Bill of Materials where it lists all parts required to complete the modifications as stipulated in SOP 114-02 Engineering Modification Instruction Procedure (Rev. 1, 12/23/2020).
 - o “As-Built” records were included as attachments to 15 completed EMIs.
 - o Four (4) completed EMIs required relevant Preventative Maintenance Instructions (PMIs) and documents to be updated. QICO validated that the documentation mentioned in the four (4) EMIs, including PMI instructions and SOPs were updated accordingly.
 - o None of the 15 completed EMI records received were stored in Documentum. According to ATCE, implemented EMIs are stored in Procore and only controlled drawings are archived in Documentum.

✓	DCB Approval	25/28
✓	Standard template compliance	27/28
✓	Bill of Materials	28/28
✓	Completed 15	In progress 13
✓	As-Built records 15/15	Not required
○	Stored in Documentum 0/15	Not required

Figure 7: EMI records review results

FQ-EMI-22-03	Quality Records	Service Delivery – Moderate (3,3)		Owner – ENGA
- For ATCE, QICO reviewed a sample of seven (7) Maximo WOs for EMI implementation and noted compliance with the EMI checklist. For the remainder of ENGA and MOWE groups, EMIs that include a design criteria or design drawing changes are not captured through Maximo WOs. - QICO reviewed nine (9) completed EMIs included test data and records signed by maintenance supervisors and engineers and noted all nine (9) EMIs were executed correctly. Adherence to the EMI record keeping procedure is crucial in assuring record traceability and compliance.				

FQ-EMI-22-04	Training	Service Delivery – Moderate (3,3)		Owner – MOWE & ENGA
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- **Establishing a training and certification matrix for personnel promotes proper skill management.**

Discussion

A training matrix is a tool that maintains and organizes all the training needs for all staff within a department per position. It provides managers and supervisors with information on position training needs. The training matrix captures all required training with the respective frequency.

- Per WMATA Quality Management System Plan (QMSP) (Rev. 2.0, 09/2021), Section 3.12, "Because training needs may vary by role, a training matrix for each project or department/office will be created that identifies each role and the corresponding, relevant training needs for each role, including frequency."
- On 10/07/2021, QICO requested a training matrix and training records from MOWE and ENGA. However, as of 05/19/2022, no training matrix or training records have been provided to QICO.
- Between 12/06/2021 and 12/16/2021, QICO conducted interviews with five (5) MOWE employees and noted that other than the trainings provided through Operations Management Services (OPMS) and tracked in Enterprise Learning Management (ELM) software, MOWE does not maintain a training matrix outlining training requirements for each job function.
- iCAPA QICO-ENGA-19-05 was identified during the 2019 ENGA Internal Safety Review and was closed on 01/23/2022. However, this iCAPA only covers safety trainings including Roadway Worker Protection (RWP) which are tracked in ELM by Technical Skills Maintenance Training (TSMT).
- QICO conducted interviews with 11 ENGA personnel and noted that other than the trainings provided through OPMS and tracked in ELM software, ENGA does not maintain a training matrix outlining training requirements for each job function.
- As of 05/12/2022 RIME is developing a training procedure for the whole department including MOWE. In regard to ENGA, CAPD is creating a plan, scheduled for delivery by June 2022, to address the applicable QMSP core standards, the QICO QMSP team is working with CAPD on the implementation of the QMSP including the training procedure.

Developing a documented training matrix for each job function would assure personnel are meeting and maintaining the skill level needed to perform their job functions. This tool helps to track staff training needs and compliance depending on personnel responsibilities.

FQ-EMI-22-05	Document Control	Service Delivery – Moderate (3,3)		Owner – MOWE & ENGA
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- **Updating Policy Instructions and governing documents within the required frequency assures accuracy and efficiency.**

Discussion

Complying with document control assures documents' accuracy and promotes efficiency throughout the organization. WMATA QMSP (Rev. 2.0, 09/2021), Section 3.2 states, "WMATA departments include procedures for receiving, transmitting, reviewing, approving, disseminating, and archiving critical documents in their respective QMPs."

- During MOWE's document review and per SOP 121-10 Document Control and Record Retention Procedure (Rev. 1, 08/26/2020), QICO noted the following discrepancies:

- o Section 6.1.2 states that “The revision and revision date shall be clearly indicated on each page of the document, as well as the document’s revision table.” However, there are four (4) documents that are missing revision tables (Figure 8).
- o Per Section 6.2, SOPs and WIs are to be reviewed every two (2) years. There are two (2) SOPs that are past the two (2) year revision timeline (Figure 8).
- According to P/I 1.1/4 Document Governance and Hierarchy (06/22/2021), Section 5.03-(b)-6 states: “Triennial Review Cycle for P/Is: every three (3) years, Offices or Departments with assigned ownership of P/Is are responsible for reviewing the policies within their areas.”
 - o However, QICO identified three (3) P/Is under the responsibility of ENGA that are past due for revision (Figure 8).
 - o On 02/09/2022, QICO Policy Instruction team sent a communication to ENGA informing them of the outdated P/Is. As of 05/19/2022, QICO Policy Instruction team has not received any evidence confirming an update on the policies.

Document Name	Discrepancy(s)	Responsible Department
OAP 121-01 Track Asset Condition Data Management (Rev. 2, 09/20/2019)	A revision was due by 09/20/2021 Missing revision table	MOWE
OAP 121-03 Key Track Asset Management Programs Planning and Analysis (Rev. 0, 09/20/2019)	A revision was due by 09/20/2021 Missing revision table	MOWE
SOP 121-11 Rail Grinding Procedure (Rev. 0, 05/11/2021)	Missing revision table	MOWE
SOP 121 -13 Tamping and Surfacing Needs Analysis and Planning (Rev. 0, 10/01/2021)	Missing revision table	MOWE
SOP 114-02 EMI Procedure (Rev. 1, 12/23/2020)	Wrong year on revision table	ENGA
P/I 1.20/0 CCCB (02/08/2019)	A revision was due by 02/08/2022	ENGA
P/I 4.10/4 Configuration Control Management (01/11/2019)	A revision was due by 01/11/2022	ENGA
P/I 4.14/3 DCB (01/15/2019)	A revision was due by 01/15/2022	ENGA

Figure 8: Discrepancies in MOWE and ENGA documents

Complying with the established documented governing revision frequency would assure performance and promote compliance.

8.4 SUMMARY OF REQUIRED ACTIONS

QICO-EMI-22-01

Action Owner – MOWE & ENGA

Overall Risk – Elevated (4,4)



Required Action: Update SOP 114-02 to include clear circumstances of when an EMI is required and enforce adherence to P/I 4.14/3 instructions for emergency repairs.

Applicable Findings

- FQ-EMI-22-01: Having well-defined criteria necessitating the utilization of an EMI and aligning the EMI SOP with governing P/Is would support process consistency
 - o **Standard:** Process Control **Risk:** Service Delivery – Moderate (4,4)
- FQ-EMI-22-02: Adherence to established processes for emergency repair enhances process compliance and reduces potential safety risks.
 - o **Standard:** Non-conformance **Risk:** Service Delivery – Moderate (3,3)

QICO-EMI-22-02

Action Owner – ENGA

Overall Risk – Moderate (3,3)



Required Action: Enforce adherence to EMI record archive according to existing guidance of SOP 114-02 and ATC 4000.

Applicable Findings

- FQ-EMI-22-03: Adherence to the established record storage process assures compliance and traceability of documents.
 - o **Standard:** Quality Records **Risk:** Service Delivery – Moderate (3,3)

QICO-EMI-22-03

Action Owner – MOWE & ENGA

Overall Risk – Moderate (3,3)



Required Action: Develop a training matrix for all ENGA and MOWE roles.

Applicable Findings

- FQ-EMI-22-04: Establishing a training and certification matrix for personnel promotes proper skill management.
 - o **Standard:** Training **Risk:** Service Delivery – Moderate (3,3)

QICO-EMI-22-04

Action Owner – MOWE & ENGA

Overall Risk – Moderate (3,3)



Required Action: Enforce revision of Policy Instructions and governing documents in accordance with the required revision periodicity and enforce implementation of SOP 121-10 document control guidelines.

Applicable Findings

- FQ-EMI-22-05: Updating Policy Instructions and governing documents within the required frequency assures accuracy and efficiency.
 - o **Standard:** Document Control **Risk:** Service Delivery – Moderate (3,3)

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

TECHNICAL TERMINOLOGY

DESCRIPTION

- **Double Crossovers:** Train tracks consisting of 2 crossovers of opposite hand orientation positioned upon each other.



- **Grout Pad:** A buffer between the support structure and railroad in direct fixation tracks. The purpose of the grout pad is to transfer railroad loading to the invert uniformly, absorb impact, provide support to track fasteners.



Additional Terms

- **As-Built Drawings:** Drawings that document the final condition in which a facility, system or subsystem was turned over to Metro at the end of a project (or the current status of a facility, system or subsystem after changes have been made to the existing configuration).
- **As-Is Drawing:** Drawings that document the present condition of the facility, system or subsystem as it is in operation. It shall include the changes made after completion of projects.
- **(ATCE) Automatic Train Control Engineering:** Provides engineering supports to ATCM through aspects including Preventive Maintenance Inspection (PMI) instructions, periodic PMI reviews and updates, sourcing of replacements for obsolete equipment, technical specification reviews, and troubleshooting support.
- **Configuration Management (CM):** Is the practice of handling documentation changes systematically. CM implements the policies and procedures required to manage, evaluate and approve proposed revisions, track their status, and to maintain an accurate inventory of the system documentation.
- **Emergency:** An emergency shall be an immediate situation characterized by actual or potential loss of life, injury or damage to property.
- **Enterprise Learning Management (ELM):** Is the learning Management System used by Metro Employees, Managers, Instructors and Administrators to manage learning throughout the entire Metro organization. ELM integrates with PeopleSoft Human Capital Management (HCM) to import personal and organization data.
- **On-the-job Training (OJT):** Training that involves a combination of observing others and hands-on experience completing tasks under the supervision of a manager, coworker or outsourced professional trainer.
- **Project Management System (PMSS):** PMSS or Procore is the primary tool for managing the configuration control of EMI documentation while they are under review and implementation phases.
- **Quality Control (QC):** Operational techniques and activities that are used to fulfill the requirements for quality and assure that a product or work activity meets WMATA requirements.
- **Standard Operating Procedure (SOP):** Step by step instructions developed to help workers carry out routine operations.
- **System:** Refers to a group of devices, equipment or other components that perform a specific operation or serve a designated purpose as designed or engineered.
- **Subsystem:** Subsystem refers a self-contained system within a larger system which also contains a group of devices, equipment or other components that perform a specific operation or serve a designated purpose as designed or engineered.



(9) Structures Maintenance Leak Mitigation Process

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 quality and safety concerns while assuring compliance with rules and regulations. 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 Structures Maintenance Leak Mitigation process and promote the actions needed to address any concerns.

QICO's Methodology:

- Review relevant 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:

Adhering to Standard Operating Procedures (SOPs) and Work Instructions (WIs) would enhance the quality of work, improve work efficiency, and create a safer work environment.

Items Resolved During the Review:

- ★ Following established safety protocols and procedures when transporting, storing, and disposing of chemicals reduces the risk to employee exposure.
- ★ Establishing a pressure range while performing grout injection would create a uniform process and help prevent damage.
- ★ Following required PPE Work Instruction guidelines helps protect employees from inhaling dust particles, prevents injury and promotes a safety culture.

Areas for Improvement:

- Defect reporting into the appropriate system of record in accordance with the Standard Operating Procedures supports accurate tracking and timely scheduling of leak mitigation activities.
- Regularly reviewing, tracking, investigating, and documenting the status of aged work plans would promote on-time completion of scheduled work providing a good state of repair.
- Following leak mitigation Work Instructions would support quality work, produce consistent results, and may prevent employee injury. [\(Repeat Finding\)](#)
- Performing tool and equipment inspections prior to utilization enhances work production and decreases job hazards.
- Reviewing and updating governing documents within the required frequency optimizes applicability and incorporates changes in a timely manner.

Required Actions:

- **QICO-STLM-22-01:** Appropriately reporting defects into the system of records, eliminating any duplicate work orders, performing regular reviews, and evaluating the status of aged work plans for accurate traceability. (Overall Risk-Elevated)
- **QICO-STLM-22-02:** Follow the guidance provided in the Standard Operating Procedures and Work Instructions when performing job functions. (Overall Risk-Moderate)
- **QICO-STLM-22-03:** Perform inspections and assure the removal of defective tools to avoid use at job locations. (Overall Risk-Moderate)

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>

9.1 FUNCTIONAL OVERVIEW AND STRUCTURES

Structures Maintenance Leak Mitigation Process (STLM)

Under the Office of Track and Structures (TRST), Structures department is responsible for the coordination, scheduling and implementation of all structural-related maintenance and inspection activities of bridges, tunnels, stations, and other structural assets throughout the WMATA system. One of the activities of Structures department is to mitigate leaks and handle water intrusion coming from weakened points of the infrastructure. This includes mainly cracks inside the railroad tunnels, parking garages, power rooms, train control rooms (TCRs), service rooms, and stations (Figure 1). Water intrusion is detrimental to the system as it accelerates the deterioration process of track components, creating corrosion and increasing the possibility of flooding, sand intrusion, electrical problems, fire, or smoke in the system. The leak mitigation process includes drilling and injecting chemical grout into the tunnel walls where leaks are located or installing diversion hoses to reroute the leak to another location, typically a track bed drain.

To help ensure a safe and timely commute for WMATA customers and maintain the structures and infrastructure, Structures department performs the following activities:

- Structures Inspections: Inspectors inspect all structures and infrastructure-related items such as bridges, tunnels, culverts, stations, fences, retaining walls, shafts, bus garages, parking garages, and other structures as required.
- Structures Oversight: Structures Maintenance Management perform periodic walkthrough inspections of the Metro system verifying reported defects.
 - by Track Walkers or Structures Inspectors and create work plans for repair.
- Structural Rehabilitation: Structures Maintenance team performs Corrective Maintenance (CM) and Preventive Maintenance (PM) such as leak repairs, concrete repairs, drain cleaning/repairs, grout pad renewal, etc.



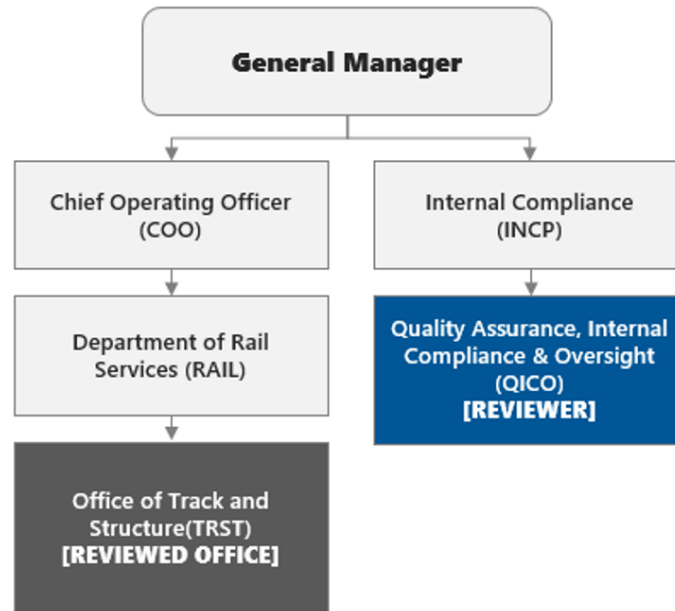
Figure 1: Types of areas affected by leaks

The objective of this STLM Internal Review (IR) is to assess adherence and effectiveness of established processes, hazard identification, and repairs that relate to leak mitigation in accordance with but not limited to the following:

- WMATA Quality Management System Plan (QMSP) (Rev. 2.0, 09/20/2021)
- TRST Work Instruction 39 Typical Leak Repair (Rev. 1.0, 09/17/2020)
- MOWE-SOE-SMI-WI-44 Typical Leak Repair (Rev. 0, 04/04/2022)
- SOP 200-05_Hazard Communication (Rev. 0, 04/15/2020)
- SOP 208-12_TRST Temporary Equipment Material and Debris Storage Removal (Rev. 2.0, 04/23/2021)
- SOP 208-15_TRST Quality Control Procedure (Rev. 0, 12/08/2020)
- ESOP 4-3_Hazardous Waste Disposal (Rev. 02, 05/20/2021)
- OAP 108-02_TRST Document Control Policy (Rev. 0, 04/28/2020)

Organizational Structures 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).



9.2 REVIEW SCOPE

Documentation Review

- TRST Work Instruction 39 Typical Leak Repair (Rev. 1.0, 09/17/2020)
- MOWE-SOE-SMI-WI-44 Typical Leak Repair (Rev. 0, 04/04/2022) (Controlled by MOWE)
- TRST 2000 Maintenance Control Program (Rev. 7.0, 01/21/2021)
- 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) (Controlled by MOWE)
- OAP 121-03 Key Track Asset Management Programs (Original, 09/20/2019)
- OAP 600-04 Material Accountability (Rev. 02 10/31/2000) (Not controlled by TRST)
- ESOP 4-3 Hazardous Waste Disposal (Rev. 02, 05/20/2021) (SAFE document)
- SOP 200-05 Hazard Communication (Rev 0.0, 04/15/2020) (SAFE document)
- SOP 208-07 Structures Inspection (Rev. 4.0, 07/13/2021)
- SOP 208-12 Temporary Equipment Material and Debris Storage Removal (Rev. 2.0, 04/23/2021)
- SOP 208-15 TRST Quality Control Procedure (Rev. 0.0, 12/08/2020)
- 20 Structural Repairer Training Records
- AssetWise Inspection Records (09/2021-03/2022)
- STRC Training Matrix (01/28/2022)
- STRC Open Leak Work Plans (05/19/2022)

Field Assessments

- Van Ness (A06) Track 1 (02-07-2022 & 02-08-2022)
- Forest Glen (B09) Track 1 (02-16-2022)
- T78 PLNT/TRST Operations Building (02-18-2022, 03-22-2022)
- Alexandria Yard (C99) (02-18-2022, 03-22-2022, 03-29-2022)

Personnel Discussions

- Assistant General Superintendent, Structures Division, TRST (03/02/2022)
- Two (2) Superintendents, Structures Maintenance and Structures Production, TRST (03/03/2022 & 03/07/2022)
- Assistant Superintendent, Structures Production, TRST (03/08/2022)
- Two (2) Maintenance Managers, Structures Inspections and Structures Production, TRST (03/03/2022 & 03/09/2022)
- Two (2) Structures Repairers, Structures Production, TRST (03/03/2022 & 03/08/2022)

Applicable Corrective Action Plans (CAPs) & Internal Corrective and Preventive Actions (iCAPAs) Reviewed

Open	- NTSB R-16-08 Past Due: 12/29/2017 Submitted: 04/15/2022	Develop safety-critical maintenance/inspection procedure manuals as detailed in the CAP, including instructions for inspecting for and mitigating water intrusion into tunnels. The submittal for this item is under review by National Transportation Safety Board (NTSB) for acceptance. Repeat Finding: FQ-STLM-22-03
Closed	- QICO-SIM-17-01 Submitted: 04/19/2019	WMATA must develop a strategy to address structural findings. <i>No repeat finding associated with this iCAPA</i>
Closed	- WMSC-21-C0089 Submitted: 01/06/2022	Metrorail must require sufficient, specific, specialized, standardized refresher training and recertification on each type of equipment at appropriate intervals, which may be more frequent if operators have not regularly used a specific type of equipment, and develop a process to ensure equipment operators have frequent exposure to any equipment they may use. All aspects of this training and recertification must be documented. <i>No repeat finding associated with this CAP</i>

9.3 ITEMS RESOLVED DURING REVIEW

Items resolved are categorized by the [15 Core QMS Standards](#)

R-STLM-22-01 Identification & Traceability of Assets & Materials

Owner – TRST

- ★ Following established safety protocols and procedures when transporting, storing, and disposing of chemicals reduces the risk to employee exposure.

Discussion

Per Metrorail Safety Rules and Procedures Handbook (MSRPH) Safety Rule 4.2e "Ensure that all containers of hazardous materials and chemical products are properly labeled". Transporting chemicals without the proper labels may impede emergency response because of the missing pertinent chemical information used in determining the course of action to handle exposed individuals.

In addition to MSRPH Safety Rule 4.2e, TRST 2000 Sec. 16.3.3 Material Control Safety Rules states the following:

- "Never store incompatible groups of materials together".
- "Containers must have proper labeling".
- "Hazardous materials must be stored on spill pallets or other secondary containment to prevent leaks/spills from spreading".
- "When a hazardous material expires, it is no longer needed or becomes off-spec and becomes a hazardous waste unless returned to the vendor or to surplus".
- "All personnel who handle expired and hazardous materials, regardless of their role in the organization must follow safety guidelines as stated in Safety Data Sheets (SDS)".

OSHA standard 1910.1200(a)(2) also states "Classifying the potential hazards of chemicals and communicating information concerning hazards and appropriate protective measures to employees may include, for example, but is not limited to, provisions for: developing and maintaining a written hazard communication program for the workplace, including lists of hazardous chemicals present; labeling of containers of chemicals in the workplace, as well as of containers of chemicals being shipped to other workplaces; preparation and distribution of safety data sheets to employees and downstream employers; and development and implementation of employee training programs regarding hazards of chemicals and protective measures."

TRST 2000 Sec. 16.4.3 also states, "The storage of expired material is prohibited. Materials that have expired are to be disposed of properly in accordance with all EPA and WMATA rules and regulations regarding the disposal of hazardous materials."

- During field assessments at Van Ness (A06) on 02/09/2022, QICO observed the following (Figure 2):
 - o Structures (STRC) employees performing leak mitigation utilizing chemicals from unlabeled containers.
 - o QICO emailed STRC management to address the unlabeled chemical containers on 02/09/2022.
- In addition, during Field Assessments at Alexandria Yard (C99) (02/18/2022 and 03/22/2022), QICO observed chemical containers missing either expiration dates or the entire labels.
- To follow up with these discrepancies, QICO conducted field assessments at Alexandria Yard on 03/29/2022 and T78 PLNT/TRST Operations Building on 03/22/2022, and verified that both yards addressed the chemical storage and transport issues in the following ways:



Figure 2: Unlabeled and properly labeled containers

- The fire equipment cabinets are reorganized per the guidelines given by the Environmental Control Officer (ECO) (Figure 3).
- All chemicals transferred into other containers are labeled with the products name, manufacturer, expiration date, and marked if used and ready for disposal.
- All liquid chemicals are stored on the appropriate spill pallets.
- All chemicals are labeled with expiration dates to properly identify when chemicals can no longer be used and need to be disposed of.



Figure 3: Organized fire cabinets

Storing, transporting, and utilizing chemicals in properly labeled containers allow employees and emergency personnel to accurately determine what chemicals they are dealing with, precautions to be taken, the necessary actions in case of exposure, and appropriate handling in emergency situations.

- ★ **Establishing a pressure range while performing grout injection would create a uniform process and help prevent damage**

Discussion

Sealing and remediation of active water leaks in underground structures is achieved by injection of chemical grout under pressure. Per the Leak Mitigation Work Instruction, WITK-TRST-SMI-WI-39, (Rev. 1.0, 09/17/2020), Sec. 11.4.7, "Inject chemical grout into injection ports." There is no defined range of pressure employees must maintain to safely pump the chemical grout into the crack (Figure 4).

- During a field assessment at Van Ness (A06) on 02/09/2022, QICO observed the following:
 - Employees injecting chemical grout into the tunnel wall were asked about the specified range of the pressure they were using; however, the employees stated that there is no specific guidance to use for the pressure range and that they have to keep pumping until the chemical grout overflows and appears on the wall surface.
- Figure 4 shows the pressure of injection of one thousand (1000) psi on the pump being utilized by this work crew.
- On 04/04/2022, TRST and Maintenance of Way Engineering (MOWE) jointly developed a new Work Instruction, MOWE-SOE-SMI-WI-44 Typical Leak Repair (Rev. 0, 04/04/2022) where a pressure range for chemical injection was included. MOWE-SOE-SMI-WI-44, Sec. 12.8.8 states to: "Attach the grout injection gun to the injection port and begin to pump grout at a low pressure (not exceeding 300psi)." The submittal for this item is under review by National Transportation Safety Board (NTSB) for acceptance as a response to Corrective Action NTSB R-16-08.



Figure 4: Pressure gauge showing psi while pumping grout into wall

- ★ Following required PPE Work Instruction guidelines helps protect employees from inhaling dust particles, prevents injury and promotes a safety culture.

Discussion

The process of cutting, grinding, drilling, or breaking concrete or rock creates fine dust particles that become airborne and contain crystalline silica commonly referred to as silica dust. Even small amounts of inhaled silica pose a health hazard. The minimum protection required when drilling or cutting is a face mask according to WITK-TRST-SMI-WI-39 (Rev. 1.0, 09/17/2020) Sec. 9.2, required Personal Protective Equipment (PPE) "respiratory protection":

- During a Field Assessment at Van Ness (A06) on 02/09/2022, QICO observed an employee drilling into the concrete wall without respiratory protection (Figure 5) and communicated the discrepancy with stakeholder.
- QICO met with SAFE Occupational Safety group on 02/11/2022 regarding silica mitigations and noted the following:
 - o Per OSHA regulation, 29 C.F.R. § 1910.134(c)(2)(ii) "Exception: Employers are not required to include in a written respiratory protection program those employees whose only use of respirators involves the voluntary use of filtering facepieces (dust masks)."
 - o SAFE conducted an earlier study where readings are taken from small drilling activities (leak port drilling), and the silica exposure levels were below the OSHA threshold to require a respirator.
- After a follow-up discussions with TRST, QICO noted that Work Instructions, MOWE-SOE-SMI-WI-44, was developed and disseminated, between 5/06/2022 and 5/22/2022, which combines and supersedes multiple Structures Work Instructions inclusive of WITK-TRST-SMI-WI-39. The requirement of respiratory protection has been removed which aligns with OSHA's guidance.



Figure 5: Worker not wearing a mask while drilling into the concrete

9.4 AREAS FOR IMPROVEMENT

Findings are categorized by the [15 Core QMS Standards](#) and rated by the [Risk Assessment](#)

FQ-STLM-22-01 Process Control

Service Delivery – Elevated (3, 5) ■ Owner – TRST

- Defect reporting into the appropriate system of record in accordance with the Standard Operating Procedures supports accurate tracking and timely scheduling of leak mitigation activities.

Discussion

Structural Evaluation Technicians (SETs) perform tunnel leak inspections and record their findings into AssetWise. Per SOP 208-07 Sec. 12.1.3 "All defects must be entered into the appropriate System of Record (SOR) for defects within 15 working days of the actual inspection date."

There are currently two (2) systems where STRC capture/report tunnel leak defects: AssetWise (previously InspectTech) and Maximo.

- AssetWise is the SOR where Structural Inspectors upload their inspection reports. Maximo is the SOR where multiple departments create and track work orders for corrective maintenance in the WMATA system. SOP 208-07 Structures Inspection, Sec. 12.7 requires Structural Evaluation Technicians to report and rate defects based on location and category (Figure 6). Each leak defect rated Category 1 or 2 must have an associated Maximo work order:
 - o Category 1 (Severe) Rated 0-2 on the 0-9 scale.
 - o Category 2 (Moderate) Rated 3-4 on the 0-9 scale.

Category	Code	Description
Category 3	N	NOT APPLICABLE
	9	EXCELLENT CONDITION – New construction.
	8	VERY GOOD CONDITION – No deficiencies noted.
	7	GOOD CONDITION – The concrete liner contains minor shrinkage cracks with a minor presence of
	6	SATISFACTORY CONDITION – Concrete liner shows some very minor deteriorations.
Category 2	5	FAIR CONDITION – Concrete elements contain moderate cracks with moderate presence of efflorescence. Minor delaminations, spalls, map cracking, and staining exist but no reinforcement steel is exposed. Precast
	4	POOR CONDITION – Moderate/severe diagonal, longitudinal, and transverse cracks with water leaks, loose
	3	SERIOUS CONDITION – Concrete elements contain numerous severe diagonal, or longitudinal cracks with extensive efflorescence, leakage, and staining. Severe delaminations and spalls are present, exposed
Category 1	2	CRITICAL CONDITION – Major repairs are required immediately to keep structure open to traffic. Concrete elements contain extensive severe cracks, delaminations, and spalls. Exposed reinforcement steel has severe
	1	IMMINENT FAILURE CONDITION – Major deterioration/deformation or section loss is present in the concrete
	0	FAILED CONDITION – Tunnel liner is out of service and beyond corrective action.

Figure 6: Leak Category, Rating and Description

- QICO sampled 20 AssetWise reports between (01/2021-01/2022) with severe and moderate leak defects in Maximo and identified the following: (Figure 7).
 - o Out of 72 reported Category 1 leaks, four (4) were reported in Maximo within 15 working days, 57 leaks were reported in Maximo beyond 15 working days, and 11 were not reported in Maximo.

- Out of 161 reported Category 2 leaks, one (1) was reported in Maximo within 15 working days, three (3) leaks were reported in Maximo beyond 15 working days, and 157 were not reported in Maximo.

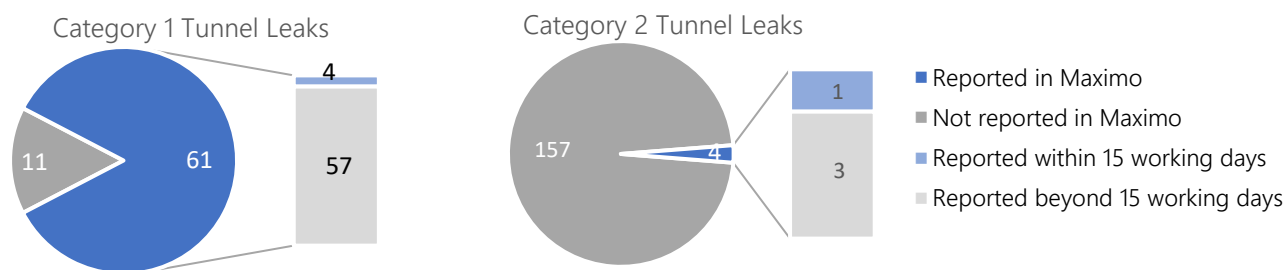


Figure 7: Assetwise report information in Maximo

When category 1 and 2 leaks are not reported in Maximo (System of Record) as required by SOP 208-07 Sec. 12.1.3, it impedes the planning of corrective leak mitigation activities and prolongs exposure of track hardware, components, and tunnel structural components.

- Regularly reviewing, tracking, investigating, and documenting the status of aged work plans would promote on-time completion of scheduled work providing a good state of repair.

Discussion

To address maintenance and repair issues, TRST develops work plans in Maximo. Based on the nature and proximity of defects, a work plan may include to address a single work order, or several work orders grouped together in a work plan to facilitate efficient planning. According to TRST 2000 Maintenance Control Program:

- Section 12.5.1 "Deferred Maintenance is the act of postponing maintenance activities, such as repairs, PMs or total renewal of infrastructure."
- Section 12.5.2 "Any work plan in the System of Record for Work Accomplishment (currently Maximo) with a Work Order type of PCM, PM, CM, or EEA that could not be resolved within 30 days of creation of the Work Order is considered as having been deferred. Continued maintenance of these systems/subsystems must be made to ensure the quality/reliability of the system/subsystem is not compromised."
- Section 12.5.3 priority one is defined as "life-safety critical systems/subsystems and any corrective maintenance linked to a Maximo Incident".

TRST 2000 provides guidelines regarding aged work plans for each step from 30 days to over 90 days. The guidelines below breakdown responsibility for each step-in aged work plans and the responsible party and the process they have to perform when it gets to that level. Priority one requires immediate action and such maintenance is not deferred.

- Sec. 12.5.5, "Aged Work Plans in the second priority (over 30 but fewer than 60 days) will be reviewed regularly by Maintenance Managers to ascertain the reason for the deferral and if all appropriate actions are being made to obtain the necessary spare parts, necessary support from another resource, department, etc. Maintenance Managers will also check for completion and ensure all Work Plans reflect the correct current status."
- TRST 2000 12.5.6, "Aged Work Plans in the third priority (over 60 but fewer than 90 days) will be reviewed regularly by Superintendents to ascertain the reason for the deferral and if all appropriate actions are being made to obtain the necessary spare parts, necessary support from another resource, department, etc."
- TRST 2000 12.5.7, "Aged Work Plans in the fourth priority (over 90 days) will be reviewed regularly by Assistant General Superintendents to ascertain the reason for the deferral and if all appropriate actions are being made to obtain the necessary spare parts, necessary support from another resource, department, etc."

QICO requested a list of the current number of aged work plans specifically related to tunnel leaks that have been open for 30 days or longer. The Structures department currently has 23 aged work plans. Of the 23 aged work plans, 18 (78%) are over 90 days. Of the 18 aged work plans, six (6) are 200 days over or more (Figure 8).

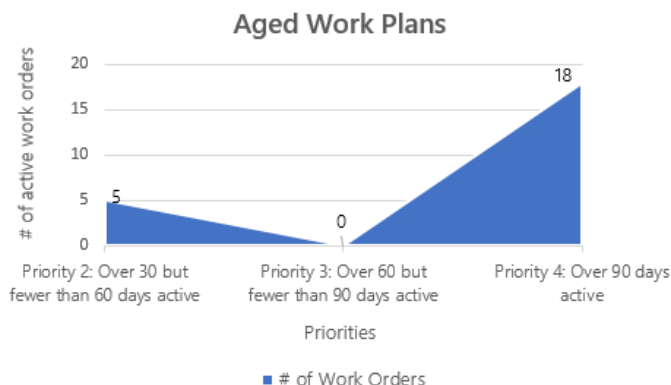


Figure 8: Active aged work plans

There is no required action beyond the 90-day deferral and no clear instruction or documentation showing actions are taken to ensure the aged work plans are being accounted for.

Well defined criteria and guidance on following up with the required actions on aged work plans would allow the closure of work orders and work plans based on priority level and unavailable data. There is currently no documented procedure to require managements' actions on post aged work plan review. .

- Following leak mitigation Work Instructions would support quality work, produce consistent results, and may prevent employee injury.

Discussion

Following work instructions when performing job functions is vital in assuring maintenance work is performed correctly, safely, and consistently across the system.

QICO conducted field assessments of STRC maintenance between 02/08/2022 and 02/17/2022 at Van Ness (A06) and Forest Glen (B09) and observed the following discrepancy as it relates to following the work instruction:

- Crews had only one (1) pump to mitigate leaks at both locations.
 - o Per WI TRST-SMI-WI-39 sec 11.4.6 "Flush crack with water to clean and monitor, pressure not to exceed 300 p.s.i." (Figure 8). However, no water was pumped into the cracks to flush the crack out. QICO observed that the crew had only one (1) pump for chemical grout and did not have a secondary pump for water. Using both chemical grout and water in the same pump would create a chemical reaction clogging the pump and would result in malfunction and downtime.
 - o Work Instruction TRST-SMI-WI-39 does not clarify how many pumps are required nor provide any warnings to avoid damaging equipment if chemicals and water are run through the same pump. (Figure 9)



Typical Leak Repair

Work Instruction No.
TRST-SMI-WI-39

Revision: 1

Page 7 of 7

11.4.6. Flush crack with water to clean and monitor, pressure not to exceed 300 p.s.i.

11.4.7. Inject chemical grout into injection ports.

11.4.8. After completion of injection method and the chemical curing process is complete remove injection ports and patch holes with concrete similar to the color of the existing concrete surface. Count leak as completed after this process has been performed.

Figure 9: Section 11.4 of the Leak Mitigation Work Instruction

- On 05/04/2022, QICO received the revised WI, MOWE-SOE-SMI-WI-44 Typical Leak Repair (Rev. 0, 04/04/2022) from the Structures department. The revised WI states that the employees are required to utilize two different pumps while performing the work. The submittal for this item is under review by National Transportation Safety Board (NTSB) for acceptance as a response to Corrective Action NTSB R-16-08.

Following documented process allows personnel to perform maintenance and repairs, timely, safely, and efficiently.

FQ-STLM-22-04 Inspection, Measuring & Test Equipment

Safety – Moderate (3, 3) Owner – TRST

- **Performing tool and equipment inspections prior to utilization enhances work production and decreases job hazards.**

Discussion

Utilizing tools or equipment that are beyond their useful life or in need of repair presents a set of risks such as cuts, scrapes, open wounds, infections, etc. to the user and those around them. Per MSRPH Safety Rule Sec. 4.88 "Before using and while in use, employees shall make visual inspections of tools, tackle, straps, ropes, jacks or other items of equipment." In addition, per Safety Rule Sec. 4.89 "Employees shall report defective tools and equipment to their supervisor and mark them "Defective – Do Not Use" including a detailed description of the defect."

- QICO conducted four (4) field assessments at multiple locations and observed the following:
 - o STRC crew was using a rail cart with cracked welds at the connection points at Van Ness (A06) on 02/08/2022 (Figure 10).
 - o The rail cart at Forest Glen (B09) on 02/17/2022 had the metal mesh damaged and created a potential safety hazard when lifted.
 - o During the Alexandria Yard (C99) field assessment on 02/18/2022, QICO noted damaged rail carts in the storage container that were not tagged "out of service". Upon a follow up visit at Alexandria Yard (C99) on 03/29/2022, the defective carts were tagged out and separated from the non-defective carts (Figure 11).

Inspecting tools and equipment prior to usage minimizes safety risks and facilitates efficient job performance with no unnecessary downtime or rework. Defective tools and equipment must be marked with an out of service tag and removed from service in accordance with MSRPH safety rules.



Figure 10: Rail cart with broken weld



Figure 11: Out of service tag located on rail cart

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

Discussion

Standard 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 similar 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 and frequent revision of these documents would support the implementation of manufacturers' updates to assets and incorporate industry's best practices for improved maintenance techniques.

- TRST OAP-108-02 Section 6.3.5 requires all TRST controlled documents to be reviewed every two (2) years (or as needed) to assess their relevance and effectiveness. QICO reviewed six (6) TRST documents and identified one (1) document that is past due for review. (Figure 12)
- TRST 2000 Sec. 13.8.3 states "TRST controlled documents are reviewed every two years (or as needed) to assess their relevance and effectiveness."

Document Title	Revision Date	Document Review Status
OAP 108-02 Document Control Policy	4/28/2020	Out of date

Figure 12: STLM document compliance

Additional discrepancies as they relate to outdated documents within TRST are noted in a finding, FS-STRC-22-04, in the Structures Inspection and Maintenance Internal Safety Review report. Utilizing outdated SOPs and OAPs while performing tasks increases safety risks and contributes to inconsistent work, rework, and waste. TRST began QMSP implementation in August 2019 and has identified all required Quality Management System Plan (QMSP) Core Standards. TRST is in the process of developing four (4) SOPs and three (3) Work Instructions to complete Phase II (documents' development) of the implementation process which is estimated to be completed by the end of 09/2022.

9.5 SUMMARY OF REQUIRED ACTIONS

QICO-STLM-22-01

Action Owner – TRST

Overall Risk – Elevated (Average Rating) 

Required Action: Appropriately reporting defects into the system of records, eliminating any duplicate work orders, performing regular reviews, and evaluating the status of aged work plans for accurate traceability.

Applicable Findings

- FQ-STLM-22-01: Defect reporting into the appropriate system of record in accordance with the Standard Operating Procedures supports accurate tracking and timely scheduling of leak mitigation activities.
 - o **Standard:** Process Control **Risk:** Elevated – (3,5)
- FQ-STLM-22-02: Regularly reviewing, tracking, investigating, and documenting the status of aged work plans would promote on-time completion of scheduled work providing a good state of repair.
 - o **Standard:** Process Control **Risk:** Elevated – (3,5)

QICO-STLM-22-02

Action Owner – TRST

Overall Risk – Moderate (Average Rating) 

Required Action: Follow the guidance provided in the Standard Operating Procedures and Work Instructions when performing job functions.

Applicable Findings

- FQ-STLM-22-03: Following leak mitigation Work Instructions would support quality work, produce consistent results, and may prevent employee injury.
 - o **Standard:** Process Control **Risk:** Moderate – (3,3)

QICO-STLM-22-03

Action Owner – TRST

Overall Risk – Moderate (Average Rating) 

Required Action: Perform inspections and assure the removal of defective tools to avoid use at job locations.

Applicable Findings

- FQ-STLM-22-04: Performing tool and equipment inspections prior to utilization enhances work production and decreases job hazards.
 - o **Standard:** Inspection, Measuring, & Test Equipment **Risk:** Moderate – (3,3)

TECHNICAL TERMINOLOGY

DESCRIPTION

- **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).



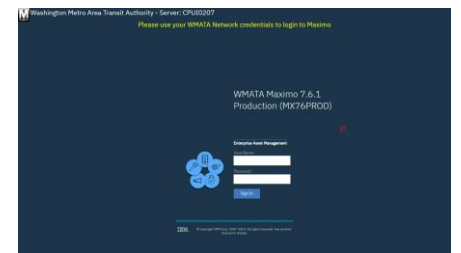
- **Safety Walk:** The Safety Walk is the path in tunnels that are elevated or at level with the tracks. They are opposite of the Third Rail to allow you to safely traverse the system and to get out of the dynamic envelope of trains and Roadway Maintenance Machines when passing by.



- **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.



- **Maximo:** Data repository where a wide range of defects are placed into and accounts for the location, defect type, work status, and work progression.



- **Tagged Out:** Nomenclature used when equipment becomes defective and needs to be taken out of service to be repaired.



- **AssetWise:** A data repository that the Structural Inspectors upload their information to for all inspections, regardless of whether deficiencies were found.



DESCRIPTION

- OPTRAM: A data repository that Track Walkers report their findings, and the Managers upload from their inspection reports.



Version: 5.7.19.19

- Silica Dust: A fine dust particle that populates into the air created from the acts of cutting, drilling, chipping, sanding, and grinding materials such as sand, concrete, brick, block, mortar, and stone can cause the respiratory issue called "Silicosis" and other serious health conditions.



- EPA: Environmental Protection Agency.



- PSI: Pounds Per Square Inch.



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.

INTERNAL CORRECTIVE & PREVENTIVE ACTIONS (iCAPAs)

Silver Line Safety Certification iCAPAs



Service Delivery

In response to the Internal Review report regarding Silver Line Safety Certification Oversight, the Department of Safety & Environmental Management (SAFE), the Office of Quality Assurance Internal Compliance & Oversight (QICO) have coordinated the development of three (3) iCAPAs. The iCAPAs have been developed to address the required actions and the associated findings.

EXECUTIVE LEADERSHIP COMMITMENT

RESPONSIBLE PARTIES

[Redacted Signature]

Theresa M. Impastato
Executive Vice President & Chief Safety Officer

Date

INTERNAL OVERSIGHT

[Redacted Signature]

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

Date

[Redacted Signature]

Eric Christensen
Executive Vice President, Internal Compliance (INCP)

Date

GENERAL MANAGER & CHIEF EXECUTIVE OFFICER (GM/CEO)

[Redacted Signature]

Andrew B. Off
Interim General Manager & Chief Executive Officer (GM/CEO)

Date

PURPOSE
AND SCOPE

On February 10, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Silver Line Safety Certification Oversight (SLSC) Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated findings and required action for QICO-SLSC-22-01.

FINDINGS

FQ-SLSC-21-01: Performing quality audits promotes compliance with requirements, provides consistency of performance, and helps identify improvement opportunities.

FQ-SLSC-21-02: Establishing and implementing processes to oversee and monitor SAFE's contractor K&J performance would provide a standard, promote efficiency, and assist in maintaining compliance throughout the life of the project.

FQ-SLSC-21-03: Creating detailed work instructions describing the Certifiable Item List approval/rejection process would reduce rework and waste while encouraging consistency of work performed.

REQUIRED
ACTION

QICO-SLSC-22-01

*Office of Safety Certification and
Engineering (OSCE)*[Moderate](#)

Enforce implementation of quality control audits and establish departmental controls to include contractor oversight as well as detailed work instructions for item review and approval

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

ACTION PLAN OVERVIEW

Process control measures will be implemented in order to enforce the implementation of quality assurance audits and office controls in reference to contractor oversight. Review and approval procedures will also be strengthened.

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. Update SOP 200-18	SAFE will update and submit SOP 200-18: <i>Development of Certifiable Elements and Items List</i> to include a step-by-step process describing the approval/rejection procedure for items on the Certifiable Items List (CIL).	Angel Gonzalez (SAFE)	05/04/22	09/14/22
2. Contractor Oversight Documented Process	SAFE will develop and submit a documented process for SAFE contractor oversight.	Angel Gonzalez (SAFE)	05/04/22	09/28/22
3. Quality Audits Documented Process	SAFE will develop and submit a documented process to fulfill quality audit requirements for future projects which require safety certification.	Angel Gonzalez (SAFE)	05/04/22	10/26/22
4. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	10/26/22	12/02/22

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

SAFE

Angel Gonzalez

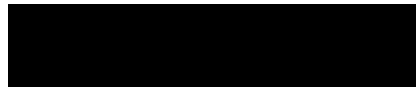


(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

SAFE

James R. Wojciechowski



(Signature/Date)

PURPOSE
AND SCOPE

On February 10, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Silver Line Safety Certification Oversight (SLSC) Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for QICO-SLSC-22-02.

FINDING

FQ-SLSC-21-04: Having a master repository of all project documents is essential in storing, organizing, tracing, and accessing project data.

REQUIRED
ACTION**QICO-SLSC-22-02****Office of Safety Certification and
Engineering (OSCE)**Low

Create and maintain a master repository throughout the project life cycle for all safety certification documents and records.

Measure: Document Control

Risk Category: Service Delivery [2,2]

ACTION PLAN OVERVIEW

A master repository will be created and maintained to retain safety certification records for all projects.

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.	Master Repository Documented Process	SAFE will identify a master repository and submit a documented process for document upload and storage of SAFE documentation including Certification related items.	Angel Gonzalez (SAFE)	05/04/22	10/05/22
2.	Implementation of Master Repository Documented Process	As per Actionable Item #1 (Master Repository Documented Process), SAFE will upload the applicable documents listed in the current Safety and Security Certification Program Plan (SSCPP) as they become finalized, to the identified master repository throughout the lifecycle of the project. SAFE will submit a sample of five different project assessment forms as the evidence of implementation and provide a read-only access for master repository verification.	Angel Gonzalez (SAFE)	10/05/22	01/25/23
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	01/25/23	02/24/23

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

SAFE

Angel Gonzalez



(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

SAFE

James R. Wojciechowski



(Signature/Date)

PURPOSE
AND SCOPE

On February 10, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Silver Line Safety Certification Oversight (SLSC) Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for QICO-SLSC-22-03.

FINDING

FQ-SLSC-21-05: Developing and maintaining the required training matrix for each safety and security certification position allows for uniformity and promotes compliance with all training requirements.

REQUIRED
ACTION

QICO-SLSC-22-03

*Office of Safety Certification and
Engineering (OSCE)*[Low](#)

Develop a training matrix for all safety and security certification positions.

Measure: Training *Risk Category:* [Service Delivery \[2,2\]](#)

ACTION PLAN OVERVIEW

The Office of Safety Certification and Engineering (OSCE) will develop and submit a training matrix to track the required training requirement for OSCE personnel. The training matrix will identify the required training for specific positions within OSCE.

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.	Training Matrix	The Office of Safety Certification and Engineering (OSCE) will develop and submit a training matrix which will identify and track the required training for all job positions within OSCE.	Angel Gonzalez (SAFE)	05/25/22	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

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

SAFE

Angel Gonzalez

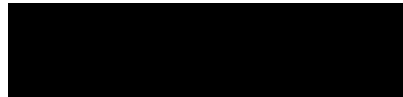


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SECOND-LEVEL RESPONSIBILITY

SAFE

James R. Wojciechowski



(Signature/Date)

CAR TRACK EQUIPMENT MAINTENANCE iCAPAs



Engineering & Maintenance

In response to the internal safety review report regarding the office of Car Track Equipment Maintenance (CTEM) the Office of Quality Assurance Internal Compliance & Oversight (QICO) have coordinated the development of five iCAPAs. The iCAPAs been developed to address the required actions and the associated findings.

EXECUTIVE LEADERSHIP COMMITMENT

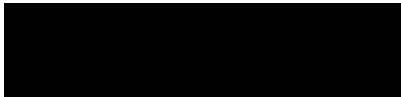
RESPONSIBLE PARTIES



Brian Dwyer

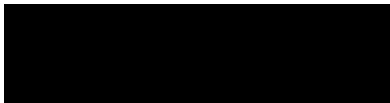
Executive Vice President & Chief Operating Officer

INTERNAL OVERSIGHT



Hakim Davis

Vice President, Quality Assurance, Internal Compliance & Oversight (QICO)



Eric Christensen

Executive Vice President, Internal Compliance (INCP)

PURPOSE
AND SCOPE

On May 12, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Car Track Equipment Maintenance (CTEM) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding and required action for **QICO-CTEM-22-01**.

FINDING

FS-CTEM-22-01: The utilization of a fall protection system supports a proactive safety management system and compliance with regulatory standards.

REQUIRED
ACTION**QICO-CTEM-22-01*****Car Track Equipment Maintenance (CTEM)***[3C Marginal/Occasional](#)

3C

Implement a fall protection system, which includes approved equipment, documented procedures, training, storage, and preventive maintenance requirements in all CTEM facilities.

Measure: Safety Risk Management, Safety Risk Mitigation 3, C

ACTION PLAN OVERVIEW

CTEM will obtain fall protection equipment to include the mobile gantry and lifeline retractors; and record that equipment as assets in Maximo. CTEM will establish a maintenance and inspection plan for their fall protection equipment in Maximo. All active CTEM supervisors and mechanics will receive On-the Job Training (OJT) on the use, maintenance, and inspection of fall protection equipment. CTEM will submit the asset record, maintenance plan document, and the training records as evidence.

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.	Obtain Fall Protection Equipment	CTEM will obtain the required fall protection equipment as listed in the Action Plan Overview. CTEM will submit evidence of obtaining the equipment.	Steven Redman (CTEM)	06/01/22	07/27/22
2.	Maintenance and Inspection Plan	As per Actionable Item #1 (Obtain Fall Protection Equipment), fall protection equipment will be recorded in Maximo and a periodic maintenance and inspection plan will be established. CTEM will provide the asset record and Maximo job plan.	Anthony LoCastro (CTEM)	07/27/22	09/14/22
3.	Training	TSMT will conduct training on the use and inspection of the Fall Protection System and related equipment for all active CTEM supervisors and mechanics. TSMT will submit Enterprise Learning Management (ELM) training records.	Bruce Lyons (TSMT)	07/27/22	09/28/22
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	09/28/22	10/28/22

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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**

CTEM

Steven Redman

(Signature/Date)

CTEM

Anthony LoCastro

(Signature/Date)

TSMT

Bruce Lyons

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

CMOR

Shushil Ramnaress

(Signature/Date)

TSMT

Joseph Robinson

(Signature/Date)

PURPOSE
AND SCOPE

On May 12, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Car Track Equipment Maintenance (CTEM) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the findings and required actions for **QICO-CTEM-22-02**.

FINDINGS

FS-CTEM-22-02: The inspection of fire extinguishers inside the Roadway Maintenance Machines (RMMs) promotes risk mitigation and compliance with regulatory standards.

FS-CTEM-22-04: Conducting regular and thorough inspections of maintenance facilities strengthens the ongoing risk management process and provide compliance with OSHA requirements.

FS-CTEM-22-06: The presence of designated Deputy Compliance Officers (DCOs) will enhance the process of hazard identification, mitigation, and compliance with existing environmental management policies.

REQUIRED
ACTION**QICO-CTEM-22-02*****Car Track Equipment Maintenance (CTEM)******3C Marginal/Occasional*****3C**

Develop and implement a plan to maintain compliance with safety and environmental regulations as it pertains to fire extinguisher inspections, facility safety inspections, and designation of compliance officers.

Measure: Safety Assurance, Compliance 3, C

ACTION PLAN OVERVIEW

CTEM will include Roadway Maintenance Machine (RMM) fire extinguisher inspections as part of the Quality Control (QC) inspection and will record the results on the CTEM supervisory QC inspection checklist. CTEM will submit a memo issued to supervisors outlining the requirements for fire extinguisher inspection and provide three months of completed checklists. CTEM will recruit and staff a Safety Coordinator who will be responsible for conducting periodic maintenance facility inspections and who will also be the Deputy Compliance Officer (DCO) certified to perform related duties. CTEM will submit three months of facility safety inspections and three months of environmental inspections for all five facilities.

Business Impact – Budget/Cost Estimate: Operating

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. Cost estimate - TBD



Actionable Items	Description	Responsible Party ¹	Est Start ²	Est End ³
1. RMM Fire Extinguisher Inspection	As part of the Quality Control (QC) inspection CTEM supervisors will include inspection of Roadway Maintenance Machines (RMMs) fire extinguishers. The inspection results will be recorded on the CTEM supervisory QC inspection checklist. CTEM will submit a memo issued to supervisors outlining the requirements for fire extinguisher inspection and submit three months of completed checklists.	Steven Redman (CTEM)	07/01/22	10/12/22
2. Recruit Safety Coordinator	CTEM will recruit and staff a Safety Coordinator who will be responsible for conducting periodic inspection at all maintenance facilities and will also be responsible for obtaining Deputy Compliance Officer (DCO) certification (in November 2023) and performing duties related to DCO. CTEM will submit the Position Control Number and proof of staffing as evidence.	Wayne Bolander (CMNT) Supporting Office⁴: Andrada Cuning (HC)	07/01/22	01/17/24
3. Inspection Reports	The CTEM Safety Coordinator will conduct and submit three months' worth of safety inspection reports for all five active CTEM facilities and three months' worth of DCO inspections for the five facilities.	Wayne Bolander (CMNT)	02/07/24	05/22/24
4. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	05/22/24	06/28/24

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RESPONSIBLE PARTIES

CTEM

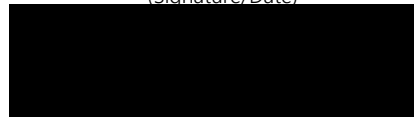
Steven Redman



(Signature/Date)

CMNT

Wayne Bolander

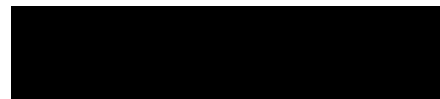


(Signature/Date)

SUPPORTING ROLE ACKNOWLEDGEMENT

HC

Andrada Cunning



(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

CMOR

Shushil Ramnaress



(Signature/Date)

PURPOSE
AND SCOPE

On May 12, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Car Track Equipment Maintenance (CTEM) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding(s) and required action for QICO-CTEM-22-03.

FINDING(S)

FS-CTEM-22-03: The creation and usage of standardized maintenance instruction manuals for all equipment will promote safe maintenance practices.

FS-CTEM-22-07: A Maintenance Control Plan (MCP) is essential for consistency and traceability of maintenance activities.

REQUIRED
ACTION

QICO-CTEM-22-03

Car Track Equipment Maintenance (CTEM)[2E Critical/Improbable](#)

2E

Required Action:

Establish and implement a comprehensive maintenance control plan and standardized manuals for all equipment.

Measure: Safety Assurance, Compliance 2, E

ACTION PLAN OVERVIEW

CTEM will review the documentation for the equipment they maintain and identify any missing procedures and instructions. Based on that review, CTEM will create standardized procedures and instructions for the identified equipment. CTEM will also develop and submit a Maintenance Control Plan (MCP).

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. Documentation Review	CTEM will review the documentation for the equipment they maintain as of the date of the report and identify any missing procedures and instructions. CTEM will provide a list of the missing documentation.	Anthony LoCastro (CTEM) Supporting Office: David Eisenhower (CENV)	07/01/22	09/07/22
2. Create Standardized Procedures and Instructions	As per Actionable Item #1 (Documentation Review), CTEM will create and submit standardized procedures and instructions. CTEM will submit documents as they are finalized.	Anthony LoCastro (CTEM) Supporting Office: David Eisenhower (CENV)	09/07/22	12/13/23
3. Maintenance Control Plan	CTEM will develop and submit a Maintenance Control Plan (MCP) in accordance with the PTASP.	Anthony LoCastro (CTEM) Supporting Office: David Eisenhower (CENV)	07/01/22	06/26/24
4. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	06/26/24	07/26/24

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RESPONSIBLE PARTIES

CTEM

Anthony LoCastro

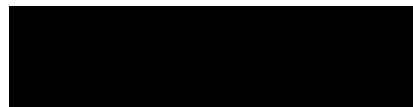


(Signature/Date)

SUPPORTING ROLE ACKNOWLEDGEMENT

CENV

David Eisenhower

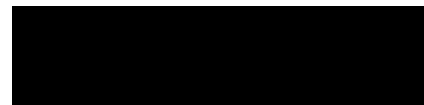


(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

CMOR

Shushil Ramnaress



(Signature/Date)

PURPOSE
AND SCOPE

On May 12, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Car Track Equipment Maintenance (CTEM) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for **QICO-CTEM-22-04**.

FINDING(S)

FS-CTEM-22-05: Performing shelf life inspections as outlined in the internal procedure prevents utilizing expired parts and materials.

REQUIRED
ACTION**QICO-CTEM-22-04*****Car Track Equipment Maintenance (CTEM)***[3C Marginal/Occasional](#)

3C

Develop a plan to maintain compliance with established shelf-life procedures.

Measure: Safety Assurance, Compliance 3, C

ACTION PLAN OVERVIEW

CTEM will develop and submit a documented procedure to include shelf life limitations and material inspection requirements. CTEM will provide three months' worth of shelf life inspections for each of the five active CTEM shops.

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.	Shelf Life Standard	CTEM will develop and submit a documented procedure to include shelf life limitations and material inspection requirements.	Anthony LoCastro (CTEM) Supporting Office⁴: (CENV) David Eisenhauer	07/01/22	07/26/23
2.	Shelf Life Inspections	CTEM will submit three months' worth of shelf life inspections per the five active CTEM shops.	Anthony LoCastro (CTEM)	08/02/23	11/15/23
3.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	11/15/23	12/15/23

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RESPONSIBLE PARTIES

CTEM

Anthony LoCastro



(Signature/Date)

SUPPORTING ROLE ACKNOWLEDGEMENT

CENV

David Eisenhower

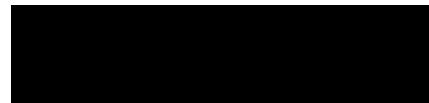


(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

CMOR

Shushil Ramnaress



(Signature/Date)

PURPOSE
AND SCOPE

On May 12, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Car Track Equipment Maintenance (CTEM) Internal Safety Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for **QICO-CTEM-22-05**.

FINDING

FS-CTEM-22-08: Completing Maximo work orders with specific data element promotes maintenance data quality and safety performance reporting.

REQUIRED
ACTION

QICO-CTEM-22-05

Car Track Equipment Maintenance (CTEM)[3C Marginal/Occasional](#)

3C

Develop and implement a process to improve work order data capture in Maximo for accuracy and consistency.

Measure: Safety Assurance, Safety Data Analysis 3, C

ACTION PLAN OVERVIEW

CTEM will review and revise the options for component codes chosen for Maximo work orders. CTEM will provide the revised list of component codes. CTEM will revise SOP 401-02 *Procedures for Recording Work Order(s) for Class 2 Rail Vehicles* to include review of component codes before the work order is closed. CTEM will submit the revised SOP.

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.	Maximo Component Code Review	CTEM will review and revise options available for component codes chosen for Maximo work orders. CTEM will submit the revised list of component codes and provide evidence of distribution to relevant parties.	Anthony LoCastro (CTEM)	07/01/22	12/14/22
2.	Update SOP	CTEM will update and submit SOP 401-02 Procedures for Recording Work Order(s) for Class 2 Rail Vehicles to include review of component codes before the work order is closed.	Anthony LoCastro (CTEM)	07/01/22	02/22/23
3.	Maximo Component Code Update	As per Actionable Item # 1 (Maximo Component Code Review), TAMO will revise component code options in Maximo and submit the updated component code list.	Billy Gannom (TAMO)	12/14/22	07/12/23
4.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	07/12/23	08/11/23

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RESPONSIBLE PARTIES

CTEM Anthony LoCastro

(Signature/Date)

TAMO Billy Gannom

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

CMOR Shushil Ramnaress

(Signature/Date)

TAMO Doojin Han

(Signature/Date)

ENGINEERING MODIFICATION INSTRUCTION iCAPAs



Engineering & Maintenance

In response to the Internal Review report regarding Engineering Modification Instruction (EMI), the Office of Engineering and Architecture(ENGA), Maintenance of Way Engineering (MOWE), 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



Andrew B. Off
Executive Vice President & Chief Infrastructure Officer

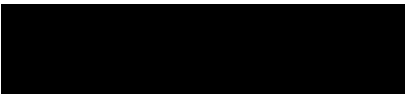
Date

INTERNAL OVERSIGHT



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

Date



Theresa M. Impastato
Executive Vice President & Chief Safety and Readiness Officer

Date

PURPOSE
AND SCOPE

On June 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Engineering Modification Instruction (EMI) Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated findings and required action for **QICO-EMI-22-01**.

FINDINGS

FQ-EMI-22-01: -Having well-defined criteria necessitating the utilization of an EMI and aligning the EMI SOP with governing P/Is would support process consistency.

FQ-EMI-22-02: -Adherence to established processes for emergency repair enhances process compliance and reduces potential safety risks.

REQUIRED
ACTION**QICO-EMI-22-01**

Maintenance of Way Engineering (MOWE)

Elevated

Office of Engineering and Architecture (ENGA)

Required Action:

Update SOP 114-02 to include clear circumstances of when an EMI is required and enforce adherence to P/I 4.14/3 instructions for emergency repairs.

Measure: Process Control / Identification & Traceability of Assets & Materials *Risk Category:* Service Delivery [4,4]

ACTION PLAN OVERVIEW

Update SOP 114-02, *Engineering Modification Instruction*, to include clear information of when an Engineering Modification Instruction (EMI) should be initiated (EMI is required in particular situations such as changes in materials or manufacture availability, improvements to materials, change of fit, form or function). Corrective actions will be applied to enforce adherence to the updated SOP 114-02 instructions for emergency repairs.

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. Update SOP 114-02	ENG A will update and submit SOP 114-02: <i>Engineering Modification Instruction</i> to reflect the following changes: • step-by-step instructions describing the criteria and requirements for initiating an EMI • will update SOP 114-02 to revise the section on addressing emergency repairs	Michelle Corum (ENG A)	03/01/23	05/03/23
2. SOP 114-02 Acknowledgment	ENG A will issue the updated SOP 114-02 <i>Engineering Modification Instruction</i> to applicable ENG A personnel (except ATCE), and MOWE. As per updated SOP 114-02, ENG A will submit an applicable personnel roster, and acknowledgements from 95% of active applicable personnel.	Michelle Corum (ENG A)	05/10/23	07/26/23
3. ENG A Enforcement and Evidence	ENG A will issue a memorandum to enforce adherence to the instruction's requirements for emergency repairs in accordance with SOP 114-02 <i>Engineering Modification Instruction</i>. ENG A will provide six months' worth of records of any emergency repairs performed in accordance with revised SOP 114-02.	Michelle Corum (ENG A)	07/26/23	02/21/24
4. SOP 114-02 Acknowledgment	MOWE will issue the updated SOP 114-02 <i>Engineering Modification Instruction</i> to applicable MOWE personnel. As per updated SOP 114-02, MOWE will submit an applicable personnel roster, and acknowledgements from 95% of active applicable personnel.	Moustapha Ouattara (MOWE)	05/10/23	07/26/23

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Actionable Items	Description	Responsible Party ¹	Est Start ²	Est End ³
5. MOWE Enforcement and Evidence	MOWE will issue a memorandum to enforce adherence to the instruction's requirements for emergency repairs in accordance with SOP 114-02 <i>Engineering Modification Instruction</i>. MOWE will provide six months' worth of records of any emergency repairs performed in accordance with revised SOP 114-02.	Moustapha Ouattara (MOWE)	07/26/23	02/21/24
6. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	02/21/24	03/22/24

**RESPONSIBLE PARTIES****ENGA****Michelle Corum**

(Signature/Date)

MOWE**Moustapha Ouattara**

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY**ENGA****Nichalos D. Gardner**

(Signature/Date)

RIME**Nathan Williams**

(Signature/Date)

RAIL**Michael J. Hass**

(Signature/Date)

PURPOSE
AND SCOPE

On June 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Engineering Modification Instruction (EMI) Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding and required action for **QICO-EMI-22-02**.

FINDING

FQ-EMI-22-03: Adherence to the established record storage process assures compliance and traceability of documents.

REQUIRED
ACTION**QICO-EMI-22-02****Maintenance of Way Engineering (MOWE)**Moderate**Office of Engineering and Architecture (ENGA)****Required Action:**

Enforce adherence to EMI record archive according to existing guidance of SOP 114-02 and ATC 4000.

Measure: Quality Records *Risk Category:* Service Delivery [3,3]

ACTION PLAN OVERVIEW

Configuration Management (CFGM) will update Documentum database and store completed EMIs in this repository.

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. Past EMI Records in Documentum	ENGA Configuration Management (CFGM) will store past and current completed EMI records in Documentum. CFGM will submit a list of completed EMIs from September 2020 to September 2023 and a link to Documentum where these EMIs are stored.	Michelle Corum (ENGA)	01/11/23	01/17/24
2. Enforcement and Evidence	ENGA will enforce adherence to the instructions of SOP 114-02 <i>Engineering Modification Instruction</i> through a Memorandum. As per the issued memorandum, ENGA will submit an applicable personnel roster, and acknowledgements from 95% of active applicable personnel.	Michelle Corum (ENGA)	05/03/23	09/13/23
3. Enforcement and Evidence	MOWE will enforce adherence to the following instructions of SOP 114-02 <i>Engineering Modification Instruction</i> through a Memorandum: <i>EMIs that have been approved and fully implemented shall be placed in the document repository Documentum.</i> As per the issued memorandum, MOWE will submit an applicable personnel roster, and acknowledgements from 95% of active applicable personnel.	Moustapha Ouattara (MOWE)	05/03/23	09/13/23
4. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	01/17/24	02/16/24

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**RESPONSIBLE PARTIES****ENGA****Michelle Corum**

(Signature/Date)

MOWE**Moustapha Ouattara**

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY**ENGA****Nichalos D. Gardner**

(Signature/Date)

RIME**Nathan Williams**

(Signature/Date)

RAIL**Michael J. Hass**

(Signature/Date)

PURPOSE
AND SCOPE

On June 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Engineering Modification Instruction (EMI) Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding and required action for **QICO-EMI-22-03**.

FINDING

FQ-EMI-22-04: Establishing a training and certification matrix for personnel promotes proper skill management.

REQUIRED
ACTION

QICO-EMI-22-03

Maintenance of Way Engineering (MOWE)

Office of Engineering and Architecture (ENGA)

Moderate

Required Action:

Develop a training matrix for all ENGA and MOWE roles.

Measure: Training *Risk Category:* Service Delivery [3,3]

ACTION PLAN OVERVIEW

ENGA & MOWE will each develop a training matrix which identifies all required training by job position for all personnel within each department. The training matrix must include the frequency for recertifications as required.

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. ENGA Training Matrix	ENG A will develop and submit a training matrix which identifies all required training by job position within ENGA.	Michelle Corum (ENG A)	12/01/22	09/27/23
2. MOWE Training Matrix	MOWE will develop and submit a training matrix which identifies all required training by job position within MOWE.	Moustapha Ouattara (MOWE)	12/01/22	09/27/23
3. ENGA Training Implementation	As per Actionable Item #1 (Training Matrix), ENGA will submit training records showing all active personnel have completed all the required training.	Michelle Corum (ENG A)	10/04/23	02/28/24
4. MOWE Training Implementation	As per Actionable Item #2 (Training Matrix), MOWE will submit training records showing all active personnel have completed all the required training.	Moustapha Ouattara (MOWE)	10/04/23	02/28/24
5. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	02/28/24	03/29/24

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**RESPONSIBLE PARTIES****ENGA****Michelle Corum**

(Signature/Date)

MOWE**Moustapha Ouattara**

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY**ENGA****Nichalos D. Gardner**

(Signature/Date)

RIME**Nathan Williams**

(Signature/Date)

RAIL**Michael J. Hass**

(Signature/Date)

PURPOSE
AND SCOPE

On June 23, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Engineering Modification Instruction (EMI) Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address associated finding and required action for **QICO-EMI-22-04**.

FINDING

FQ-EMI-22-05: Updating Policy Instructions and governing documents within the required frequency assures accuracy and efficiency.

REQUIRED
ACTION**QICO-EMI-22-04****Maintenance of Way Engineering (MOWE)**Moderate**Office of Engineering and Architecture (ENGA)****Required Action:**

Enforce revision of Policy Instructions and governing documents in accordance with the required revision periodicity and enforce implementation of SOP 121-10 document control guidelines.

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

ACTION PLAN OVERVIEW

ENGA and MOWE will revise the following outdated documents:

- P/I 1.20/0 *Configuration Change Control Board (CCCB)* (02/08/2019) (ENGA)
- P/I 4.10/4 *Configuration Control Management* (01/11/2019) (ENGA)
- P/I 4.14/3 *Design Control Board (DCB)* (01/15/2019) (ENGA)
- OAP 121-01 *Track Asset Condition Data Management* (Rev. 2, 09/20/2019) (MOWE)
- OAP 121-03 *Key Track Asset Management Programs Planning and Analysis* (Rev. 0, 09/20/2019) (MOWE)

MOWE will update the following documents in accordance with the SOP 121-10 document control guidelines:

- OAP 121-01 *Track Asset Condition Data Management* (Rev. 2, 09/20/2019)
- OAP 121-03 *Key Track Asset Management Programs Planning and Analysis* (Rev. 0, 09/20/2019)
- SOP 121-11 *Rail Grinding Procedure* (Rev. 0, 05/11/2021)
- SOP 121 -13 *Tamping and Surfacing Needs Analysis and Planning* (Rev. 0, 10/01/2021)

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. Update Documents	ENGA will update and submit the outdated documents in accordance with the action plan overview.	Michelle Corum (ENGA)	10/12/22	03/29/23
2. Update Documents	MOWE will update and submit the documents mentioned above in the action plan overview in accordance with SOP 121-10 <i>Document Control and Record Retention Procedures</i> .	Moustapha Ouattara (MOWE)	10/12/22	03/29/23
3. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	03/29/23	04/28/23

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**RESPONSIBLE PARTIES****ENGA****Michelle Corum**

(Signature/Date)

MOWE**Moustapha Ouattara**

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY**ENGA****Nichalos D. Gardner**

(Signature/Date)

RIME**Nathan Williams**

(Signature/Date)

RAIL**Michael J. Hass**

(Signature/Date)

STRUCTURES MAINTENANCE LEAK MITIGATION iCAPAs



Engineering & Maintenance

In response to the Internal Review report regarding Structures Maintenance Leak Mitigation Process, the Office of Track and Structure (TRST), the Office of Quality Assurance Internal Compliance & Oversight (QICO) have coordinated the development of three (3) iCAPAs. The iCAPAs have been developed to address the required actions and the associated findings.

EXECUTIVE LEADERSHIP COMMITMENT

RESPONSIBLE PARTIES

[Redacted Signature]

Andrew B. Off
Executive Vice President & Chief Infrastructure Officer

Date

INTERNAL OVERSIGHT

[Redacted Signature]

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

Date

[Redacted Signature]

Theresa M. Impastato
Executive Vice President & Chief Safety and Readiness Officer

Date

PURPOSE
AND SCOPE

On July 20, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Structures Maintenance Leak Mitigation Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated findings and required action for **QICO-STLM-22-01**.

FINDINGS

FQ-STLM-22-01: Defect reporting into the appropriate system of record in accordance with the Standard Operating Procedures supports accurate tracking and timely scheduling of leak mitigation activities.

FQ-STLM-22-02: Regularly reviewing, tracking, investigating, and documenting the status of aged work plans would promote on-time completion of scheduled work providing a good state of repair.

REQUIRED
ACTION**QICO-STLM-22-01****Track and Structures (TRST)****Elevated****Required Action:**

Appropriately reporting defects into the system of records, eliminating any duplicate work orders, performing regular reviews, and evaluating the status of aged work plans for accurate traceability.

Measure: Process Control *Risk Category:* Service Delivery [3,5]

ACTION PLAN OVERVIEW

TRST will enforce adherence to Standard Operating Procedure *208-07 Structures Inspection* and update *TRST 2000 Maintenance Control Plan* to include a step-by-step process for addressing aged work plans.

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. Memorandum Enforcing Adherence with SOP 208-07	TRST will issue a memorandum to TRST employees to enforce adherence to SOP 208-07 <i>Structures Inspection</i> Section 12.1.3 TRST Assets. TRST will submit a roster of applicable personnel and evidence of acknowledgement from 95% of active applicable personnel.	Yaser Cabral (TRST)	10/03/22	01/25/23
2. Perform Quality Assurance/Quality Control (QA/QC)	TRST will submit six months' worth of Maximo reports reflecting compliance to SOP 208-07 <i>Structures Inspection</i> Section 12.1.3 TRST Assets.	Yaser Cabral (TRST)	12/01/22	06/21/23
3. Aged Work Plans Verification/Reclassification	TRST will review aged work plans (past 90 days) to reclassify work plans to defects when appropriate and close any unnecessary work plans. TRST will submit a report of updating aged work plans based on reclassification.	Yaser Cabral (TRST)	10/03/22	04/05/23
4. Justification of Open Aged Work Plans	TRST will review all aged work plans (past 90 days) to determine if they should remain open, and either have them closed, or add a Work Order task and document why they should remain open. TRST will submit justification for aged work plans (past 90 days) that will remain open.	Rory Damico (TRST)	04/05/23	08/02/23
5. Update TRST 2000	TRST will update the TRST 2000 <i>Maintenance Control Plan</i> to include steps for addressing aged work plans past 90 days as determined by Action Items #3 and #4. TRST will submit the updated MCP.	Bruce Buck (TRST)	12/07/22	06/28/23

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

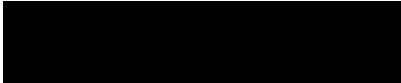
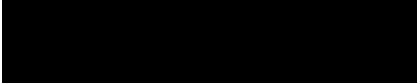
² Est Start – Estimated Start Date.

³ Est End – Estimated Completion Date.

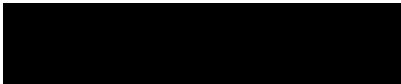
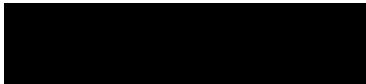


Actionable Items	Description	Responsible Party ¹	Est Start ²	Est End ³
6. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	08/02/23	09/01/23

RESPONSIBLE PARTIES

TRST	Yaser Cabral	
		(Signature/Date)
TRST	Bruce Buck	
		(Signature/Date)
TRST	Rory Damico	
		(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

TRST	Joseph Fowler	
		(Signature/Date)
RAIL	Nathan Williams	
		(Signature/Date)
RAIL	Michael J. Hass	
		(Signature/Date)

PURPOSE
AND SCOPE

On July 20, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Structures Maintenance Leak Mitigation Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for **QICO-STLM-22-02**.

FINDING

FQ-STLM-22-03: Following leak mitigation Work Instructions would support quality work, produce consistent results, and prevent employee injury.

REQUIRED
ACTION**QICO-STLM-22-02**

Track and Structures (TRST)

Moderate**Required Action:**

Follow the guidance provided in the Standard Operating Procedures and Work Instructions when performing job functions.

Measure: Process Control *Risk Category:* Safety [3,3]

ACTION PLAN OVERVIEW

TRST will enforce adherence to Work Instruction *MOWE-SOE-SMI-WI-44 Typical Leak Repair* by providing associated quality control checks to verify compliance.

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.	Quality Control Checks	TRST will complete quality control checks to verify leak mitigation repairs are compliant with Work Instruction MOWE-SOE-SMI-WI-44 <i>Typical Leak Repair</i> . TRST will submit three months' worth of completed leak mitigation repair quality control checklists.	Joseph Fowler (TRST)	10/03/22	03/29/23
2.	QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion.	QICO	03/29/23	04/28/23

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.



RESPONSIBLE PARTIES

TRST

Joseph Fowler

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

RAIL

Nathan Williams

(Signature/Date)

RAIL

Michael J. Hass

(Signature/Date)

PURPOSE
AND SCOPE

On July 20, 2022, the Office of Quality Assurance, Internal Compliance & Oversight (QICO) issued the Structures Maintenance Leak Mitigation Internal Review report. This internal Corrective and Preventive Action (iCAPA) is developed to address the associated finding and required action for **QICO-STLM-22-03**.

FINDING

FQ-STLM-22-04: Performing tool and equipment inspections prior to utilization enhances work production and decreases job hazards.

REQUIRED
ACTION**QICO-STLM-22-03**

Track and Structures (TRST)

Moderate**Required Action:**

Perform inspections and assure the removal of defective tools to avoid use at job locations.

Measure: Inspection, Measuring & Test Equipment *Risk Category:* Service Delivery [3,3]

ACTION PLAN OVERVIEW

TRST will issue a memorandum to enforce compliance with the *Metrorail Safety Rules and Procedures Handbook (MSRPH) Section 4.88 and 4.89: Material Handling and Storage*.

QICO will perform random field assessments of work locations and storage facilities to verify defective tools have been removed from service and properly tagged.

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. Memorandum Enforcing Adherence to the MSRPH	TRST will issue a memorandum to employees to enforce compliance with sections 4.88 and 4.89 Material Handling and Storage in the <i>MSRPH</i> to assure inspection and removal of defective tools prior to utilization. TRST will submit a roster of applicable personnel, and acknowledgements from 95% of active applicable personnel.	Joseph Fowler (TRST)	10/03/22	01/11/23
2. QICO CAP Verification Report	QICO will evaluate actionable items submitted to confirm there is evidence of completion. QICO will perform field assessments of TRST work locations and storage facilities to verify that defective equipment is tagged for repair or removal.	Wafaa Sabir (QICO)	01/11/23	02/10/23

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.

**RESPONSIBLE PARTIES**

TRST

Joseph Fowler

(Signature/Date)

SECOND-LEVEL RESPONSIBILITY

RAIL

Nathan Williams

(Signature/Date)

RAIL

Michael J. Hass

(Signature/Date)

SUPPLEMENTAL MATERIALS

APPENDIX A: 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:** Measures 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 fulfillment 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 B: QUALITY REVIEW RISK ASSESSMENT

Risk Assessment Methodology

QICO's risk assessment methodology is based on the [Metro Enterprise Risk Management \(ERM\) Framework and Internal Control Manual](#). 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 often does/will it happen? – The Probability of Occurrence
- How bad are the consequences? – The Impact
- Is the risk acceptable? – The Risk Treatment, Remediation

Risk Category	1 – Negligible	2 – Minor	3 – Moderate	4 – Significant	5 – Major
Financial Management Risk	Event does not affect core service objectives, business processes, or capital projects; financial impact is less than \$1M.	Failure to meet one or more core service, business process, or project objectives; financial loss of at least \$1M, but less than \$20M.	Failure to meet one or more core service, business process, or project objectives; financial loss of at least \$20M, but less than \$50M.	Failure to meet one or more core service, business process, or project objectives; financial loss of at least \$50M, but less than \$100M.	Failure to achieve core service, business process, or project objectives; financial losses greater than \$100M
Legal & Compliance Risk	Core service objectives are not affected by the event.	Core service objectives will fail unless corrective actions or business process improvements are implemented.	Significant intervention or scrutiny by independent authorities will disrupt delivery of core services.	Core service delivery is disrupted, resulting in material changes to business practices, turnover in key personnel, or increased scrutiny from authorities.	Core service delivery will be brought to a halt either voluntarily or involuntarily by regulatory authorities.
Reputation Risk	Event does not affect reputation or brand identity.	Event temporarily damages funding partner or customer relationships, resulting in decreased or missed funding and decline in ridership.	Event damages funding partner or customer relationships, resulting in decreased revenues, missed funding opportunities, or decline in ridership.	Event has a sustained effect on funding partner or customer relationships, resulting in decreased/missed funding and decline in ridership.	Event permanently affects funding partner or customer relationships, resulting in decreased/missed funding and decline in ridership.
Safety Risk*	Event does not affect individuals' health or productivity, nor does it damage the environment.	Event is expected to result in one or more of the following: injury or occupational illness that does not result in a lost workday, no loss of passenger/crew 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.	Event is expected to result in one or more of the following: injury or illness resulting in one or more lost workday(s), loss of passenger/crew 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.	Event is expected to result in one or more of the following: permanent partial disability, injuries/illness that results in hospitalization, loss of passenger/crew occupied volume with equipment damage that causes openings in structure, infrastructure damage that suspends service through the affected area for greater than 2 and up to 24 hours.	Event is expected to result in one or more of the following: death, permanent total disability, loss of passenger/crew occupied volume with equipment damage causing separations in structure, infrastructure damage that suspends service through the affected area for greater than 24 hours.

Risk Category	1 – Negligible	2 - Minor	3 - Moderate	4 – Significant	5 - Major
Service Delivery Risk	Disruption to core service, internal process, or project delivery is generally not noticeable.	Disruption to core service is temporary, although it could result in major declines in ridership or unplanned maintenance; or temporary failure to support a core business processes or meet project objectives.	Moderate disruption to core service or project delivery occurs, causing brief but substantial declines in ridership or substantial unplanned maintenance; or temporary substantial failure to support business processes or meet project objectives.	Significant disruption to core service delivery occurs (of up to twenty-four (24) hours), causing sustained declines in ridership or significant, unplanned maintenance; or lasting failure to execute a critical business processes or project objective.	Core service delivery is halted for more than twenty-four (24) hours, causing sustained, major declines in ridership or major unplanned maintenance; or lasting failure to execute multiple critical business processes or project objectives
Strategic Risk	Event has no noticeable effect on achievement of strategic initiatives or employee morale	Event slightly impairs or delays the achievement of strategic initiatives, or results redirection of resources to respond, slight damage to employee morale may also occur.	Event alters strategic initiatives, requiring a substantial redirection of resources from key areas, or resulting in decreased employee morale and higher attrition rates.	A complete change in strategy is required, requiring significant redirection of resources from key areas, or employee morale declines to the extent that achievement of objectives is at risk of failure.	Strategic objectives cannot be achieved with existing resources; Federal intervention is required, or employee morale declines to the extent that Metro cannot deliver its mission.
Technology Risk	Event causes no noticeable loss of availability, confidentiality, or integrity of information.	Event results in some loss of information availability, confidentiality, and integrity, and has a limited effect on core service delivery.	Event results in substantial loss of information availability, confidentiality, and integrity, and has a long-term effect on core service delivery.	Event results in a severe loss of information availability, confidentiality, and integrity, and has a long-term effect on core service delivery.	Event results in a catastrophic loss of information availability, confidentiality, and integrity, which impedes Metro's ability to deliver core services indefinitely

**Note: The above impact matrix is designed as a tool for entity-level risk assessments. The Metro ASP risk matrix was leveraged when defining the enterprise safety risk category impact descriptions. When risks are linked to the safety risk category, the Metro IRM tool allows for assessment of risk using both the enterprise and ASP frameworks to provide reporting and alignment for both frameworks.*

APPENDIX B: QUALITY REVIEW RISK ASSESSMENT

Risk Assessment Matrix

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

Risk Scale Definitions

Insignificant	Risk exposure is lower than targeted levels. Undesirable outcomes are remote. Risk response may include an evaluation of the opportunity to take on additional risk. Continue monitoring through ongoing management activities, separate evaluations, or both.
Low	Risk exposure is generally in line with targeted or expected levels. Undesirable outcomes are remote. Risk response is planned for in the normal course of business. Continue monitoring through ongoing management activities, separate evaluations, or both.
Moderate	Risk exposure is generally in line with targeted or expected levels. Undesirable outcomes are unlikely. Risk response is planned for in the normal course of business. Continue monitoring through ongoing management activities, separate evaluations, or both.
Elevated	Risk exposure is higher than targets and levels are approaching or at tolerance. Undesirable outcomes are possible. Additional risk response above plan is required. Requires Executive Risk Management Committee attention.
High	Risk exposure has exceeded levels willing to be tolerated. Undesirable outcomes are likely. Emergency response measures should be considered or may be required. Requires attention of the Risk Committee, GM/CEO, and the Board of Directors at GM's discretion.

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** – 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 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 (0% to 10%) | (4) Likely – Reasonable assumption that this risk will likely occur (61%-90%) |
| (2) Unlikely – Reasonable assumption that this risk will likely not occur (11% to 40%) | (5) Almost Certain – Reasonable assumption that this will occur (91%-100%) |
| (3) Possible – Reasonable assumption that this risk may occur (41% to 60%) | |

APPENDIX C: 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 D: SAFETY REVIEW RISK ASSESSMENT

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 Metro 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 workday(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 workday, 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 D: SAFETY REVIEW RISK ASSESSMENT

Risk Assessment Matrix

Frequent (A)	Risk Probability	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
Probability	Risk Severity				
	Severity	Catastrophic (1)	Critical (2)	Marginal (3)	Negligible (4)

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.